SEQUENCE LISTING

<110> KORBER, Bette
THEILER, James
FRUEH, Klaus
PICKER, Louis
BRUENING, Eric
MARSHALL, Emily

<120> HIV Vaccines

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<151> 2014-10-03

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<170> PatentIn version 3.5

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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
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Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
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Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
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Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
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Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly His Ser Asn Gln Val
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Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
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Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
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Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
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Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala
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Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
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Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
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Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Thr Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
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Ser Gly Val Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
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His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Lys Ile Ile Ala Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Ile Tyr Cys Val His Gln Arg Ile Glu Val Lys Xaa
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Glu Ala Gly Thr Gly Asn Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
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Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
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Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Val
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys His Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Ile Asn Xaa Ala Thr Val Met Xaa Gln Lys Gly Asp Tyr Arg Asn
370 375 380

Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile

385 390 395 400

Ala Lys Asn Cys Arg Ala Pro Xaa Lys Lys Gly Cys Trp Lys Cys Gly
405 410 415

Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
420 425 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
435 440 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu Ile
450 455 460

Phe Arg Phe Gly Glu Glu Thr Ala Pro Ser Gln Lys Gln Glu Arg Thr
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Asp Arg Asp Lys Glu Leu Tyr Pro Ser Ala Ala Leu Arg Ser Leu Phe
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Gly Asn Asp Pro Leu Ser Gln
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Leu Val Trp Xaa Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Thr Glu Gly Cys Lys Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Thr Leu Tyr Cys Val His Lys Asn Ile Asp Val Ala Asp
                85                  90                  95


Thr Lys Glu Xaa Leu Glu Lys Xaa Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Xaa Asn Asn Ser Gln Val
        115                 120                 125


Ser His Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Xaa Val Glu
145                 150                 155                 160


Glu Lys Ala Xaa Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
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180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Asp Glu
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Ala Ala Glu Trp Asp Arg Leu His Pro Pro Gln Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Xaa Thr Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Xaa Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Xaa Glu Pro Phe Arg Asp Tyr Val Xaa Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg

370 375 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Xaa Gly His
385 390 395 400

Ile Ala Arg Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Xaa Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Gln Thr Asp
465 470 475 480

Lys Glu Thr Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
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Pro Ser Ser Gln
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

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His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Ala Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Pro Glu Glu Leu Lys Ser Val Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Arg Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Arg Asn Ser
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220
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```
Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Val
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Ala Asn Ser Thr Thr Ile Met Met Gln Lys Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415
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Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Glu Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Gly Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro
465 470 475 480

Ile Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
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            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45
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Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Arg Ile Leu Gly Gln Xaa
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Asp Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
100 105 110

Lys Xaa Ala Gln Gln Ala Ala Ala Asp Thr Gly Xaa Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Xaa Val Ile Pro Met Phe Ser Ala Xaa Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

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Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Xaa Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Ile Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Xaa Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Cys
        355                 360                 365

Gln Ala Asn Ser Asn Thr Ile Met Met Gln Arg Gly Asn Phe Lys Ser
    370                 375                 380

Gln Arg Lys Xaa Val Lys Xaa Phe Asn Cys Gly Arg Glu Gly His Ile
385                 390                 395                 400

Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Val Asn Phe
            420                 425                 430
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Leu Gly Lys Xaa Trp Pro Ser Asn Lys Gly Arg Pro Gly Asn Phe Leu
435 440 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg Phe
450 455 460

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Ser Ser Gln

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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Xaa Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


His Pro Xaa Leu His Thr Gly Ser Glu Glu Leu Lys Ser Val Tyr Asn
65                  70                  75                  80
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Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ile Lys
            100                 105                 110

Lys Lys Val Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Xaa Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Pro Ala Gly Pro Ile Ala
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Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Xaa Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270
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Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Xaa Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Xaa Ala
                325                 330                 335

Leu Gly Pro Xaa Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ala Gly Ala Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ser Ile Lys Cys Phe Asn Xaa Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Arg Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Xaa Asp Cys Asn Glu Arg Gln Val Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460
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Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Thr Ile Asp
465 470 475 480

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485 490 495

Asn Asp Pro Ser Ser Gln
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His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Xaa Glu Gln Ile
50 55 60

Gln Pro Ser Leu Lys Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Pro Ala Ala Ala Asp Thr Gly Asn Asn Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
130 135 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

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Glu Arg Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Ser Asp Leu Asn Ile Met Leu Asn Thr Xaa Gly
            180                 185                 190

Gly His Gln Ala Xaa Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu Xaa Pro Val His Ala Gly Pro Xaa Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Xaa Ile Gly Trp Met Thr Gly Asn Pro Ala Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Xaa Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
```

```
Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Ala Ser Thr Asn Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Gly
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Ser Asp
                485                 490                 495

Pro Ala Ser Gln
            500
```

<210> 8
<211> 507
<212> PRT
<213> Human immunodeficiency virus

<220>

<221> misc_feature
<222> (118)..(118)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (127)..(127)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (140)..(140)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (149)..(149)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (195)..(195)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (298)..(298)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (372)..(372)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (465)..(465)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (472)..(472)
<223> Xaa can be any naturally occurring amino acid

<400> 8

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Xaa Ala Ala Asp Thr Gly Ser Ser Ser Xaa Val
        115                 120                 125

Ser Pro Val Ser Gln Asn Tyr Pro Ile Val Gln Xaa Met Gln Gly Gln
    130                 135                 140

Met Val His Gln Xaa Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Xaa Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205
```

```
Asn Glu Glu Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Xaa Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Xaa Val Thr Asn Ser Ala Asn Ile Met Met Gln Arg Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400
```

```
Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415


Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430


Gln Val Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445


Gly Asn Phe Phe Gln Ser Arg Leu Glu Ser Arg Pro Glu Pro Thr Ala
    450                 455                 460


Xaa Pro Glu Glu Ser Phe Arg Xaa Gly Glu Glu Thr Thr Thr Pro Pro
465                 470                 475                 480


Gln Lys Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu
                485                 490                 495


Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505


<210>  9
<211>  502
<212>  PRT
<213>  Human immunodeficiency virus


<220>
<221>  misc_feature
<222>  (485)..(485)
<223>  Xaa can be any naturally occurring amino acid

<400>  9

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
```

```
            20                  25                  30

His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Met Glu Gln Ile
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His His Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Gly
        115                 120                 125

Lys Val Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
```

210 215 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225 230 235 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
245 250 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
260 265 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
275 280 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
290 295 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305 310 315 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
325 330 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
340 345 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
355 360 365

Met Ser Gln Ala Thr Asn Ala Thr Thr Ile Met Met Gln Arg Gly Asn
370 375 380

Phe Arg Asn Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu
385 390 395 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp

405 410 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
420 425 430

Val Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro
465 470 475 480

Thr Asp Lys Asp Xaa Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 10
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (163)..(163)
<223> Xaa can be any naturally occurring amino acid

<400> 10

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ala Leu Arg Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Gln Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Ala Glu Gln Asn Glu Ser Lys
            100                 105                 110

Lys Lys Thr Gln Gln Ala Ala Ala Asp Pro Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Xaa Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Thr His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335


Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350


Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365


Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380


Asn Asn Lys Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Val Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Leu Glu Pro Ser Arg Pro Glu Pro Thr Ala Pro Pro
450 455 460

Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Pro Thr Pro Pro Gln Lys
465 470 475 480

Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Ser Ala Ser Leu Arg Ser
485 490 495

Leu Phe Gly Asn Asp Pro
500

<210> 11
<211> 507
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (8)..(8)
<223> Xaa can be any naturally occurring amino acid

<400> 11

Met Gly Ala Arg Ala Ser Val Xaa Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Ala Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ser Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ala Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Asp Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Asn Val Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Pro Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
```

```
Phe Leu Gly Arg Val Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Glu Pro Thr Ala Pro
    450                 455                 460


Pro Glu Glu Ser Phe Arg Phe Gly Gly Glu Thr Thr Thr Pro Ser Gln
465                 470                 475                 480


Arg Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Pro Leu Ala Ser Leu
                485                 490                 495


Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505


<210>  12
<211>  502
<212>  PRT
<213>  Human immunodeficiency virus

<400>  12

Met Gly Ala Arg Ala Ser Ile Leu Thr Gly Gly Gln Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Gly Gly Cys Arg Gln Ile Leu Lys Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80
```

```
Thr Val Ala Val Leu Tyr Cys Val His Gln Gln Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Gln Thr Gln Gln Ala Ala Ala Ala Ala Gly Thr Gly Asn Ser Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ala Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Asp Ile Tyr Lys Lys Trp Ile Ile Ile Gly Leu
            260                 265                 270
```

```
Asn Lys Ile Val Arg Met Tyr Ser Pro Ala Ser Ile Leu Asp Ile Lys
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Ser Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Ile Gln Lys Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu Ser
    450                 455                 460
```

```
Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Gln
465                 470                 475                 480


Thr Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495


Asn Asp Pro Ser Ser Gln
            500
```

<210> 13
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 13

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


His Pro Ser Leu Pro Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Val Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Gln Val
```

```
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Val
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
```

```
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Asn Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Asn Ser Thr Thr Ile Met Met Gln Arg Gly Asn Phe Arg Asn
    370                 375                 380

Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His Leu
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Gly Phe
    450                 455                 460

Gly Glu Glu Ile Val Thr Pro Ser Gln Lys Gln Glu Pro Lys Asp Lys
465                 470                 475                 480

Asp Leu Ser Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495

Ser Ser Gln
```

<210> 14
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 14

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asn Thr Gly Asn Asn Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160
```

```
Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
```

```
Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Ser Ser Asn Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Arg Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 15
<211> 498
<212> PRT
<213> Human immunodeficiency virus

<400> 15

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Ile Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ser Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ser Gln Gly Gln Met Ile His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro His Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Leu Arg
    370                 375                 380
```

```
Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Asn Arg Thr Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Thr Asp Lys Glu
465                 470                 475                 480


Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser
                485                 490                 495


Ser Gln



<210>  16
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus

<400>  16

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30
```

```
His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Thr Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335


Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350


Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365


Gln Val Thr Asn Pro Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380


Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Gln Lys Glu Gln Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 17
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 17

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn

65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Ile Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Ile His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys

```
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ser Thr Ala Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Thr Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Thr Ala Pro Pro Glu Glu
```

450 455 460

Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu
465 470 475 480

Thr Ile Asp Lys Glu Lys Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
485 490 495

Gly Asn Asp Pro Leu Ser Gln
500

<210> 18
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 18

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Lys Ile Ile Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

```
Lys Lys Ala Gln Pro Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Ile Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Ala Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Ile Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300
```

```
Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Ala Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn
    370                 375                 380

Phe Arg Ser Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser
    450                 455                 460

Phe Ser Phe Gly Glu Gly Thr Thr Ala Pro Ser Gln Lys Gln Glu Pro
465                 470                 475                 480

Thr Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495
```

Asn Asp Pro Ser Ser Gln
500

<210> 19
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 19

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Leu Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Arg Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Gln Asn
115 120 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Phe Gln Gly Gln Met
130 135 140

```
Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ala Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Asp Trp Met Thr His Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335
```

```
Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Asn Ser Gly Ala Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Lys Gln Val
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu
    450                 455                 460

Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln
465                 470                 475                 480

Glu Pro Ile Asp Lys Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495

Asn Asp Pro Leu Ser Gln
            500
```

<210> 20
<211> 503
<212> PRT

<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (112)..(112)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (118)..(118)
<223> Xaa can be any naturally occurring amino acid

<400> 20

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Ser Ser Asn Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ser Leu Lys Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Xaa
100 105 110

Lys Lys Ala Gln Gln Xaa Ala Ala Ala Ala Ala Asp Thr Gly Ser Ser
115 120 125

Asn Gln Thr Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln

```
    130                 135                 140

Met Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Gly Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Val Met Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
```

325 330 335

Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Ser Ala
340 345 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
355 360 365

Ala Met Ser Gln Val Thr Asn Ser Ala Thr Val Met Met Gln Arg Gly
370 375 380

Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys
385 390 395 400

Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
405 410 415

Trp Lys Cys Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
420 425 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
435 440 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
450 455 460

Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu
465 470 475 480

Pro Arg Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
485 490 495

Gly Asn Asp Pro Ser Ser Gln
500

<210> 21

<211> 504
<212> PRT
<213> Human immunodeficiency virus

<400> 21

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Ile
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Met Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Gln Lys Ala Gln Arg Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn
        115                 120                 125

Ser Asn Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly
    130                 135                 140

Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175
```

```
Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala
    210                 215                 220

Gly Pro Val Ala Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser
                245                 250                 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp
        275                 280                 285

Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Leu Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
        355                 360                 365
```

```
Glu Ala Met Ser Gln Met Thr Asn Ser Ala Thr Val Met Met Gln Arg
    370                 375                 380

Gly Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly
                405                 410                 415

Cys Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu
            420                 425                 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
        435                 440                 445

Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala
    450                 455                 460

Glu Ser Phe Gly Phe Gly Glu Gly Thr Thr Ala Pro Ser Gln Lys Gln
465                 470                 475                 480

Asp Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu
                485                 490                 495

Phe Gly Asn Asp Pro Ser Ser Gln
            500
```

<210> 22
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 22

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Trp
1               5                   10                  15
```

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr His Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Thr Gln Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Glu Asn Asn Lys Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205
```

```
Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Met Ser Thr Ser Pro Ala Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400
```

```
Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ala His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Thr Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500
```

<210> 23
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 23

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45
```

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Gly Val Gln Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Val Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Ala Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ser Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
```

Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 24
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 24

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp

85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Val Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly

```
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ser Ser Thr Val Leu Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
```

465 470 475 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Leu Ser Gln
500

<210> 25
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 25

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Gly Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Asn Pro Val
115 120 125

```
Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Pro Gln Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Ala Val
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Arg Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320
```

```
Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Lys Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Ala Ser Ala Ala Ile Met Met Gln Arg Gly Asn Tyr Arg
    370                 375                 380

Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu
465                 470                 475                 480

Thr Ile Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Ser Ser Gln
            500
```

<210> 26
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 26

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Ala Glu Lys Ser Gln Ala Ser
        115                 120                 125


Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln
    130                 135                 140


Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145                 150                 155                 160
```

```
Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190

His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala Pro
    210                 215                 220

Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240

Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro
                245                 250                 255

Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
            260                 265                 270

Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Val Leu Arg
    290                 295                 300

Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350
```

```
Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Val Thr Asn Ser Ala Thr Val Met Met Gln Arg Gly Asn Pro Arg Asn
    370                 375                 380

Gln Arg Arg Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Lys Asn Cys Arg Ala Pro Arg Arg Arg Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Pro Pro Glu Ser Phe Gly
    450                 455                 460

Phe Gly Glu Glu Thr Ala Ala Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 27
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 27

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Val Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Ala Val Ala Val Leu Tyr Cys Val His Gln Gly Met Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Glu Ala Gly Thr Gly Asn Ser Ser Gln Ile
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Asn Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Ser Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Gly Pro Ala Ala Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380
```

```
Pro Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Leu Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Val Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Arg Asp
465                 470                 475                 480


Gln Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500
```

<210> 28
<211> 498
<212> PRT
<213> Human immunodeficiency virus

<400> 28

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
```

```
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Met Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Val Glu Ile Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Arg Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Thr Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
```

```
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Arg Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
```

420 425 430

Phe Leu Gly Lys Ile Trp Ser Ser Gln Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Arg Phe Arg
450 455 460

Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys Glu
465 470 475 480

Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser
485 490 495

Leu Gln

<210> 29
<211> 498
<212> PRT
<213> Human immunodeficiency virus

<400> 29

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Ile Gly Gln Leu
50 55 60

Gln Pro Ser Leu Lys Thr Gly Ser Glu Glu Ile Lys Ser Leu Tyr Asn
65 70 75 80

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Ser Lys
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140

His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Asn Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Ile
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270
```

```
Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Gly Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Thr Pro Pro Ala Ile Met Met Gln Lys Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu Ser Phe
    450                 455                 460
```

```
Gly Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Ser Arg
465                 470                 475                 480


Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
                485                 490                 495


Asp Pro
```

<210> 30
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 30

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Gly Gly Cys Lys Gln Ile Met Glu Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80


Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110
```

```
Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Arg Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ser Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Ile Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Ser Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Pro Ser Gln Lys Lys Glu Gln Ile Asp Lys
465                 470                 475                 480

Glu Leu Tyr Pro Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495
```

Pro Ser Ser Gln
500

<210> 31
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 31

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Gln Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Phe Arg
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
85 90 95

Thr Lys Asp Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Val Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

```
Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gly Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220


Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Asp Asn Phe Lys
    370                 375                 380

Asn Gln Arg Arg Ile Val Lys Cys Phe Asn Cys Gly Lys Val Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Arg Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Ala Ala Ala Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 32
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 32

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Ala Glu Lys Ser Gln Ala Ser
        115                 120                 125


Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln
    130                 135                 140


Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145                 150                 155                 160


Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu
                165                 170                 175


Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
```

```
            180                 185                 190

His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala Pro
    210                 215                 220

Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240

Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro
                245                 250                 255

Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
            260                 265                 270

Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Val Leu Arg
    290                 295                 300

Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Val Thr Asn Ser Ala Thr Val Met Met Gln Arg Gly Asn Pro Arg Asn
```

370 375 380

Gln Arg Arg Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385 390 395 400

Ala Lys Asn Cys Arg Ala Pro Arg Arg Arg Gly Cys Trp Lys Cys Gly
405 410 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
420 425 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
435 440 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Pro Pro Glu Ser Phe Gly
450 455 460

Phe Gly Glu Glu Thr Ala Ala Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 33
<211> 509
<212> PRT
<213> Human immunodeficiency virus

<400> 33

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Ile Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Phe Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Thr Gly Asn Ser Asn Pro Gly
        115                 120                 125

Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly
    130                 135                 140

Gln Met Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Ser Ala Leu Ala Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala
    210                 215                 220
```

```
Gly Pro Ile Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr His
                245                 250                 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp
        275                 280                 285

Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Arg Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg
    370                 375                 380

Gly Asn Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly
                405                 410                 415
```

```
Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Ser Glu
            420                 425                 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
        435                 440                 445

Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala
    450                 455                 460

Glu Ser Phe Leu Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln
465                 470                 475                 480

Glu Pro Ile Lys Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala
                485                 490                 495

Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505
```

<210> 34
<211> 509
<212> PRT
<213> Human immunodeficiency virus

<400> 34

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
    50                  55                  60
```

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Arg Ser Lys
            100                 105                 110

Lys Gln Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Ser Gln
        115                 120                 125

Ala His Ser Ser Gln Val Ser Gln Val Ser Gln Asn Tyr Pro Ile Val
    130                 135                 140

Gln Asn Met Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr
145                 150                 155                 160

Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu
                165                 170                 175

Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp
            180                 185                 190

Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln
        195                 200                 205

Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu
    210                 215                 220

His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro
225                 230                 235                 240

Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile
                245                 250                 255
```

```
Gly Trp Met Thr Asn Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys
            260                 265                 270

Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro
        275                 280                 285

Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp
    290                 295                 300

Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln
305                 310                 315                 320

Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn
                325                 330                 335

Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu
            340                 345                 350

Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys
        355                 360                 365

Ala Arg Val Leu Ala Glu Ala Met Ser Gln Val Thr Asn Ser Ala Thr
    370                 375                 380

Ile Met Met Gln Lys Gly Asn Phe Arg Asn Pro Arg Lys Thr Val Lys
385                 390                 395                 400

Cys Phe Asn Cys Gly Lys Asp Gly His Ile Ala Arg Asn Cys Arg Ala
                405                 410                 415

Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met
            420                 425                 430

Lys Asp Cys Asn Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro
        435                 440                 445
```

```
Ser His Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro
    450                 455                 460


Ser Ala Pro Pro Ala Glu Ser Phe Lys Phe Gly Glu Glu Thr Thr Thr
465                 470                 475                 480


Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys Glu Met Tyr Pro Leu Ala
                485                 490                 495


Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
            500                 505


<210>  35
<211>  501
<212>  PRT
<213>  Human immunodeficiency virus

<400>  35

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Ala Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Ile Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95
```

```
Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Val Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Ala His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Gln Asn Pro Pro Ile
                245                 250                 255

Gln Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ile Ala Thr Pro Pro Ala Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Gly Gln Arg Lys Val Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Pro Arg
465                 470                 475                 480
```

Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 36
<211> 521
<212> PRT
<213> Human immunodeficiency virus

<400> 36

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Arg Ala Gln Gln Ala Ala Ala Gln Gln Ala Ala Ala Ala Ala Asp
115 120 125

Thr Gly Asn Arg Asn Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn

```
    130                 135                 140

Leu Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn
145                 150                 155                 160

Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile
                165                 170                 175

Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn
            180                 185                 190

Thr Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu
        195                 200                 205

Lys Glu Thr Ile Asn Glu Glu Ala Ala Asp Trp Asp Arg Thr Gln Pro
    210                 215                 220

Val His Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly
225                 230                 235                 240

Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Val Ala Trp
                245                 250                 255

Met Thr Ser Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp
            260                 265                 270

Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser
        275                 280                 285

Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val
    290                 295                 300

Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val
305                 310                 315                 320

Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp
```

325 330 335

Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu
340 345 350

Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg
355 360 365

Val Leu Ala Glu Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met
370 375 380

Met Gln Arg Gly Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe
385 390 395 400

Asn Cys Gly Lys Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg
405 410 415

Lys Lys Gly Cys Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp
420 425 430

Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly Arg Ile Trp Pro Ser His
435 440 445

Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala
450 455 460

Pro Leu Glu Glu Ser Phe Arg Ser Arg Pro Glu Pro Thr Ala Pro Pro
465 470 475 480

Ala Glu Ser Phe Arg Phe Gly Glu Glu Ala Ala Ala Pro Ser Gln Lys
485 490 495

Arg Glu Pro Thr Asp Gln Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser
500 505 510

Leu Phe Gly Asn Asp Pro Ser Ser Gln

515 520

<210> 37
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 37

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Arg Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Asp Thr Gly Asn Ser Asn Gln
115 120 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
130 135 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145 150 155 160

```
Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350
```

```
Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe
    370                 375                 380

Arg Ser Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Arg Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460

Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Asn Pro Glu Met Arg
465                 470                 475                 480

Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
                485                 490                 495

Asp Pro Ser Ser Gln
            500
```

<210> 38
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 38

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Lys Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Gln Lys Thr Gln Gln Ala Ala Ala Gly Gly Asn Ser Ser Gln Val Ser
        115                 120                 125

Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His Gln
    130                 135                 140

Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190
```

```
His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala Pro
    210                 215                 220

Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240

Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile Pro
                245                 250                 255

Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
            260                 265                 270

Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg
    290                 295                 300

Ala Glu Gln Ala Ser Gln Glu Val Lys His Trp Met Thr Glu Thr Leu
305                 310                 315                 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Lys Asn
    370                 375                 380
```

```
Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400


Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415


Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Val Asn Phe
            420                 425                 430


Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445


Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
    450                 455                 460


Gly Glu Glu Thr Thr Thr Pro Ala Gln Lys Gln Glu Pro Ile Asp Lys
465                 470                 475                 480


Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495


Ser Ser Gln
```

<210> 39
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (383)..(383)
<223> Xaa can be any naturally occurring amino acid

<400> 39

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                   10                  15
```

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Met Glu Gln Ile
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Gly Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205
```

```
Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Ala Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Xaa Arg
    370                 375                 380

Ser Gln Lys Arg Met Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400
```

```
Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Met Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Met Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
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<210> 40
<211> 509
<212> PRT
<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<220>
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<220>
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<220>
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<220>
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<220>
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<220>
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<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (492)..(492)
<223> Xaa can be any naturally occurring amino acid

<400> 40

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Gln Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Xaa Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ser Leu Lys Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80


Thr Xaa Ala Thr Leu Tyr Cys Val Leu Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Xaa Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Thr Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Arg Ser
        115                 120                 125


Pro Val Ser Gln Gly Ser Xaa Gln Val Ser Gln Asn Tyr Pro Ile Val
    130                 135                 140


Gln Asn Leu Gln Gly Gln Met Val His Gln Pro Leu Ser Pro Arg Thr
145                 150                 155                 160


Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu
```

165 170 175

Val Ile Pro Met Phe Ser Xaa Leu Ser Glu Gly Ala Thr Pro Gln Asp
180 185 190

Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln
195 200 205

Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu
210 215 220

His Pro Val His Ala Gly Pro Ala Ala Pro Gly Gln Met Arg Glu Pro
225 230 235 240

Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile
245 250 255

Gly Trp Met Thr Xaa Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys
260 265 270

Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Xaa
275 280 285

Val Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Xaa Phe Arg Asp
290 295 300

Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Thr Gln
305 310 315 320

Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Xaa Asn
325 330 335

Pro Asp Cys Xaa Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu
340 345 350

Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys

355 360 365

Ala Arg Val Leu Ala Glu Ala Met Ser Gln Xaa Thr Gly Ser Ala Thr
370 375 380

Ile Met Met Gln Lys Gly Asn Phe Arg Asn Gln Arg Lys Xaa Val Lys
385 390 395 400

Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala
405 410 415

Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Leu
420 425 430

Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro
435 440 445

Ser His Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro
450 455 460

Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Ala Met
465 470 475 480

Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys Glu Xaa Tyr Pro Leu Ala
485 490 495

Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 41
<211> 497
<212> PRT
<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (381)..(381)
<223> Xaa can be any naturally occurring amino acid

<400> 41

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Ile Glu Gln Leu
    50   55   60

Gln Pro Ser Leu Gln Val Gly Ser Glu Glu Ile Lys Ser Leu Tyr Asn
65   70   75   80

Thr Val Ala Thr Leu Tyr Cys Val His Lys Lys Ile Asp Val Lys Asp
                85   90   95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Lys Asn Arg Ser Lys
            100   105   110

Lys Xaa Ala Gln Gln Ala Ala Ala Asp Ser Ser Gln Val Ser Gln Asn
        115   120   125

Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala Leu
    130   135   140

```
Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala
145                 150                 155                 160

Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly Ala
                165                 170                 175

Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln
            180                 185                 190

Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu
        195                 200                 205

Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln
    210                 215                 220

Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu
225                 230                 235                 240

Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro Val Gly
                245                 250                 255

Glu Xaa Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg
            260                 265                 270

Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu
        275                 280                 285

Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu
    290                 295                 300

Gln Cys Thr Gln Asp Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val
305                 310                 315                 320

Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro
                325                 330                 335
```

```
Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly
            340                 345                 350

Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Ala Thr
        355                 360                 365

Thr Pro Ala Ala Ile Met Met Gln Arg Gly Asn Phe Xaa Asn Gln Arg
    370                 375                 380

Lys Thr Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His Ile Ala Lys
385                 390                 395                 400

Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Lys Glu
                405                 410                 415

Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly
            420                 425                 430

Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser
        435                 440                 445

Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu
    450                 455                 460

Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Arg Asp Lys Asp Leu
465                 470                 475                 480

Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser
                485                 490                 495

Gln
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<210> 42
<211> 504

<212> PRT
<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (435)..(435)
<223> Xaa can be any naturally occurring amino acid

<400> 42

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Xaa Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

```
Lys Lys Ala Gln Gln Ala Ala Pro Gln Ala Ala Ala Gly Ala Gly Asn
        115                 120                 125

Asn Ser Gln Val Ser Tyr Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly
    130                 135                 140

Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala
    210                 215                 220

Gly Pro Thr Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser
                245                 250                 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp
        275                 280                 285

Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300
```

```
Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Xaa Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser Gln Ala Gln Ser Ser Ala Asn Met Met Met Gln Arg
    370                 375                 380

Gly Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly
                405                 410                 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu
            420                 425                 430

Arg Gln Xaa Asn Phe Leu Gly Lys Leu Trp Pro Ser His Lys Gly Arg
        435                 440                 445

Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu
    450                 455                 460

Glu Ser Phe Lys Phe Gly Gly Glu Thr Thr Thr Pro Pro Gln Lys Gln
465                 470                 475                 480

Glu Pro Ile Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu
                485                 490                 495
```

Phe Gly Asn Asp Pro Ser Ser Gln
            500

<210> 43
<211> 510
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (90)..(90)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (139)..(139)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (163)..(163)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (169)..(169)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (368)..(368)
<223> Xaa can be any naturally occurring amino acid

<400> 43

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Pro Thr Gly Ser Glu Glu Ile Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Xaa Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Ile Lys Ala Gln Gln Ala Ala Ala Gln Gln Ala Ala Ala Ala Thr Gly
        115                 120                 125

Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Xaa Gln Asn Leu Gln Gly
    130                 135                 140

Gln Met Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Xaa Glu Glu Lys Ala Phe Xaa Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Asp Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala
    210                 215                 220

Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240
```

```
Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn
                245                 250                 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp
        275                 280                 285

Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Xaa
        355                 360                 365

Glu Ala Met Ser Gln Val Gln Asn Ser Asn Ala Ile Met Met Gln Arg
    370                 375                 380

Gly Asn Phe Lys Thr Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly
                405                 410                 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Thr
            420                 425                 430
```

Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly
        435   440   445

Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro
    450   455   460

Glu Glu Ser Phe Arg Phe Gly Glu Glu Ala Ala Ala Pro Ser Gln Lys
465   470   475   480

Gln Glu Pro Met His Lys Glu Lys Gln Glu Pro Arg Asp Lys Glu Leu
                485   490   495

Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
            500   505   510

<210> 44
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<220>
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<220>
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 44

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Arg Ile Arg Leu Arg Pro Gly Gly Asn Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110


Asn Lys Ala Gln Gln Ala Xaa Ala Gly Thr Gly Asn Asn Ser Gln Ala
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Xaa Gln Met Val His
    130                 135                 140


Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
```

165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Xaa Gly Glu Xaa Tyr Lys Arg Trp Ile Ile Xaa Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser

```
        355                 360                 365

Gln Val Thr Asn Ser Ala Ala Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Lys Gln Arg Asn Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Val Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu
465                 470                 475                 480

Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Leu Ser Gln
            500
```

<210> 45
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<400> 45

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15
```

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Arg Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ala Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205
```

```
Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Ile Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Ser Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Lys Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ala Thr Met Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400
```

```
Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro
    450                 455                 460

Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Leu Gln Lys
465                 470                 475                 480

Gln Glu Gln Thr Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser
                485                 490                 495

Leu Phe Gly Asn Asp Pro Ser Ser Thr
            500                 505
```

<210> 46
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 46

```
Met Gly Ala Arg Ala Ser Val Leu Arg Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45
```

```
Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Glu Ser Lys
            100                 105                 110

Lys Lys Ala Gln Arg Gln Ala Ala Glu Ala Asp Pro Gly Lys Asn Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Asn Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240
```

```
Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Asn Gln Ala Asn Ser Ala Ala Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Lys Asn Gln Arg Arg Thr Ile Lys Cys Phe Asn Cys Gly Arg Glu Gly
385                 390                 395                 400

His Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430
```

```
Asn Phe Leu Gly Lys Ile Trp Pro Ser Leu Lys Gly Arg Pro Gly Asn
        435                 440                 445


Phe Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu Ser Phe
    450                 455                 460


Gly Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile
465                 470                 475                 480


Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Ser
                485                 490                 495


Asp Pro Ser Ser Gln
            500


<210>  47
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus

<400>  47

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Leu Lys Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80
```

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Ser Ile Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Val Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Val
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Gly
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Asp Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu
    450                 455                 460
```

Ser Phe Arg Phe Gly Glu Glu Ala Ala Ala Pro Pro Gln Lys Gln Glu
465 470 475 480

Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
485 490 495

Gly Asn Asp Pro
500

<210> 48
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 48

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Thr Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Gln Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser

```
        115                 120                 125

Asn Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met
    130                 135                 140

Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gly Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
```

```
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Cys Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Arg Asp Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Gly Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser
    450                 455                 460

Phe Thr Phe Gly Glu Glu Ala Ala Thr Pro Ser Gln Lys Gln Glu Thr
465                 470                 475                 480

Arg Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495

Asn Asp Pro Ser Ser Gln
```

500

<210> 49
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (129)..(129)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (228)..(228)
<223> Xaa can be any naturally occurring amino acid

<400> 49

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

```
Lys Lys Val Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Ser Ser Ser
        115                 120                 125


Xaa Gln Val Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140


Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160


Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175


Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190


Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205


Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220


Pro Ile Ala Xaa Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240


Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn
                245                 250                 255


Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270


Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285


Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300
```

```
Arg Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Asn Pro Thr Asn Ile Met Met Gln Arg Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Gln Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Pro Gln Gly Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Ser Gly Glu Glu Thr Ala Thr Pro Ser Gln Arg Gln Glu
465                 470                 475                 480

Thr Val Asp Lys Glu Leu Tyr Pro Pro Leu Thr Ser Leu Arg Ser Leu
                485                 490                 495
```

Phe Gly Ser Asp Pro Ser Ser Gln
            500

<210> 50
<211> 508
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (84)..(84)
<223> Xaa can be any naturally occurring amino acid

<400> 50

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1   5   10   15

Glu Lys Ile Ser Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20   25   30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Met Glu Gln Leu
    50   55   60

Gln Pro Ala Leu Arg Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65   70   75   80

Thr Val Ala Xaa Leu Tyr Cys Val His Gln Arg Ile Gln Ile Lys Asp
                85   90   95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100   105   110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Gln Gly
        115   120   125

```
Asn Asn Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln
    130                 135                 140

Gly Gln Met Val His Gln Ala Met Ser Pro Arg Thr Leu Asn Ala Trp
145                 150                 155                 160

Val Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met
                165                 170                 175

Phe Ala Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
            180                 185                 190

Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu
        195                 200                 205

Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Met His Pro Val His
    210                 215                 220

Ala Gly Pro Leu Pro Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp
225                 230                 235                 240

Ile Ala Gly Thr Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr
                245                 250                 255

Ser Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile
            260                 265                 270

Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu
        275                 280                 285

Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg
    290                 295                 300

Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn
305                 310                 315                 320
```

```
Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys
                325                 330                 335

Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met
            340                 345                 350

Thr Ala Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu
        355                 360                 365

Ala Glu Ala Met Ser Gln Val Asn Asn Ser Ala Ala Ile Met Met Gln
    370                 375                 380

Lys Gly Asn Phe Arg Asn Gln Lys Lys Ile Pro Lys Cys Phe Asn Cys
385                 390                 395                 400

Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg
                405                 410                 415

Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr
            420                 425                 430

Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly
        435                 440                 445

Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro
    450                 455                 460

Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro
465                 470                 475                 480

Ser Gln Lys Gln Glu Ser Gly Asn Lys Glu Leu Tyr Pro Leu Ala Ser
                485                 490                 495

Leu Arg Ser Leu Phe Gly Ser Asp Pro Ser Ser Gln
            500                 505
```

<210> 51
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<400> 51

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Ala Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Asn Lys Arg Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Ile Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Lys Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110


Glu Lys Ala Gln Gln Ala Ala Ala Asn Thr Gly Asn Ser Gly Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160
```

```
Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Asn Pro
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
```

```
Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Thr Ala Ala Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Val Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Gln Gln Lys Gln Ala Pro Pro Gln
465                 470                 475                 480

Lys Gln Glu Pro Thr Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg
                485                 490                 495

Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505
```

<210> 52
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<400> 52

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15

Glu Lys Ile Arg Ile Ser Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Gln Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Phe Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Gln Ile Glu Glu Glu Gln Thr Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Gln Gln Ala Ala Ala Ala Ala
        115                 120                 125

Glu Thr Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met
    130                 135                 140

Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala
145                 150                 155                 160

Trp Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro
                165                 170                 175

Met Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr
            180                 185                 190
```

```
Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys
        195                 200                 205

Asp Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val
    210                 215                 220

His Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Lys Gly Ser
225                 230                 235                 240

Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met
                245                 250                 255

Thr His Ile Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile
            260                 265                 270

Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile
        275                 280                 285

Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp
    290                 295                 300

Arg Phe Tyr Arg Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys
305                 310                 315                 320

Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys
                325                 330                 335

Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met
            340                 345                 350

Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val
        355                 360                 365

Leu Ala Glu Ala Met Ser Gln Val Thr Gly Ser Ala Thr Ile Met Met
    370                 375                 380
```

Gln Lys Gly Asn Phe Arg Asn Gln Arg Lys Met Val Lys Cys Phe Asn
385 390 395 400

Cys Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys
405 410 415

Arg Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys
420 425 430

Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys
435 440 445

Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro
450 455 460

Pro Glu Glu Ser Phe Arg Ser Gly Glu Glu Thr Thr Ala Pro Ser Gln
465 470 475 480

Lys Gln Glu Pro Lys Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg
485 490 495

Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 53
<211> 508
<212> PRT
<213> Human immunodeficiency virus

<400> 53

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro

```
        35                  40                  45

Gly Leu Leu Glu Thr Pro Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Asn Ile Glu Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Arg Asn Ser Gly Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu
    130                 135                 140

Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala
145                 150                 155                 160

Trp Val Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro
                165                 170                 175

Met Phe Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr
            180                 185                 190

Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys
        195                 200                 205

Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Met His Pro Val
    210                 215                 220

His Ala Gly Pro Ala Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser
```

225 230 235 240

Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met
245 250 255

Thr Gly Asn Pro Pro Val Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile
260 265 270

Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile
275 280 285

Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp
290 295 300

Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys
305 310 315 320

Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys
325 330 335

Lys Thr Ile Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met
340 345 350

Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val
355 360 365

Leu Ala Glu Ala Met Ser Gln Val Thr Asn Ser Asn Thr Ile Met Met
370 375 380

Gln Arg Gly Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn
385 390 395 400

Cys Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys
405 410 415

Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys

420 425 430

Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys
435 440 445

Gly Arg Pro Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro
450 455 460

Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Ile Thr Pro Ser Gln
465 470 475 480

Lys Gln Glu Gln Thr Asp Arg Asp Lys Glu Lys Tyr Pro Leu Thr Ser
485 490 495

Leu Arg Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
500 505

<210> 54
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<400> 54

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Ile Arg Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Met Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Ser Gln
        115                 120                 125

Val Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly
    130                 135                 140

Gln Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala
    210                 215                 220

Gly Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His
                245                 250                 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270
```

```
Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Ala Ser Ile Leu Asp
        275                 280                 285

Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser Gln Val Thr Asn Ser Asn Thr Ile Met Met Gln Arg
    370                 375                 380

Gly Asn Phe Arg Asn Gln Lys Arg Thr Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Asp Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly
                405                 410                 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu
            420                 425                 430

Arg Gln Ala Asn Phe Leu Gly Lys Val Trp Pro Ser His Lys Gly Arg
        435                 440                 445

Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu
    450                 455                 460
```

```
Lys Ser Phe Arg Phe Gly Glu Glu Thr Ala Ala Pro Pro Gln Lys Gln
465                 470                 475                 480


Glu Pro Ile Asp Lys Gly Leu Tyr Pro Ser Ala Ser Leu Arg Ser Leu
                485                 490                 495


Phe Gly Asn Asp Pro Ser Ser Gln
            500
```

<210> 55
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 55

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Ile
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Ile Val Arg Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Ser Lys Ser Lys
            100                 105                 110
```

```
Lys Lys Glu Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Val
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Thr Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Ile Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Asp Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Met Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Ser Gln Gly Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Gln Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Arg Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Gly Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Ser Gly Glu Glu Thr Thr Ser Pro Ser Gln Lys Gln Glu Thr Ile Asp
465                 470                 475                 480

Lys Thr Leu Tyr Pro Ser Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495
```

Pro Ser Ser Gln
500

<210> 56
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 56

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Ile Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Lys Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ser Leu Arg Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Ile Ala Val Leu Phe Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Lys Asn Lys Ser Lys
100 105 110

Lys Arg Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly
130 135 140

```
Gln Met Val His Gln Pro Ile Thr Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160


Lys Val Val Glu Glu Lys Ser Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175


Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190


Asn Thr Ile Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205


Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala
    210                 215                 220


Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240


Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Ile Thr His
                245                 250                 255


Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270


Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp
        275                 280                 285


Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300


Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp
305                 310                 315                 320


Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335
```

```
Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser Gln Val Thr Asn Pro Pro Thr Ile Met Met Gln Arg
    370                 375                 380

Gly Asn Phe Arg Asn Gln Gly Arg Ile Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly
                405                 410                 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu
            420                 425                 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
        435                 440                 445

Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu
    450                 455                 460

Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Pro Ser Gln Lys Gln Glu
465                 470                 475                 480

Gln Ile Asp Lys Glu Leu Tyr Pro Ser Ala Ser Leu Lys Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Ser Ser Gln
            500
```

<210> 57
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 57

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Lys Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ala Leu Arg Thr Gly Thr Glu Glu Leu Arg Ser Leu Asn Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Arg Gln Ile Glu Val Arg Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Glu Ala Asp Thr Gly Asn Ser Arg Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
```

180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Asn Ile Leu Lys Ala
325 330 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Gly
355 360 365

Gln Ile Thr Ser Ser Ala Thr Val Met Met Gln Arg Gly Asn Phe Arg

370 375 380

Gly Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Lys Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
405 410 415

Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Pro Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Gly Thr Met Asp
465 470 475 480

Lys Glu His Pro Ser Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
485 490 495

Asp Pro Leu Ser Gln
500

<210> 58
<211> 507
<212> PRT
<213> Human immunodeficiency virus

<400> 58

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

```
His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Glu Lys Ala Gln Thr Ala Ala Gln Lys Ala Ala Ala Asp Thr Lys Asn
        115                 120                 125

Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly
    130                 135                 140

Gln Met Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Asp Trp Asp Arg Leu His Pro Val Gln Ala
    210                 215                 220
```

```
Gly Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser
                245                 250                 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Gly Ile Leu Asp
        275                 280                 285

Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser Gln Met Thr Asn Ser Ala Thr Ile Met Met Gln Lys
    370                 375                 380

Gly Asn Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly
                405                 410                 415
```

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu
420 425 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
435 440 445

Pro Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala
450 455 460

Pro Pro Glu Glu Ser Phe Lys Phe Gly Glu Glu Thr Thr Thr Pro Pro
465 470 475 480

Gln Lys Gln Glu Pro Lys Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu
485 490 495

Arg Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
500 505

<210> 59
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (113)..(113)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (130)..(130)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (250)..(250)
<223> Xaa can be any naturally occurring amino acid

<400> 59

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Arg Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Cys Cys Val His Gln Gly Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Xaa Lys Thr Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Gly
        115                 120                 125

Gln Xaa Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190
```

```
Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Xaa Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Ser Thr Ala Ile Met Met Gln Lys Gly Asn
    370                 375                 380
```

```
Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400


Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415


Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430


Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445


Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
    450                 455                 460


Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Lys Gln
465                 470                 475                 480


Glu Pro Val Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu
                485                 490                 495


Phe Gly Asn Asp Pro Ser Ser Gln
            500


<210>  60
<211>  501
<212>  PRT
<213>  Human immunodeficiency virus

<400>  60

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30
```

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ser Ile Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Glu Ala Asp Thr Gly Ser Asn Asn Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Lys Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ala Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335


Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350


Val Gly Gly Pro Gly His Lys Ala Arg Ile Leu Ala Glu Ala Met Cys
        355                 360                 365


Gln Val Thr Asn Ala Asn Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380


Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

Gly Gly Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Gly Arg Pro Gly Asn
435 440 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
450 455 460

Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile
465 470 475 480

Asn Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 61
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<400> 61

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Asp Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Met Ser Gln Leu
50 55 60

Gln Ser Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn

65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Ile Val Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Ser Gln
115 120 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
130 135 140

His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145 150 155 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
165 170 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
180 185 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
195 200 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly Pro Val
210 215 220

Gln Pro Gly Gln Ile Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr
225 230 235 240

Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro
245 250 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn

260 265 270

Lys Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln
275 280 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
290 295 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305 310 315 320

Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys
325 330 335

Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
340 345 350

Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met
355 360 365

Ser Gln Val Asn Asn Ser Ala Ser Val Met Met Gln Lys Gly Asn Phe
370 375 380

Lys Asn Gln Lys Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Val Gly
385 390 395 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Arg Lys Gly Cys Trp Lys
405 410 415

Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Ser Glu Lys Gln Ala
420 425 430

Asn Phe Leu Gly Lys Val Trp Pro Ser His Lys Gly Arg Pro Gly Asn
435 440 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Ser Glu

```
    450                 455                 460

Glu Ser Phe Arg Phe Gly Glu Glu Thr Ala Ala Pro Pro Gln Lys Gln
465                 470                 475                 480

Glu Pro Ile Asp Gln Gly Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu
                485                 490                 495

Phe Gly Asn Asp Pro Ser Ser Gln
            500
```

<210> 62
<211> 510
<212> PRT
<213> Human immunodeficiency virus

<400> 62

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Lys Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110
```

```
Lys Lys Ala Gln Pro Ala Ala Ala Ala Ala Asp Thr Gly Asn Asn Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300
```

```
Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460

Arg Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Pro Ala
465                 470                 475                 480

Thr Pro Ser Gln Lys Gln Glu Gln Ile Asp Lys Glu Leu Tyr Pro Leu
                485                 490                 495
```

Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505 510

<210> 63
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<400> 63

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Ala Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Ser Leu Leu Glu Thr Pro Glu Gly Cys Lys Gln Ile Leu Val Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Ser Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Arg Thr Gln Gln Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln
115 120 125

Gly Ser Gln Val Ser His Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly
130 135 140

```
Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala
    210                 215                 220

Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn
                245                 250                 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Cys Ile Leu Asp
        275                 280                 285

Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr
                325                 330                 335
```

```
Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser His Val Thr Asn Pro Thr Asn Ile Met Met Gln Gly
    370                 375                 380

Gly Asn Phe Arg Ser Gln Lys Lys Met Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Val Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly
                405                 410                 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Glu
            420                 425                 430

Arg Gln Gly Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys
        435                 440                 445

Gly Arg Pro Gly Asn Phe Leu Gln Asn Arg Thr Glu Pro Thr Ala Pro
    450                 455                 460

Pro Glu Glu Ile Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln
465                 470                 475                 480

Lys Gln Gly Pro Met Asp Lys Glu Gln Tyr Pro Leu Thr Ser Leu Arg
                485                 490                 495

Ser Leu Phe Gly Ser Asp Pro Ser Ser Gln
            500                 505
```

<210> 64
<211> 500
<212> PRT

<213> Human immunodeficiency virus

<400> 64

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Tyr
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Ile Glu Gly Leu Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Glu Ile Leu Gly Gln Leu
    50                  55                  60


His Pro Ser Leu Gln Thr Gly Ser Glu Glu Phe Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Asn Ser
        115                 120                 125


Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140


Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160


Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175
```

```
Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190


Thr Val Gly Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile
        195                 200                 205


Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220


Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240


Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
                245                 250                 255


Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly
            260                 265                 270


Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile
        275                 280                 285


Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300


Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320


Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335


Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350


Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365
```

Ala Met Ser Gln Val Thr Asn Pro Ala Thr Ile Met Ile Gln Lys Gly
370 375 380

Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys
385 390 395 400

Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
405 410 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
420 425 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
435 440 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
450 455 460

Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu
465 470 475 480

Pro Ile Asp Arg Glu Met Tyr Pro Ser Thr Ser Leu Lys Ser Leu Phe
485 490 495

Gly Asn Asp Pro
500

<210> 65
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (51)..(51)
<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature
<222> (143)..(143)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (341)..(341)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (397)..(397)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (403)..(403)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (463)..(463)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (483)..(483)
<223> Xaa can be any naturally occurring amino acid

<400> 65

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Gln Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Xaa Glu Thr Ala Gln Gly Cys Arg Gln Ile Leu Gln Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Thr Glu Glu Leu Arg Ser Leu Tyr Asn

65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Arg Val Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Glu Gln Ala Ala Ala Asp Thr Arg Ser Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Xaa His
130 135 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys

260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Val Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Xaa Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Xaa Glu Gly His
385 390 395 400

Ile Ala Xaa Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
405 410 415

Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Asp Ser Xaa Arg

450 455 460

Phe Ala Glu Gln Thr Ala Thr Pro Gln Thr Ala Thr Pro Ser Gln Lys
465 470 475 480

Gln Glu Xaa Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser
485 490 495

Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 66
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<400> 66

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

```
Lys Lys Ala Gln Gln Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser Thr
        115                 120                 125

Gly Asn Gly Ser Lys Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu
    130                 135                 140

Gln Gly Gln Met Val His Gln Thr Leu Ser Pro Arg Thr Leu Asn Ala
145                 150                 155                 160

Trp Val Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Ile Ile Pro
                165                 170                 175

Met Phe Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr
            180                 185                 190

Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys
        195                 200                 205

Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Pro
    210                 215                 220

Gln Ala Gly Pro Val Ala Pro Gly Gln Ile Arg Asp Pro Arg Gly Ser
225                 230                 235                 240

Asp Ile Ala Gly Thr Thr Ser Asn Leu Gln Glu Gln Ile Ala Trp Met
                245                 250                 255

Thr Asn Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile
            260                 265                 270

Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile
        275                 280                 285

Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp
    290                 295                 300
```

```
Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys
305                 310                 315                 320

Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys
                325                 330                 335

Lys Thr Ile Leu Lys Ala Leu Gly Pro Gly Ala Ser Leu Glu Glu Met
            340                 345                 350

Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val
        355                 360                 365

Leu Ala Glu Ala Met Ser Gln Val Thr Asn Ser Thr Ala Ile Met Met
    370                 375                 380

Gln Lys Gly Asn Phe Arg Asn Gln Arg Arg Thr Ile Lys Cys Phe Asn
385                 390                 395                 400

Cys Gly Lys Glu Gly His Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys
                405                 410                 415

Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys
            420                 425                 430

Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys
        435                 440                 445

Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro
    450                 455                 460

Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln
465                 470                 475                 480

Lys Gln Glu Pro Ile Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Lys
                485                 490                 495
```

Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 67
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 67

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Ala Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr His Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gln Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Lys Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

```
Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220


Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ile Asn Pro Thr Thr Val Met Met Gln Arg Gly Asn Phe Arg Asn
    370                 375                 380

Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Gln Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu Ser
    450                 455                 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Ala Pro Ser Gln Lys Gln Glu
465                 470                 475                 480

Pro Ile Asp Lys Gly Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Ser Ser Gln
            500
```

<210> 68
<211> 503
<212> PRT

<213> Human immunodeficiency virus

<400> 68

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ala Leu Arg Thr Gly Ser Glu Glu Leu Arg Ser Val Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Lys Asn
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175
```

```
Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365
```

```
Ala Met Ser Asn Val Thr Asn Ser Thr Thr Ile Met Met Gln Lys Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Glu Lys Ala Thr Pro Ser Gln Lys Gln Glu
465                 470                 475                 480

Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Ser Ser Gln
            500
```

<210> 69
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (124)..(124)
<223> Xaa can be any naturally occurring amino acid

<400> 69

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Met Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Ala Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Ala Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Xaa Gly Ser Ser Ser
        115                 120                 125

Gln Val Ser Arg Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190
```

```
Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Gly Asn Pro
                245                 250                 255

Ala Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Ser Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Ala Thr Ser Ala Ala Thr Ile Met Met Gln Lys Gly Asn
    370                 375                 380
```

```
Phe Arg Ser Gln Gly Lys Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400


His Ile Ser Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415


Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala
            420                 425                 430


Asn Phe Leu Gly Lys Val Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445


Phe Val Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu Ser Phe
    450                 455                 460


Met Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Val
465                 470                 475                 480


Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Ser
                485                 490                 495


Asp Pro Ser Ser Gln
            500
```

<210> 70
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 70

```
Met Gly Ala Arg Ala Ser Ile Ile Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Asn Lys Lys Tyr Arg Leu Lys
            20                  25                  30
```

```
His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Ile Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Leu Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Leu Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Lys Ser Ser Gly Asn
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln His
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220
```

```
Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240


Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
                245                 250                 255


Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Ile Gly Leu
            260                 265                 270


Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg
        275                 280                 285


Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300


Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320


Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335


Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350


Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala
        355                 360                 365


Met Ser Gln Val Thr Asn Pro Thr Thr Ile Met Met Gln Arg Gly Asn
    370                 375                 380


Phe Arg Asn Gln Arg Arg Pro Ile Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400


Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415
```

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Ser Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Thr
465 470 475 480

Val Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 71
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (280)..(280)
<223> Xaa can be any naturally occurring amino acid

<400> 71

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Gln Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Leu Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gly Gly Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Asn Ser Ser
        115                 120                 125

Pro Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240
```

```
Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Xaa Pro Thr Ser Ile Leu Asp Ile Lys
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Val Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Ser His Lys Ala Lys Val Leu Ala Glu Ala
        355                 360                 365

Met Gly Gln Val Thr Ser Ser Ala Thr Ile Met Met Gln Lys Gly Asn
    370                 375                 380

Phe Arg Asp Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Thr
385                 390                 395                 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln
            420                 425                 430
```

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Ala Thr Ala Pro Ser Pro Lys Pro Glu Pro
465 470 475 480

Ile Asp Glu Met Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 72
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (388)..(388)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (482)..(482)
<223> Xaa can be any naturally occurring amino acid

<400> 72

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro

```
        35                  40                  45

Gly Leu Leu Glu Thr Ala Thr Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ala Leu Lys Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Ala Ile Glu Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Asn Lys Ala Gln Gln Ala Ala Ala Asp Ala Gly Asn Asn Asn Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Met Thr Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
```

225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Ala Asn Thr Thr Ser Ile Met Met Gln Arg Gly Asn Phe Arg Asn
370 375 380

Gln Arg Lys Xaa Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385 390 395 400

Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
405 410 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe

420 425 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
435 440 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Leu Glu Glu Ser Phe Gly Phe
450 455 460

Gly Glu Glu Thr Ile Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp Lys
465 470 475 480

Gly Xaa Tyr Pro Ser Val Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
485 490 495

Leu Ser Gln

<210> 73
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 73

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Lys Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

```
Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Ser Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val
    130                 135                 140

His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Glu Trp Met Thr His Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270
```

```
Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Ala Thr Asn Thr Asn Ile Met Leu Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Leu Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460
```

```
Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Thr Asp
465                 470                 475                 480


Lys Glu Val Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Thr
            500
```

<210> 74
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 74

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110
```

```
Lys Lys Val Gln Gln Ala Ala Ala Asp Ser Gly Asn Ser Asp Ser Gln
        115                 120                 125

Val Ser Lys Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300
```

```
Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Asn Gln Val Thr Asn Pro Thr Ser Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Ser Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Pro Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460

Arg Phe Gly Glu Glu Thr Thr Ala Pro Ser Leu Lys Gln Glu Pro Ile
465                 470                 475                 480

Asn Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
                485                 490                 495
```

Asp Pro Ser Ser Gln
            500

<210> 75
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<400> 75

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ala Ser Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50   55   60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65   70   75   80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85   90   95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100   105   110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Gly Thr Gly Asn Ser
        115   120   125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130   135   140

```
Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160


Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175


Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190


Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205


Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220


Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240


Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
                245                 250                 255


Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270


Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285


Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300


Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320


Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335
```

```
Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Ser Ala Asn Ser Ala Ala Ile Met Met Gln Lys Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro
    450                 455                 460

Ala Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys
465                 470                 475                 480

Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser
                485                 490                 495

Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505
```

<210> 76
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 76

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Ile
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Val Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ser Phe Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80


Thr Ile Ala Thr Leu Tyr Cys Val His Gln Asn Ile Asp Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Arg Ala Gln Gln Ala Ala Ala Ala Asp Thr Gly Asn Asn Lys Gln
        115                 120                 125


Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val
    130                 135                 140


His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160


Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu
                165                 170                 175


Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
```

180 185 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
195 200 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
210 215 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225 230 235 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro
245 250 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Ile Asn
260 265 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
275 280 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
290 295 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305 310 315 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
325 330 335

Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
340 345 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
355 360 365

Ser Gln Val Thr Asn Pro Ala Thr Ile Met Ile Gln Lys Gly Asn Phe

370 375 380

Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385 390 395 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
405 410 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
420 425 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
435 440 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ile Phe
450 455 460

Arg Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu Pro Ile
465 470 475 480

Asp Lys Glu Leu Tyr Pro Ser Ala Ser Leu Arg Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 77
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 77

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Thr Tyr Lys Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Met Gly His Leu
    50                  55                  60

His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Ala Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Arg Val Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asn Thr Glu Thr Asn Thr Gly Asn
        115                 120                 125

Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly
    130                 135                 140

Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Ser Ala Leu Ser Glu Gly Ala Thr Pro Ala Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala
    210                 215                 220
```

```
Gly Pro Val Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Asn
                245                 250                 255

Asn Pro Pro Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp
        275                 280                 285

Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser His Val Asn Ser Ala Ala Ile Met Met Gln Lys Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415
```

```
Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Asn Arg Thr Glu Pro Ser Ala Pro Pro Glu Glu
    450                 455                 460

Ile Phe Gly Phe Gly Glu Glu Ala Ala Ala Pro Pro Gln Lys Gln Glu
465                 470                 475                 480

Pro Ile Asp Lys Glu Lys Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Ser Ser Gln
            500
```

<210> 78
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 78

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asn Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Gly Thr Ile Met Met Gln Arg Gly Asn Leu Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Arg Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 79
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<400> 79

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

```
Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ala His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ala Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Ser Ala Pro Pro Ala Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Glu Ile Thr Thr Pro Pro Gln Lys Gln Glu
465                 470                 475                 480
```

Thr Leu Ile Asp Leu Asp Lys Glu Leu Tyr Pro Ser Ala Ser Leu Lys
485 490 495

Ser Leu Phe Gly Asn Asp Pro Leu Leu Lys
500 505

<210> 80
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 80

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Glu Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Lys
115 120 125

Gln Val Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Val Gln Gly Gln

130 135 140

Met Val His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145 150 155 160

Val Val Glu Glu Arg Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr
165 170 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
180 185 190

Thr Ile Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
195 200 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
210 215 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225 230 235 240

Gly Thr Thr Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn
245 250 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
260 265 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
275 280 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
290 295 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305 310 315 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys His Ile

325 330 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
340 345 350

Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu
355 360 365

Ala Met Ser Gln Val Thr Ser Ser Thr Thr Ile Met Met Gln Arg Gly
370 375 380

Asn Phe Lys Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys
385 390 395 400

Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys
405 410 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
420 425 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
435 440 445

Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu
450 455 460

Ser Phe Arg Cys Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu
465 470 475 480

Thr Ile Asp Lys Asp Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe
485 490 495

Gly Ser Asp Pro Ser Ser Gln
500

<210> 81

<211> 504
<212> PRT
<213> Human immunodeficiency virus

<400> 81

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Ile Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Phe Arg Ser Leu Tyr Asn
65                  70                  75                  80


Ala Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Val Gln Gln Ala Ala Ala Ala Thr Ala Ala Ala Gly Asn Ser
        115                 120                 125


Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln
    130                 135                 140


Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160


Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala
                165                 170                 175
```

```
Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Leu Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Asp Trp Asp Arg Leu His Pro Ala Gln Ala Gly
    210                 215                 220

Pro Val Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Ser Asn
                245                 250                 255

Pro Pro Ile Gln Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Arg Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365
```

```
Ala Met Ser Gln Leu Thr Asn Thr Thr Asn Ile Met Met Gln Lys Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Arg Ser Ile Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Thr Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu
    450                 455                 460

Ile Phe Arg Phe Gly Glu Glu Thr Thr Thr Asn Pro Ser Gln Lys Gln
465                 470                 475                 480

Glu Met Val Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu
                485                 490                 495

Phe Gly Asn Asp Pro Ser Ser Gln
            500
```

<210> 82
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<400> 82

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15
```

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Glu Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Glu Val Gly Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Val Ala Ala Ala Gln Pro Ala Ala Ala Val Thr
        115                 120                 125

Gly Asn Ser Asn Gln Ile Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu
    130                 135                 140

Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala
145                 150                 155                 160

Trp Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro
                165                 170                 175

Met Phe Ala Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr
            180                 185                 190

Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys
        195                 200                 205
```

```
Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val
    210                 215                 220

His Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser
225                 230                 235                 240

Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met
                245                 250                 255

Thr Asn Asn Pro Ala Ile Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile
            260                 265                 270

Ile Met Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Ala Ser Ile
        275                 280                 285

Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp
    290                 295                 300

Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys
305                 310                 315                 320

Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys
                325                 330                 335

Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met
            340                 345                 350

Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val
        355                 360                 365

Leu Ala Glu Ala Met Ser Gln Ala Thr Asn Gln Ala Thr Ile Met Met
    370                 375                 380

Gln Lys Gly Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn
385                 390                 395                 400
```

Cys Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys
405 410 415

Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys
420 425 430

Thr Glu Arg Gln Val Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys
435 440 445

Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Leu Glu Pro Thr Ala Pro
450 455 460

Pro Ala Glu Ser Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln
465 470 475 480

Lys Gln Glu Thr Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys
485 490 495

Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 83
<211> 507
<212> PRT
<213> Human immunodeficiency virus

<400> 83

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Ile Lys Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Thr Pro Pro Ala Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Pro Arg Lys Val Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
```

Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Pro Thr Ala Pro
450 455 460

Pro Ala Ala Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln
465 470 475 480

Lys Gln Glu Pro Pro Val Asp Arg Glu Leu Tyr Pro Leu Ala Ser Leu
485 490 495

Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 84
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 84

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Arg Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp

```
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Asn
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Arg Ser Gln Ala
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Thr Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
```

```
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Asn Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Gln Thr Ser Thr Ala Met Met Met Gln Gly Ser Asn His Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Val Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Asn Pro Pro Gln Lys Gln Glu Pro Ile Asp
```

465 470 475 480

Glu Leu Tyr Pro Met Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
485 490 495

Ser Ser Gln

<210> 85
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 85

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

```
Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Ile Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Ser Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320
```

```
Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Met Thr Pro Pro Pro Thr Val Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Gly Gln Arg Lys Val Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Lys
    450                 455                 460

Phe Gly Gly Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Thr Val Asp
465                 470                 475                 480

Lys Asp Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 86
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 86

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ala Leu Arg Thr Gly Ser Glu Glu Phe Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Gly Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Val Ala Ala Asp Thr Glu Asn Lys Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140


Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160
```

```
Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
```

```
Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Pro Gln Ser Arg Thr Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Gly Gln Gly Pro
465                 470                 475                 480

Ile Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495

Asn Asp Pro Ser Ser Gln
            500
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<210> 87
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 87

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Arg Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Phe Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Gln Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Thr Ala Ala Gly Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Met Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Asp Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Ala Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380
```

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Asp Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ser Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Thr Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Arg Pro Glu Ser Ile Asp
465 470 475 480

Lys Glu Met Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 88
<211> 497
<212> PRT
<213> Human immunodeficiency virus

<400> 88

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro

```
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Thr Ala Ala Ala Asp Thr Gly Asn Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
```

225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Ile Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Thr Ala Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Asn Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn

420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Lys Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro

<210> 89
<211> 507
<212> PRT
<213> Human immunodeficiency virus

<400> 89

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ala Leu Lys Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Ala Ala Gln Pro Ala Ala Ala Ala Ala Ala Ala Gly Asn Ser Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Asn Pro Glu Val Ile Pro Met Phe Ala Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Asp Glu Ala Ala Glu Trp Asp Arg Thr His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Leu Gly Leu
            260                 265                 270
```

```
Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Ser Thr Ala Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Tyr Lys Gly Gln Arg Lys Ala Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Val Glu Pro Thr
    450                 455                 460
```

```
Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Gly Thr Thr Pro Ser
465                 470                 475                 480


Leu Lys Gln Glu Pro Thr Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu
                485                 490                 495


Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505


<210>  90
<211>  498
<212>  PRT
<213>  Human immunodeficiency virus


<220>
<221>  misc_feature
<222>  (127)..(127)
<223>  Xaa can be any naturally occurring amino acid

<220>
<221>  misc_feature
<222>  (413)..(413)
<223>  Xaa can be any naturally occurring amino acid

<400>  90

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Ile Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Lys Glu Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Xaa Thr
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ser Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Val Asn Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Xaa Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Asn Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Ser Ile Asp
465 470 475 480

Lys Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser
485 490 495

Ser Gln

<210> 91
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 91

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys

```
            100                 105                 110

Lys Arg Ala Gln Gln Ala Ala Ala Asp Thr Lys Asn Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Val Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Ile Leu
```

290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Ser Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Gln Lys Arg Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Ala Ala Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Thr Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp

485 490 495

Pro Ser Ser Gln
500

<210> 92
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 92

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Glu Lys Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
130 135 140

```
Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu His Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

His Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu Pro Arg Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
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<210> 93
<211> 500

<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (28)..(28)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (46)..(46)
<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

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<222> (88)..(88)
<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<222> (337)..(337)
<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<222> (421)..(421)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (426)..(426)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (478)..(478)
<223> Xaa can be any naturally occurring amino acid

<400> 93

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Xaa Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Xaa Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Lys Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80
```

```
Thr Ile Ala Xaa Leu Tyr Cys Xaa His Gln Arg Ile Glu Xaa Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Met Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Lys Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Xaa Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gly Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Xaa His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Xaa Gln Glu Gln Ile Ala Trp Met Thr Ala Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
```

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Xaa Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Xaa Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Xaa Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Arg Glu Gly Xaa Gln Met Lys Asp Xaa Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Cys Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Xaa Ile Asp
465 470 475 480

Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 94
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 94

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
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Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
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Lys Lys Ala Gln Gln Ala Ala Ala Asn Thr Gly Asn Gly Ser Pro Val

115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
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Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
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Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Ala Ser Ile Leu Asp Ile Arg Gln Gly
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Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr

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305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
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Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Val Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Gly Thr Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
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Pro Ser Ser Gln
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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys

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            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Asp Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Val Glu Xaa Glu Gln Asn Gln Ser Lys
            100                 105                 110

Xaa Lys Ala Gln Gln Ala Ala Xaa Ala Ala Asp Xaa Arg Asn Ser Cys
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Xaa Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Xaa Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Xaa Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Xaa Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro
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210 215 220

Val Ala Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225 230 235 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Xaa Trp Met Thr His Asn Pro
245 250 255

Pro Ile Pro Val Gly Glu Xaa Tyr Lys Xaa Trp Ile Ile Met Gly Leu
260 265 270

Xaa Lys Ile Val Arg Met Tyr Ser Pro Xaa Ser Ile Leu Asp Ile Arg
275 280 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
290 295 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305 310 315 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
325 330 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Asp Met Met Thr Ala Cys
340 345 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
355 360 365

Met Ser Gln Val Thr Asn Ser Ala Xaa Val Met Met Gln Lys Gly Asn
370 375 380

Phe Arg Asn Gln Arg Lys Xaa Val Lys Cys Phe Asn Cys Gly Lys Glu
385 390 395 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp

405 410 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Pro Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Gly Ser
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Xaa Asp Lys Asn Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Xaa Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50   55   60

Xaa Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65   70   75   80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85   90   95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100   105   110

Glu Lys Ala Arg Gln Xaa Ala Ala Asp Thr Gly Asn Lys Ser Gln Val

115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Xaa Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Xaa Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Xaa Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
245 250 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Xaa Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Xaa Thr

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305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Xaa Met Met Gln Lys Ser Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Val Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Xaa Arg Pro Xaa Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Xaa Thr Thr Pro Xaa Gln Lys Gln Xaa Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Xaa Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Leu Gln
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500

<210> 97
<211> 497
<212> PRT
<213> Human immunodeficiency virus

<400> 97

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Gln Leu Asp Arg Trp
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Lys Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
100 105 110

Lys Lys Ala Gln Gln Val Thr Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
130 135 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

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Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
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Val Gly Gly Pro Thr His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Gly Ala Asn Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Glu Glu Ile Thr Pro Pro Gln Lys Gln Glu Pro Arg Asp Lys Glu Met
465                 470                 475                 480

Tyr Pro Leu Val Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser
                485                 490                 495

Gln
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<210> 98
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 98

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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Thr Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Val Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser His Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190
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Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Asp Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ser Ala Thr Ile Met Met Gln Gly Gly Lys Phe
    370                 375                 380
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Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400


His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys
                405                 410                 415


Cys Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430


Asn Phe Leu Gly Lys Ile Trp Pro Ser Cys Lys Gly Arg Pro Gly Asn
        435                 440                 445


Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460


Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Ser Ile
465                 470                 475                 480


Asp Lys Glu Arg Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn
                485                 490                 495


Asp Pro Leu Ser Gln
            500


<210>  99
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Lys Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Pro Ala Ala Ala Asp Thr Gly Asn Ser Gly Gln Val
115 120 125

Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly

180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Xaa Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Xaa Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Val Met Met Gln Arg Gly Asn Phe Arg

370 375 380

Asn Gln Arg Arg Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Asn Glu Arg Gln Ala
420 425 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
435 440 445

Phe Leu Gln Asn Arg Pro Glu Pro Arg Pro Glu Pro Thr Ala Pro Pro
450 455 460

Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys
465 470 475 480

Gln Glu Pro Thr Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser
485 490 495

Leu Phe Gly Asn Asp His Ser Ser Gln
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Xaa Lys Lys Tyr Gln Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Thr Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Ser Ser Ser
        115                 120                 125


Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met
    130                 135                 140


Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160
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Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350
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Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Xaa Ala Thr Val Met Met Gln Arg Gly Asn
    370                 375                 380

Leu Arg Asn Gln Arg Lys Xaa Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Arg Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
    450                 455                 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Thr
465                 470                 475                 480

Ile Asp Lys Glu Arg Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495

Asn Asp Pro Ser Ser Gln
            500
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<210> 101
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<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

<400> 101

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Xaa Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Xaa Asn Pro
        35                  40                  45


Gly Leu Xaa Glu Thr Ser Xaa Gly Cys Arg Gln Ile Ile Arg Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Xaa Lys
            100                 105                 110


Lys Xaa Ala Gln Pro Ala Ala Ala Asp Thr Gly Ser Thr Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Xaa Met Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
```

```
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Xaa Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Xaa Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Xaa Asp Ile Arg Gln Gly
        275                 280                 285

Pro Xaa Glu Pro Phe Arg Xaa Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Xaa Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Xaa Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
```

340 345 350

Val Gly Gly Pro Gly Xaa Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Pro Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Xaa Cys
405 410 415

Gly Lys Glu Gly His Xaa Met Lys Xaa Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Xaa Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Xaa Thr Xaa Pro Gln Lys Gln Glu Pro Thr Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 102
<211> 508
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

<400> 102

Met Gly Ala Arg Ala Ser Ile Leu Thr Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Val Val Trp Ala Ser Arg Glu Xaa Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Phe Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Asn Lys Ala Gln Xaa Ala Ala Ala Ala Xaa Ala Asp Thr Gly Asn Gly
        115                 120                 125

Ser Lys Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln
    130                 135                 140

Met Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240
```

```
Gly Xaa Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Ile Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Thr Ala Ser Ala Ala Ile Met Met Gln Lys
    370                 375                 380

Gly Asn Phe Arg Thr Pro Arg Lys Thr Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly
                405                 410                 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu
            420                 425                 430
```

```
Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
        435                 440                 445

Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu
    450                 455                 460

Glu Ser Phe Arg Phe Arg Glu Glu Ala Thr Thr Pro Ser Gln Lys Gln
465                 470                 475                 480

Glu Pro Ile Asp Lys Glu Ile Asp Lys Glu Xaa Tyr Pro Leu Xaa Ser
                485                 490                 495

Leu Arg Ser Leu Phe Gly Asn Asp Pro Xaa Ser Gln
            500                 505
```

<210> 103
<211> 508
<212> PRT
<213> Human immunodeficiency virus

<400> 103

```
Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Lys Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Val Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80
```

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Pro Ile Ser Ala Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Val Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270
```

```
Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Gly Ala Ser Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Ala Thr Asn Ser Thr Ala Val Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Lys Asn Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Ala Glu Pro Ser
    450                 455                 460
```

```
Ala Pro Pro Ala Glu Ser Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro
465                 470                 475                 480


Ser Gln Lys Gln Glu Gln Ile Asp Lys Glu Met Tyr Pro Leu Ala Ser
                485                 490                 495


Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505


<210>  104
<211>  504
<212>  PRT
<213>  Human immunodeficiency virus

<400>  104

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Asp Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Ala Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110
```

```
Lys Lys Val Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Ile Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335


Leu Gly Thr Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350


Val Gly Gly Pro Ala His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365


Gln Leu Thr Pro Ala Thr Val Met Met Gln Lys Gly Asn Phe Arg Asn
    370                 375                 380


Ser Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His Ile
385                 390                 395                 400


Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415


Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430


Leu Gly Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445


Gln Asn Arg Pro Glu Pro Thr Ala Pro Glu Pro Thr Ala Pro Pro Leu
    450                 455                 460


Glu Ser Phe Arg Phe Gly Glu Glu Ala Thr Ala Pro Pro Gln Arg Gln
465                 470                 475                 480


Glu Pro Ile Asp Arg Glu Leu Tyr Pro Ser Ala Ser Leu Lys Ser Leu
                485                 490                 495
```

Phe Gly Asn Asp Pro Ser Ser Gln
            500

<210> 105
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 105

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1   5   10   15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50   55   60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65   70   75   80

Thr Val Ala Val Leu Phe Cys Val His Gln Lys Ile Glu Val Lys Asp
                85   90   95

Thr Lys Glu Ala Val Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100   105   110

Lys Lys Ala Gln Pro Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115   120   125

Ser Arg Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130   135   140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu

145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Glu Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly

340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
370 375 380

Asn Ser Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Ile Thr Thr Pro Pro Gln Lys Gln Glu Pro Val Asp
465 470 475 480

Lys Glu Met Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 106
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 106

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Ser Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

His Pro Ser Leu Lys Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Asp Thr Asn Ser Pro Val Ser
        115                 120                 125

Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln
    130                 135                 140

Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190
```

```
His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Glu Trp Asp Arg Thr His Pro Val Gln Ala Gly Pro Val Ala Pro
    210                 215                 220

Gly Gln Val Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240

Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile Pro
                245                 250                 255

Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
            260                 265                 270

Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg
    290                 295                 300

Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Val Thr Asn Ser Thr Ala Ile Met Met Gln Arg Gly Asn Phe Lys Gly
    370                 375                 380
```

```
Gln Arg Lys Asn Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400


Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415


Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430


Leu Gly Lys Ile Trp Pro Ser Gln Arg Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445


Gln Ser Arg Pro Glu Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu
    450                 455                 460


Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu
465                 470                 475                 480


Pro Ile Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
                485                 490                 495


Gly Asn Asp Pro Ser Ser Gln
            500


<210>  107
<211>  507
<212>  PRT
<213>  Human immunodeficiency virus

<400>  107

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Thr Tyr Lys Leu Lys
            20                  25                  30
```

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Ala Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Thr Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Thr Gly Asn
        115                 120                 125

Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly
    130                 135                 140

Gln Met Val His Gln Ala Met Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Ala Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Ile His Pro Val His Ala
    210                 215                 220
```

```
Gly Pro Val Ala Pro Gly Gln Met Arg Lys Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser
                245                 250                 255

Asn Pro Pro Val Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp
        275                 280                 285

Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser Gln Val Thr Ser Ser Ala Thr Ile Met Met Gln Arg
    370                 375                 380

Gly Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Arg Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly
                405                 410                 415
```

```
Cys Trp Lys Cys Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu
            420                 425                 430


Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
        435                 440                 445


Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Val Pro Thr Ala
    450                 455                 460


Pro Leu Glu Glu Ser Phe Arg Phe Gly Glu Gly Thr Thr Thr Pro Pro
465                 470                 475                 480


Gln Lys Gln Asp Thr Ile Asp Lys Glu Leu Tyr Pro Ser Ala Ser Leu
                485                 490                 495


Arg Ser Leu Phe Gly Asn Asp Pro Leu Leu Gln
            500                 505


<210>  108
<211>  501
<212>  PRT
<213>  Human immunodeficiency virus

<400>  108

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Trp Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Ala Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Thr Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Ser Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ser Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro His Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255
```

```
Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Ser Pro Ala Thr Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Lys Gly Gln Arg Lys Met Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Ile Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445
```

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Leu
450 455 460

Arg Phe Arg Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Thr Thr
465 470 475 480

Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
485 490 495

Asp Pro Leu Ser Gln
500

<210> 109
<211> 499
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

<400> 109

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Ala Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Xaa Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Val Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Xaa Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Xaa Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Xaa Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala
                165                 170                 175

Glu Gly Ala Xaa Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Xaa Lys Xaa Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Xaa Tyr Lys Arg Trp Ile Ile Leu Gly Leu Xaa Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Xaa Glu Gln Ala Ser Gln Xaa Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Xaa Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Val Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Gly Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Val Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

Gly Lys Glu Gly His Gln Met Lys Asp Cys Asp Lys Gln Ala Asn Phe
420 425 430

Leu Gly Lys Ile Trp Pro Ser His Lys Glu Arg Pro Gly Asn Phe Leu
435 440 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg Phe
450 455 460

Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys
465 470 475 480

Xaa Xaa Tyr Pro Met Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
485 490 495

Ser Ser Gln

<210> 110
<211> 502
<212> PRT
<213> Human immunodeficiency virus

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<400> 110

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Asp Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ala Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Phe Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Ile Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asp Lys Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asn Thr Gly Asn Ser Gly Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Pro Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Ala Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Val Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ile Asn Ala Ala Ala Met Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Asn Gly Pro Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Ile
385                 390                 395                 400

Gly His Leu Ala Lys Asn Cys Xaa Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln
            420                 425                 430
```

```
Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
    450                 455                 460

Phe Arg Phe Gly Glu Glu Val Ala Thr Pro Ser Gln Lys Gln Glu Pro
465                 470                 475                 480

Arg Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495

Asn Asp Pro Ser Ser Gln
            500
```

<210> 111
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<400> 111

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80
```

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Ile Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asn Thr Gly Asn Gly Asn Gln Ala
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly
    210                 215                 220

Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn
                245                 250                 255

Pro Ala Ile Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly
            260                 265                 270
```

```
Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Lys Gln Gly Pro Lys Glu Ser Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Val Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Cys Gln Val Thr Gly Ser Ala Thr Ala Ala Ile Met Met Gln
    370                 375                 380

Lys Gly Asn Phe Lys Thr Gln Arg Lys Ile Val Lys Cys Phe Asn Cys
385                 390                 395                 400

Gly Arg Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys
                405                 410                 415

Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr
            420                 425                 430

Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly
        435                 440                 445

Arg Pro Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro Pro
    450                 455                 460
```

```
Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys
465                 470                 475                 480


Gln Glu Pro Thr Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser
                485                 490                 495


Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505


<210>  112
<211>  505
<212>  PRT
<213>  Human immunodeficiency virus

<400>  112

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Ser Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Asn Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110
```

```
Lys Lys Ala Gln Pro Ala Ala Ala Asp Thr Gly Asn Thr Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335


Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350


Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365


Gln Ala Ser Gly Leu Ala Ser Ala Ala Ile Met Met Gln Arg Gly Asn
    370                 375                 380


Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400


Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415


Lys Cys Gly Lys Asp Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430


Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445


Asn Phe Phe Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro
    450                 455                 460


Glu Glu Ser Phe Arg Phe Gly Glu Glu Ala Thr Thr Pro Pro Gln Lys
465                 470                 475                 480


Gln Glu Arg Lys Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser
                485                 490                 495
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Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 113
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 113

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Val Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Arg Ala Gln Gln Ala Ala Ala Ala Ala Asp Ser Gly Thr Asn Ser
115 120 125

Asn Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
130 135 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val

```
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Ile Leu Arg Ala Glu Gln Cys Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
```

340 345 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
355 360 365

Met Ser Gln Met Thr Asn Ser Thr Ala Ile Met Met Gln Arg Gly Asn
370 375 380

Phe Arg Asn Gln Arg Arg Ser Val Lys Cys Phe Asn Cys Gly Lys Glu
385 390 395 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
405 410 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Leu Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Ser Ser Gln Lys Gln Glu Pro
465 470 475 480

Ile Asp Lys Glu Leu Tyr Pro Ser Ala Ser Leu Arg Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 114
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 114

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Ala Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Ala
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ser Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Ser Val Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Ile His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Asn Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Gly Ser Ala Ala Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380
```

```
Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Ser Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500


<210>  115
<211>  501
<212>  PRT
<213>  Human immunodeficiency virus


<220>
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<223>  Xaa can be any naturally occurring amino acid

<220>
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<222>  (30)..(30)
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (387)..(387)
<223> Xaa can be any naturally occurring amino acid

<400> 115

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Xaa Tyr Xaa Leu Lys
            20   25   30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50   55   60

```
Gln Pro Ala Leu Lys Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Ala Val Ala Thr Leu Tyr Cys Val His Gln Asp Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Xaa Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Xaa Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Asp Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Xaa Ala Xaa Ile Met Ile Gln Arg Gly Xaa Phe Arg
    370                 375                 380

Asn Pro Xaa Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

```
Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Lys Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480


Lys Glu Glu Gln Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
                485                 490                 495


Asp Pro Ser Ser Gln
            500


<210>  116
<211>  502
<212>  PRT
<213>  Human immunodeficiency virus


<220>
<221>  misc_feature
<222>  (334)..(334)
<223>  Xaa can be any naturally occurring amino acid

<220>
<221>  misc_feature
<222>  (376)..(376)
<223>  Xaa can be any naturally occurring amino acid

<400>  116

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Gln Gly Gly Arg Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Tyr Ala Ile Asp Pro
        35                  40                  45
```

```
Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Pro Thr Gly Ser Glu Glu Leu Arg Ser Leu His Asn
65                  70                  75                  80

Ala Ile Ala Thr Leu Tyr Cys Val His Gln Asn Ile Asp Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Ser Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240
```

```
Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Xaa Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser His Met Thr Ser Gln Xaa Thr Ile Met Leu Gln Arg Gly Asn
    370                 375                 380

Phe Lys Asn Pro Gly Arg Pro Val Lys Cys Phe Asn Cys Gly Lys Val
385                 390                 395                 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430
```

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro
465 470 475 480

Ile Asp Lys Asn Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 117
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 117

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Lys Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp

85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Thr Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly

```
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

His Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Ser Gln Arg Lys Met Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Arg Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Gln Ile Asp
```

465 470 475 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 118
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 118

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Ser Tyr Gln Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Ser Ser Leu Lys Thr Gly Thr Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Ala Val Ala Val Leu Tyr Cys Val His Gln Gly Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Glu Ala Ala Asp Thr Gly Asn Asn Ser Asn
115 120 125

```
Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Val Tyr Lys Lys Trp Ile Ile Ile Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320
```

```
Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Ala Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Gln Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Pro Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser
    450                 455                 460

Phe Arg Phe Gly Glu Glu Ala Thr Thr Pro Ser Gln Lys Gln Glu Gln
465                 470                 475                 480

Lys Asp Lys Glu Val Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495

Asn Asp Pro Leu Ser Gln
            500
```

<210> 119
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 119

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Asn Lys Arg Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Lys Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Glu Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Thr Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Ile Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160
```

```
Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro His Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Glu Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Ile Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Ser Ala Cys Gln Gly
            340                 345                 350
```

```
Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Thr Thr Asn Ala Ala Ala Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Ala Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Gln Pro Thr Ala Pro Pro
    450                 455                 460

Glu Glu Ser Ile Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys
465                 470                 475                 480

Gln Glu Gln Lys Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser
                485                 490                 495

Leu Phe Gly Asn Asp Gln
            500
```

<210> 120
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 120

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Thr Ala Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Arg Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Thr Thr Ala Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380
```

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Leu Arg
450 455 460

Phe Gly Gly Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Leu Ser Gln
500

<210> 121
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 121

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Thr Lys Tyr Lys Leu Gln
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro

```
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Val Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
```

225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Met Thr Asn Ser Ala Thr Ala Thr Ile Met Met Gln Lys Gly Asn
370 375 380

Phe Arg Asn Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu
385 390 395 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
405 410 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln

420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Ala Gln Gly Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Gly
450 455 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro
465 470 475 480

Ile Asp Lys Asp Leu Tyr Pro Ser Val Ser Leu Arg Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 122
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (85)..(85)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (391)..(391)
<223> Xaa can be any naturally occurring amino acid

<400> 122

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Lys Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Xaa Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220
```

```
Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys His Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Thr Ser Ala Ile Leu Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Xaa Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

```
Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Ile Val Pro Thr Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Glu Thr Thr Pro Ser Arg Lys Pro Glu Gln
465                 470                 475                 480

Gly Asp Lys Glu Met Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly
                485                 490                 495

Asn Asp Pro Leu Ser Gln
            500
```

<210> 123
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 123

```
Met Gly Ala Arg Ala Ser Ile Leu Arg Gly Gly Lys Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Lys Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Val Leu Tyr Cys Val His Gln Asn Ile Asp Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110


Lys Lys Val Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly Pro Val Ala
    210                 215                 220


Pro Asn Gln Val Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Ile Gly Leu Asn Thr
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Gly Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Arg Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Val Met Met Gln Lys Asn Asn Phe Gly
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Arg Gln Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu Ser Val Arg
450 455 460

Phe Gly Glu Glu Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp Glu
465 470 475 480

Glu Arg Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
485 490 495

Ser Ser Gln

<210> 124
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<400> 124

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys

100 105 110

Lys Lys Ala Gln Gln Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly
115 120 125

Asn Arg Gly Gln Val Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln
130 135 140

Gly Gln Met Val His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp
145 150 155 160

Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met
165 170 175

Phe Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
180 185 190

Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu
195 200 205

Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His
210 215 220

Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp
225 230 235 240

Ile Ala Gly Thr Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr
245 250 255

His Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile
260 265 270

Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu
275 280 285

Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg

290 295 300

Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn
305 310 315 320

Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys
325 330 335

Thr Ile Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met
340 345 350

Thr Ala Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu
355 360 365

Ala Glu Ala Met Ser Gln Val Asn Ser Ala Thr Val Met Met Gln Arg
370 375 380

Gly Asn Ile Arg Asn Gln Arg Lys Ala Val Lys Cys Phe Asn Cys Gly
385 390 395 400

Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly
405 410 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu
420 425 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
435 440 445

Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu
450 455 460

Glu Ser Phe Arg Phe Gly Glu Arg Thr Thr Thr Pro Pro Gln Lys Gln
465 470 475 480

Glu Gln Ile Asp Lys Asp Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu

485 490 495

Phe Gly Asn Asp Pro Ser Ser Gln
500

<210> 125
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (41)..(41)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (223)..(223)
<223> Xaa can be any naturally occurring amino acid

<400> 125

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Ser Lys Lys Tyr Arg Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Xaa Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
85 90 95

```
Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Ser Lys Ser Lys
            100                 105                 110

Lys Gly Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala
                165                 170                 175

Glu Gly Ala Thr Pro His Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Xaa Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Val Val Lys Met Tyr Ser Pro Ile Ser Ile Leu Glu Ile Arg Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Glu Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Ser Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Ser Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Pro Thr Ala Pro
    450                 455                 460

Pro Ala Glu Ser Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln
465                 470                 475                 480
```

Lys Gln Glu Pro Lys Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg
485 490 495

Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 126
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (477)..(477)
<223> Xaa can be any naturally occurring amino acid

<400> 126

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp

85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ser Ala Ala Asp Thr Gly Asn Lys Gln Pro Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly

```
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Met Thr Asn Ser Asn Thr Val Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Xaa His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Arg Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Val Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Xaa Pro Ile Asp
```

465 470 475 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 127
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (13)..(13)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (22)..(22)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (28)..(28)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (52)..(52)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (67)..(67)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (102)..(102)
<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature
<222> (128)..(128)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (130)..(130)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (170)..(170)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (316)..(316)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (382)..(382)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (421)..(421)
<223> Xaa can be any naturally occurring amino acid

<400> 127

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Xaa Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Xaa Pro Gly Gly Lys Lys Xaa Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Xaa Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Xaa Ile Lys Thr Gly Thr Glu Glu Leu Arg Ser Leu Phe Asn

65 70 75 80

Thr Val Ser Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Xaa Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Xaa
115 120 125

Ser Xaa Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
130 135 140

Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145 150 155 160

Val Val Glu Glu Lys Ala Phe Ser Pro Xaa Val Ile Pro Met Phe Ser
165 170 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
180 185 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
195 200 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
210 215 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225 230 235 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn
245 250 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly

260 265 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
275 280 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
290 295 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Xaa Lys Asn Trp Met
305 310 315 320

Thr Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile
325 330 335

Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala
340 345 350

Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu
355 360 365

Ala Met Ser Gln Val Thr Asn Pro Thr Thr Ile Met Met Xaa Lys Gly
370 375 380

Asn Phe Arg Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys
385 390 395 400

Glu Gly His Ile Ser Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
405 410 415

Trp Lys Cys Gly Xaa Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
420 425 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
435 440 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu

450 455 460

Ser Leu Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu
465 470 475 480

Pro Val Asp Lys Glu Leu Tyr Pro Phe Ser Ser Leu Arg Ser Leu Phe
485 490 495

Gly Asn Asp Pro Ser Ser Gln
500

<210> 128
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (13)..(13)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (122)..(122)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (168)..(168)
<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (248)..(248)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (251)..(251)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (309)..(309)
<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (404)..(404)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (443)..(443)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (469)..(469)
<223> Xaa can be any naturally occurring amino acid

<400> 128

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Xaa Asp Gln Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu

50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
100 105 110

Lys Arg Val Gln Gln Ala Ala Ala Asp Xaa Gly Ser Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Xaa Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Xaa Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Val Xaa Trp Met Xaa Asn Asn Pro Pro Ile

245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
260 265 270

Val Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Xaa Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Xaa Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Ala Thr Asn Ser Ala Ala Ala Ile Met Met Gln Lys Gly Asn Phe
370 375 380

Lys Thr His Arg Lys Xaa Val Lys Cys Phe Asn Cys Gly Arg Glu Gly
385 390 395 400

His Ile Ala Xaa Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys
405 410 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
420 425 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Xaa Gly Arg Pro Gly Asn

435 440 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ile Phe
450 455 460

Arg Phe Gly Glu Xaa Thr Thr Thr Pro Thr Gln Lys Gln Glu Pro Ile
465 470 475 480

Asp Lys Glu Leu Ser Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 129
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (107)..(107)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (307)..(307)
<223> Xaa can be any naturally occurring amino acid

<400> 129

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Tyr Ser Leu Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Thr Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Val Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Xaa Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Phe Pro Ile Val Gln Asn Ala Gln Gly Gln Met Val His
    130                 135                 140

Gln Ser Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Val Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Xaa Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ala Tyr Lys Ala Lys Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ser Thr Asn Met Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Glu Cys Ser Glu Arg Gln Ala Asn
            420                 425                 430
```

```
Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Ser Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Leu Leu Gln
            500
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<210> 130
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
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<400> 130

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Asp Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Lys Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60
```

```
Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Leu Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Thr Ile Glu Lys Glu Gln Asn Lys Ser Lys
            100                 105                 110

Ala Lys Glu Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Lys Val
        115                 120                 125

Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Thr His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Ala Ile Met Met Gln Lys Gly Asn Phe Gly
    370                 375                 380

Asn Gln Arg Lys Ser Ile Lys Cys Phe Asn Cys Gly Lys Val Gly His
385                 390                 395                 400

Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Xaa Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

```
Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Ile Ala Thr Pro Ser Gln Lys Gln Gly Gln Met Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Ser Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Leu Ser Gln
            500


<210>  131
<211>  505
<212>  PRT
<213>  Human immunodeficiency virus


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<400>  131

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45
```

```
Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Gly Xaa Gln Ser
        115                 120                 125

Ser Gly Asn Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln
    130                 135                 140

Gly Gln Met Val His Gln Ala Ile Thr Pro Arg Thr Leu Asn Ala Trp
145                 150                 155                 160

Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met
                165                 170                 175

Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
            180                 185                 190

Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu
        195                 200                 205

Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His
    210                 215                 220

Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp
225                 230                 235                 240
```

```
Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr
                245                 250                 255

Asn Asn Pro Pro Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile
            260                 265                 270

Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu
        275                 280                 285

Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg
    290                 295                 300

Phe Tyr Lys Thr Leu Arg Ala Glu Gln Thr Thr Gln Glu Val Lys Asn
305                 310                 315                 320

Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys
                325                 330                 335

Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met
            340                 345                 350

Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu
        355                 360                 365

Ala Glu Ala Met Ser Gln Val Thr Asn Ser Thr Ser Ile Met Met Gln
    370                 375                 380

Arg Gly Asn Phe Lys Asn Gln Arg Arg Thr Val Lys Cys Xaa Asn Cys
385                 390                 395                 400

Gly Lys Asp Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys
                405                 410                 415

Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn
            420                 425                 430
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Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly
435 440 445

Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro
450 455 460

Glu Glu Ser Phe Ser Phe Gly Pro Glu Thr Thr Thr Pro Ser Gln Lys
465 470 475 480

Gln Glu Pro Ile Asp Gln Gly Val Tyr Pro Leu Thr Ser Leu Lys Ser
485 490 495

Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 132
<211> 503
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

<400> 132

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Val Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Xaa Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Thr Leu Tyr Cys Xaa His Xaa Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110
```

```
Lys Lys Thr Gln Gln Ala Ala Ala Asp Thr Arg Asn Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Xaa Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Ile Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Xaa Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Xaa Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Asn Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Pro Gln Arg Lys Xaa Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Ile Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Arg Glu Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Gly
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Xaa Thr Asp
465                 470                 475                 480

Lys Glu His Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
                485                 490                 495
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Gly Asn Asp Pro Ser Ser Gln
            500

<210> 133
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<400> 133

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Leu
1   5   10   15

Glu Lys Ile Arg Leu Arg Ala Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20   25   30

His Val Val Trp Ala Ser Arg Glu Leu Glu Gln Phe Ala Ile Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50   55   60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Xaa Ser Leu Tyr Asn
65   70   75   80

Thr Val Ala Thr Leu Tyr Cys Val His Lys Lys Leu Glu Ile Arg Asp
                85   90   95

Thr Gln Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100   105   110

```
Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Asn Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Ser Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Arg Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Met Tyr Pro Xaa Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495
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Pro Ser Ser Gln
500

<210> 134
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<400> 134

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Xaa Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Ile Gln Leu
50 55 60

Gln Pro Ser Ile Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Glu Ile Arg Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asn Thr Gly Asn Ser Ser Xaa Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Pro Ile Ser Ala Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu

145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Xaa Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Ala Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Xaa His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Xaa Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly

340 345 350

Val Gly Gly Pro Gly His Lys Ala Xaa Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Ala Thr Asn Thr Ala Ala Ala Ile Met Met Gln Arg Gly Asn Phe
370 375 380

Arg Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385 390 395 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
405 410 415

Cys Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
420 425 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
435 440 445

Xaa Leu Xaa Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Leu
450 455 460

Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Glu
465 470 475 480

Xaa Lys Gly Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 135
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<213> Human immunodeficiency virus

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<400> 135

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Lys Xaa Cys Ser Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95
```

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Thr Lys Glu Ala Leu Xaa Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Arg Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Xaa Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Xaa Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Xaa Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Xaa Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Xaa Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Xaa Val Gln Asn Ala Asn Pro Asp Cys Xaa Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Val Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Xaa Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Xaa Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Xaa Thr Pro Ser Gln Lys Gln Glu Thr Xaa Asp
465                 470                 475                 480
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Lys Glu Xaa Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 136
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

<400> 136

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Xaa Tyr Gln Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

Gly Leu Leu Xaa Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50   55   60

Gln Xaa Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65   70   75   80

Thr Val Ala Xaa Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85   90   95

Thr Lys Glu Ala Leu Glu Lys Val Xaa Glu Glu Gln Asn Lys Ser Lys
            100   105   110

Lys Gln Ala Gln Gln Xaa Ala Ala Asp Thr Ala Lys Ser Ser Gln Val

```
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Xaa Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Xaa Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Ala Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
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305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Lys
370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Xaa Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu
450 455 460

Ser Phe Arg Phe Gly Glu Glu Thr Ile Thr Pro Pro Gln Arg Gln Glu
465 470 475 480

Pro Thr Asp Lys Xaa Met Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe
485 490 495

Gly Ser Asp Pro

500

<210> 137
<211> 501
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

<400> 137

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Pro Ala Ala Ala Ala Ala Ala Gly Asn Asp Asn Gln
115 120 125

```
Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140

His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Xaa Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Pro Gln Ala Gly Pro Val
    210                 215                 220

Ala Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320
```

```
Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Gly Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Ala Thr Asn Thr Ala Thr Ile Met Met Gln Lys Gly Asn Phe
    370                 375                 380

Lys Asn Gln Arg Lys Met Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460

Arg Phe Gly Glu Glu Ala Ala Ala Pro Pro Gln Lys Gln Glu Pro Thr
465                 470                 475                 480

Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
                485                 490                 495

Asp Pro Ser Ser Gln
            500
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<210> 138
<211> 502
<212> PRT
<213> Human immunodeficiency virus

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<400> 138

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Met Val Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Ile
        115                 120                 125

Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Xaa Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
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```
Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Xaa Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Asp Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Asn Ser Ala Ala Ile Met Met Gln Lys Gly Asn Phe Lys Asn
    370                 375                 380

Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Val
385                 390                 395                 400

Ala Lys Asn Cys Arg Ala Pro Arg Xaa Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Gln Glu Gly His Gln Met Lys Asp Cys Thr Ala Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Xaa Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu Ser
    450                 455                 460
```

```
Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro
465                 470                 475                 480


Thr Asp Lys Ser Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495


Asn Asp Pro Ser Ser Gln
            500


<210>  139
<211>  498
<212>  PRT
<213>  Human immunodeficiency virus


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<400> 139

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Asn Leu Lys
20 25 30

His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Arg Thr Gly Ser Glu Glu Leu Xaa Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Arg Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Thr Asp Thr Gly Ser Lys Glu Gln Ile
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Xaa Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

Glu Lys Ala Xaa Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ala Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Ser Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Ser Ala Ala Ile Met Met Gln Arg Gly Asn Phe Arg Asp
    370                 375                 380
```

```
Lys Arg Lys Thr Val Xaa Cys Xaa Asn Cys Gly Arg Glu Gly His Ile
385                 390                 395                 400


Ala Lys Asn Cys Arg Ala Pro Xaa Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415


Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430


Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445


Gln Ser Lys Val Glu Pro Thr Ala Pro Pro Glu Glu Ser Ile Arg Phe
    450                 455                 460


Gly Glu Glu Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys Glu
465                 470                 475                 480


Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Ser
                485                 490                 495


Ser Gln
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<210> 140
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<400> 140

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Xaa Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Xaa Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Xaa Ser Glu Gly Cys Arg Lys Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn

65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Xaa Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Xaa Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Ser Gln
115 120 125

Val Ser Gln Asn Tyr Pro Ile Xaa Gln Asn Ile Gln Gly Gln Met Val
130 135 140

Xaa Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile
145 150 155 160

Glu Glu Lys Xaa Phe Ser Xaa Glu Val Ile Pro Met Phe Ser Ala Leu
165 170 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
180 185 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
195 200 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
210 215 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Xaa Asp Ile Ala Gly Thr
225 230 235 240

Thr Ser Thr Leu Gln Glu Gln Ile Xaa Trp Met Thr His Asn Pro Pro
245 250 255

Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn

260 265 270

Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln
275 280 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
290 295 300

Leu Arg Ala Glu Gln Ala Ser Gln Xaa Val Lys Asn Trp Met Thr Glu
305 310 315 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
325 330 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
340 345 350

Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met
355 360 365

Ser Gln Thr Asn Ser Ala Thr Ile Met Met Gln Xaa Gly Asn Phe Arg
370 375 380

Asn Pro Lys Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Ser Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Arg Leu Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Xaa Ser

450 455 460

Xaa Arg Glu Glu Ile Thr Thr Pro Pro Gln Lys Gln Glu Pro Xaa Asp
465 470 475 480

Lys Thr Met Tyr Pro Xaa Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 141
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<400> 141

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Ser Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Ala Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

```
Lys Lys Val Gln Gln Gln Gln Ala Ala Ala Ala Ala Gly Ser Ser Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300
```

```
Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Pro Ala Thr Val Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro
    450                 455                 460

Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Ala Ala Pro Ser Gln Lys
465                 470                 475                 480

Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser
                485                 490                 495
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Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 142
<211> 510
<212> PRT
<213> Human immunodeficiency virus

<400> 142

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Gly Thr Asn
115 120 125

Thr Gly Asn Ser Gly Thr Val Ser Gln Asn Tyr Pro Ile Val Gln Asn
130 135 140

```
Leu Gln Gly Gln Met Val His Gln Pro Leu Ser Pro Arg Thr Leu Asn
145                 150                 155                 160

Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile
                165                 170                 175

Pro Met Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn
            180                 185                 190

Thr Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu
        195                 200                 205

Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro
    210                 215                 220

Val His Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly
225                 230                 235                 240

Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp
                245                 250                 255

Met Thr His Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp
            260                 265                 270

Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser
        275                 280                 285

Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val
    290                 295                 300

Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val
305                 310                 315                 320

Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp
                325                 330                 335
```

```
Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu
            340                 345                 350

Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg
        355                 360                 365

Val Leu Ala Glu Ala Met Ser Gln Met Thr Asn Pro Ala Ser Ile Met
    370                 375                 380

Met Gln Arg Gly Asn Tyr Arg Asn Gln Arg Lys Thr Val Lys Cys Phe
385                 390                 395                 400

Asn Cys Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg
                405                 410                 415

Lys Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp
            420                 425                 430

Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His
        435                 440                 445

Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala
    450                 455                 460

Pro Pro Ala Pro Pro Glu Glu Ser Phe Met Phe Gly Glu Glu Thr Thr
465                 470                 475                 480

Thr Pro Pro Gln Lys Gln Glu Ser Ile Asp Lys Gly Gly Tyr Pro Leu
                485                 490                 495

Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505                 510
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<210> 143
<211> 500
<212> PRT

<213> Human immunodeficiency virus

<400> 143

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Asn Lys Arg Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Gly Gly Cys Arg Gln Ile Leu Ala Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Pro Ala Ala Ala Asp Ala Gly Thr Ser Ser Gln Ala
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175
```

```
Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365
```

```
Gln Val Thr Gly Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Val Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
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<210> 144
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<220>
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<400> 144

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Xaa Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

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Lys Lys Ala Pro Gln Thr Ala Ala Ala Ala Ala Asp Ala Gly Ser Asn
        115                 120                 125

Ser Lys Val Ser Leu Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Xaa Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300
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Lys Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Met Thr Asn Ser Ala Thr Val Met Met Gln Arg Gly
    370                 375                 380

Asn Phe Lys Gly Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Xaa Gly His Gln Met Lys Asp Cys Asp Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
    450                 455                 460

Phe Arg Phe Gly Glu Glu Thr Thr Pro Pro Gln Lys Gln Glu Xaa Thr
465                 470                 475                 480

Xaa Arg Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe
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Gly Asn Asp Pro Ser Ser Gln
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<210> 145
<211> 494
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<213> Human immunodeficiency virus

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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Xaa Glu Arg Xaa Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asp Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Ser Ser Gln Val Ser Gln Asn
        115                 120                 125

Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His Gln Ala Ile
    130                 135                 140

Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala
145                 150                 155                 160

Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser Glu Gly Ala
                165                 170                 175

Thr Pro Gln Xaa Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln
            180                 185                 190
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Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu
        195                 200                 205

Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln
    210                 215                 220

Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu
225                 230                 235                 240

Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Thr Pro Val Gly
                245                 250                 255

Glu Xaa Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg
            260                 265                 270

Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu
        275                 280                 285

Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Xaa Arg Ala Glu
    290                 295                 300

Gln Ala Xaa Gln Glu Val Lys Asn Trp Met Thr Xaa Thr Leu Leu Val
305                 310                 315                 320

Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro
                325                 330                 335

Gly Ala Thr Leu Glu Asp Met Met Thr Ala Cys Gln Gly Val Gly Gly
            340                 345                 350

Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Val Asn
        355                 360                 365

Pro Ala Thr Ile Met Val Gln Arg Gly Asn Phe Arg Asn Gln Arg Lys
    370                 375                 380
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Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Val Ala Arg Asn
385 390 395 400

Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly
405 410 415

His Gln Met Lys Asp Cys Thr Glu Arg Gln Val Asn Phe Leu Gly Lys
420 425 430

Ile Trp Pro Ser His Lys Glu Arg Pro Gly Asn Phe Phe Gln Ser Arg
435 440 445

Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg Glu Glu Thr Thr
450 455 460

Thr Pro Ser Gln Lys Gln Glu Pro Lys Asp Lys Glu Leu Tyr Pro Leu
465 470 475 480

Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
485 490

<210> 146
<211> 500
<212> PRT
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<400> 146

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Arg Trp
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Gly Glu Gly Cys Arg Gln Ile Leu Ala Gln Leu

50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Ala Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Arg Ser Lys
100 105 110

Arg Lys Val Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Thr Ile
115 120 125

Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ser Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile

245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Met Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Ser Pro Ala Asn Ile Met Met Gln Arg Gly Asn Phe Lys
370 375 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Asp Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Val Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe

435 440 445

Leu Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser Val Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 147
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
    50   55   60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65   70   75   80

Thr Val Ala Thr Leu Tyr Cys Xaa His Gln Xaa Ile Glu Val Lys Asp
                85   90   95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Xaa Cys Lys
            100   105   110

Lys Lys Ala Gln Gln Ala Xaa Ala Asp Thr Gly Asn Ser Asn Gln Val
        115   120   125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130   135   140

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Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Xaa Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Xaa His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
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Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Gly
    370                 375                 380

Asn Gln Lys Arg Lys Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Arg Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Ile Glu Arg Gln Val Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Glu Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu
    450                 455                 460

Glu Ser Phe Arg Phe Gly Glu Gly Thr Thr Thr Pro Ser Gln Lys Gln
465                 470                 475                 480

Glu Xaa Thr Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu
                485                 490                 495

Phe Gly Asn Asp Pro Leu Leu Gln
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<210> 148
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<212> PRT
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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
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Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Ser
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Xaa Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Xaa Asn
65 70 75 80

Thr Xaa Ala Thr Leu Tyr Cys Val His Gln Gly Ile Asp Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Xaa Lys
100 105 110

Lys Lys Ala Lys Gln Ala Glu Ala Asp Ala Gly Asn Asn Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ala Gln Gly Gln Met Xaa His

130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Xaa Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Xaa His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Xaa Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
260 265 270

Ile Val Xaa Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Xaa Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala

325 330 335

Leu Gly Pro Xaa Ala Thr Leu Glu Glu Met Met Thr Ala Xaa Gln Gly
340 345 350

Val Gly Gly Pro Ala His Lys Ala Arg Val Leu Ala Glu Ala Met Gly
355 360 365

Gln Val Thr Asn Ser Asn Ile Ile Met Met Gln Lys Gly Asn Phe Arg
370 375 380

Asn Gln Arg Xaa Thr Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Xaa Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Xaa Arg Pro Xaa Asn Xaa
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Ala Thr Pro Xaa Gln Lys Gln Xaa Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Xaa Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Xaa
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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1   5   10   15

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Glu Lys Ile Arg Xaa Arg Pro Xaa Gly Lys Lys Thr Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Asp Xaa Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Gln Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Gln Ile Glu Glu Glu Gln Asn Arg Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Xaa Gln Asn Met Gln Gly Gln
    130                 135                 140

Met Val His Gln Xaa Ile Ser Pro Arg Thr Leu Asn Xaa Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr
                165                 170                 175

Ala Leu Ser Glu Gly Ala Xaa Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile
        195                 200                 205
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Asn Glu Glu Xaa Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn
                245                 250                 255

Pro Pro Met Pro Val Gly Xaa Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Xaa Thr Ser Ile Xaa Asp Ile
        275                 280                 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Ala Asp Val Lys Gly Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly
    370                 375                 380

Asn Phe Arg Xaa Gln Arg Lys Xaa Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400
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Xaa Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys
405 410 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
420 425 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Xaa Arg Pro
435 440 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Xaa Glu Glu
450 455 460

Ser Phe Arg Phe Gly Glu Glu Xaa Ala Thr Pro Ser Gln Lys Gln Glu
465 470 475 480

Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe
485 490 495

Gly Asn Asp His Ser Ser Gln
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Xaa Leu
50 55 60

Xaa Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Xaa Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Xaa His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Xaa Ala Gln Gln Ala Ala Ala Asp Thr Glu Lys Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Xaa Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

```
Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Xaa Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Val Ala Trp Met Thr Ala Asn Pro Ala Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Xaa Tyr Val Asp Arg Phe Tyr Arg Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Xaa Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
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```
Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Gln Thr Pro Asn Ser Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Xaa Arg Lys Asn Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Xaa Glu Ser Phe Arg
    450                 455                 460

Xaa Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Gln Tyr Pro Leu Xaa Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Thr
            500
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<210> 151
<211> 503
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

<400> 151

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Asp Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Xaa Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Lys Val Ala Asp

85 90 95

Thr Lys Glu Ala Leu Glu Lys Leu Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Thr Gln Gln Ala Ala Ala Ala Ala Thr Gly Thr Gly Asn Ser
115 120 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
130 135 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145 150 155 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
165 170 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
180 185 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
195 200 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Val His Xaa Val His Ala Gly
210 215 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225 230 235 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
245 250 255

Xaa Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
260 265 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile

275 280 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
290 295 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305 310 315 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
325 330 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
340 345 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
355 360 365

Ala Met Ser Gln Val Thr Asn Ser Ala Ser Ile Met Met Gln Arg Gly
370 375 380

Asn Phe Arg Asn Gln Arg Lys Ala Val Lys Cys Phe Asn Cys Gly Lys
385 390 395 400

Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
405 410 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
420 425 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Xaa Ser His Lys Gly Arg Pro
435 440 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu
450 455 460

Xaa Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu

465 470 475 480

Pro Ile Asp Arg Glu Val Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe
485 490 495

Gly Asn Asp Pro Ser Ser Gln
500

<210> 152
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<400> 152

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

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Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Xaa Thr Tyr Gln Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Xaa Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Pro Ala Ala Ala Asp Thr Xaa Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ser Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Xaa Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205
```

```
Ala Ala Glu Trp Asp Arg Leu His Pro Val Xaa Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Xaa Ile Gly Trp Met Thr Ser Asn Pro Pro Xaa
                245                 250                 255

Gln Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Xaa Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Thr Ala Thr Ile Met Ala Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Xaa Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400
```

```
Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Xaa Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu Ser Phe Lys
    450                 455                 460

Phe Gly Xaa Glu Thr Xaa Thr Pro Pro Gln Lys Gln Asp Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Xaa Ala Ser Leu Xaa Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Xaa
            500
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<210> 153
<211> 508
<212> PRT
<213> Human immunodeficiency virus

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<400> 153

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95


Xaa Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Ser Gln
        115                 120                 125


Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val
    130                 135                 140


His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160


Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175
```

```
Ser Glu Gly Ala Thr Pro Gln Asp Leu Xaa Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Xaa Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Ser His Lys Ala Lys Ile Met Ala Glu Ala Met
        355                 360                 365
```

```
Ser Gln Ile Thr Asn Ser Ala Ala Ile Met Met Gln Lys Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Asn Arg Pro Asp Pro Pro Ala Pro Arg Pro Glu Pro Ser
    450                 455                 460

Ala Pro Pro Met Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro
465                 470                 475                 480

Ser Gln Lys Lys Glu Glu Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser
                485                 490                 495

Leu Lys Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
            500                 505
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<210> 154
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 154

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Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Arg Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Thr Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Ile Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Met Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Arg Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Thr Glu Asn Ser Ser Gln Gly Gln
        115                 120                 125

Gly Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190
```

```
Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Xaa Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Asn Ser Ala Thr Thr Met Met Gln Arg Gly Asn Phe
    370                 375                 380
```

```
Arg Asn Pro Arg Lys Asn Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400


His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415


Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430


Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445


Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460


Arg Phe Gly Glu Glu Ala Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Ser Asp
                485                 490                 495


Pro Ser Ser Gln
            500


<210>  155
<211>  499
<212>  PRT
<213>  Human immunodeficiency virus


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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 155

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Xaa Gln Tyr Xaa Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Xaa Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Gly Glu Gly Cys Lys Gln Ile Leu Glu Xaa Leu
50 55 60

Xaa Pro Ala Leu Xaa Thr Gly Ser Glu Glu Leu Lys Ser Leu Xaa Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Ala Gly Asn Asn Xaa Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Xaa Asn Xaa Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

```
Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Xaa Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Xaa Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Xaa Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Xaa Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Xaa Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Xaa Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
```

Val Gly Gly Pro Gly His Lys Ala Xaa Ile Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Arg Xaa Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
435 440 445

Xaa Gln Ser Xaa Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Pro Pro Gln Lys Gln Xaa Gln Ile Asp Lys
465 470 475 480

Glu Leu Tyr Pro Ser Xaa Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
485 490 495

Ser Ser Gln

<210> 156
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (375)..(375)
<223> Xaa can be any naturally occurring amino acid

<400> 156

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Thr Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Leu Ala Val Leu Tyr Cys Val His Gln Asn Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Gln Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Thr Ala Asn Thr Gly Asn Ser Asn Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175
```

```
Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly Pro Asn Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365
```

```
Gln Val Thr Asn Ser Ala Xaa Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Arg Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Pro Glu Gln Ala Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Val Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 157
<211> 507
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (317)..(317)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (386)..(386)
<223> Xaa can be any naturally occurring amino acid

<400> 157

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asn Thr Gly Asn Ser Ser Gln Gly
        115                 120                 125


Ser Gln Ser Gly Ser Gln Gly Ser Gln Asn Tyr Pro Ile Val Gln Asn
    130                 135                 140


Ile Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn
145                 150                 155                 160


Ala Trp Val Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile
```

165 170 175

Pro Met Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn
180 185 190

Thr Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu
195 200 205

Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro
210 215 220

Val Pro Ala Gly Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly
225 230 235 240

Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp
245 250 255

Met Thr Asn Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp
260 265 270

Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser
275 280 285

Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val
290 295 300

Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Xaa Gln Glu Val
305 310 315 320

Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp
325 330 335

Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu
340 345 350

Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg

```
        355                 360                 365

Val Leu Ala Glu Ala Met Ser Gln Val Thr Asn Pro Thr Thr Ile Met
    370                 375                 380

Met Xaa Arg Gly Asn Phe Arg Asn Gln Arg Lys Thr Ile Lys Cys Phe
385                 390                 395                 400

Asn Cys Gly Lys Glu Gly His Leu Ala Arg Asn Cys Arg Ala Pro Arg
                405                 410                 415

Lys Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp
            420                 425                 430

Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His
        435                 440                 445

Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala
    450                 455                 460

Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser
465                 470                 475                 480

Gln Lys Gln Glu Thr Ile Asp Lys Glu Met Tyr Pro Ile Thr Ser Leu
                485                 490                 495

Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505
```

<210> 158
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<400> 158

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15
```

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Glu Ala Asp Thr Gly Asn Arg Asn Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205
```

```
Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Thr Ala Ile Met Ile Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400
```

```
Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala
    450                 455                 460

Glu Ser Phe Arg Phe Gly Glu Glu Thr Met Ala Pro Ser Gln Lys Gln
465                 470                 475                 480

Glu Pro Thr Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu
                485                 490                 495

Phe Gly Asn Asp Pro Ser Ser Gln
            500
```

<210> 159
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (161)..(161)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (264)..(264)
<223> Xaa can be any naturally occurring amino acid

<400> 159

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Glu Lys Leu Gly Asn Trp
1               5                  10                  15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Glu Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Gln Ala
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Xaa Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Xaa Trp Ile Val Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Val Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr His Pro Thr Thr Ile Met Met Gln Lys Gly Asn Phe Gly
    370                 375                 380
```

```
Asn Gln Arg Lys Met Val Lys Cys Phe Asn Cys Gly Lys Ala Gly His
385                 390                 395                 400


Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500
```

<210> 160
<211> 498
<212> PRT
<213> Human immunodeficiency virus

<400> 160

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
```

```
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Ser Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser
        115                 120                 125

Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His Gln
    130                 135                 140

Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190

His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro
    210                 215                 220

Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
```

225 230 235 240

Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile Pro
245 250 255

Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
260 265 270

Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly Pro
275 280 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Ile Leu Arg
290 295 300

Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Ala Glu Thr Leu
305 310 315 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
325 330 335

Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
340 345 350

Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
355 360 365

Val Ala Asn Pro Pro Thr Ile Met Ile Gln Lys Gly Asn Phe Arg Asn
370 375 380

Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His Leu
385 390 395 400

Ala Arg Asn Cys Lys Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys Gly
405 410 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe

420 425 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
435 440 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
450 455 460

Gly Glu Glu Thr Thr Thr Pro Gln Lys Gln Glu Pro Ile Asp Lys Glu
465 470 475 480

Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser
485 490 495

Ser Thr

<210> 161
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 161

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Met Gly Arg Lys Lys Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Asp Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Arg Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Glu Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Lys Asn Ser Thr Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Ser Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Ser Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460
```

```
Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480


Lys Glu Arg Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500


<210>  162
<211>  510
<212>  PRT
<213>  Human immunodeficiency virus

<400>  162

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110
```

```
Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser His Thr
        115                 120                 125

Gly Asn Ser Gly Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu
    130                 135                 140

Gln Gly Gln Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala
145                 150                 155                 160

Trp Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro
                165                 170                 175

Met Phe Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr
            180                 185                 190

Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys
        195                 200                 205

Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val
    210                 215                 220

His Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser
225                 230                 235                 240

Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met
                245                 250                 255

Thr His Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile
            260                 265                 270

Ile Met Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile
        275                 280                 285

Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp
    290                 295                 300
```

```
Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys
305                 310                 315                 320


Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys
                325                 330                 335


Lys Thr Ile Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met
            340                 345                 350


Met Thr Ala Cys Gln Gly Val Gly Gly Pro Ala His Lys Ala Arg Val
        355                 360                 365


Leu Ala Glu Ala Met Ser Gln Val Thr Asn Ser Ala Thr Val Met Met
    370                 375                 380


Gln Lys Gly Asn Phe Arg Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn
385                 390                 395                 400


Cys Gly Lys Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys
                405                 410                 415


Arg Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys
            420                 425                 430


Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys
        435                 440                 445


Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Ser Arg Pro Glu
    450                 455                 460


Pro Thr Ala Pro Pro Glu Glu Cys Phe Arg Phe Gly Glu Glu Thr Thr
465                 470                 475                 480


Ala Pro Pro Gln Lys Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu
                485                 490                 495
```

Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505 510

<210> 163
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 163

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Thr Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Glu Ile Lys Asp
85 90 95

Thr Arg Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Val Gln Gln Thr Ala Asp Gly Thr Gly Asn Ser Ser Gln Ala
115 120 125

Ser Gln Asn Tyr Pro Ile Val Arg Asn Leu Gln Gly Gln Leu Thr His
130 135 140

```
Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220


Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Asp Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Gly Ser Ala Thr Ile Met Met Gln Lys Gly Asn Ile Arg
    370                 375                 380

Ser Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Glu Thr Thr Ala Pro Ser Gln Lys Gln Glu
465                 470                 475                 480

Pro Ile Asn Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Ser Ser Gln
            500
```

<210> 164
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 164

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Thr Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Gln Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Pro Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Gly Lys
            100                 105                 110


Lys Gln Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Ser Ser Lys Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140


Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
```

180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Ala Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg

370 375 380

Asn Gln Arg Lys Pro Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro Gly Asn Phe
435 440 445

Pro Gln Gly Arg Leu Thr Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu
450 455 460

Ser Phe Arg Phe Gly Glu Glu Thr Thr Asn Pro Ser Gln Arg Gln Glu
465 470 475 480

Pro Ile Asp Gln Glu Arg Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe
485 490 495

Gly Asn Asp Pro Ser Ser Gln
500

<210> 165
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 165

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Gln Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Ser Ser Leu Pro Thr Ala Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Asn Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Pro Ala Thr Ala Ala Asp Thr Gly Ser Ser Ser Thr
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220
```

```
Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Gly Ser Ala Asn Val Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Lys Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Arg Glu Gly
385                 390                 395                 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415
```

```
Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe
    450                 455                 460

Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile
465                 470                 475                 480

Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
                485                 490                 495

Asp Pro Ser Ser Gln
            500
```

<210> 166
<211> 508
<212> PRT
<213> Human immunodeficiency virus

<400> 166

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60
```

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Phe Cys Val Gln Arg Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Gln Gln Ala Ala Ala Asp Thr Arg
        115                 120                 125

Asn Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln
    130                 135                 140

Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp
145                 150                 155                 160

Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met
                165                 170                 175

Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
            180                 185                 190

Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu
        195                 200                 205

Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His
    210                 215                 220

Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp
225                 230                 235                 240

Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr
                245                 250                 255
```

```
Asn Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile
            260                 265                 270

Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu
        275                 280                 285

Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg
    290                 295                 300

Phe Tyr Lys Ile Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn
305                 310                 315                 320

Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys
                325                 330                 335

Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met
            340                 345                 350

Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu
        355                 360                 365

Ala Glu Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln
    370                 375                 380

Arg Gly Asn Phe Lys Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys
385                 390                 395                 400

Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys
                405                 410                 415

Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asn Cys Thr
            420                 425                 430

Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly
        435                 440                 445
```

```
Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro
    450                 455                 460


Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro
465                 470                 475                 480


Pro Gln Arg Gln Glu Gln Arg Asp Glu Glu Lys Tyr Pro Leu Thr Ser
                485                 490                 495


Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505


<210>  167
<211>  503
<212>  PRT
<213>  Human immunodeficiency virus

<400>  167

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Ala Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Glu Ile Lys Asp
                85                  90                  95
```

```
Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Ala Ala Gln Gln Ala Ala Ala Gly Thr Gly Asp Ser
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285
```

```
Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly
    370                 375                 380

Asn Phe Arg Ser Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Thr Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Glu Thr Thr Ala Thr Pro Pro Gln Lys Gln
465                 470                 475                 480
```

Glu Pro Ile Asp Arg Glu Val Tyr Pro Leu Thr Ser Leu Arg Ser Leu
485 490 495

Phe Gly Asn Asp Pro Ser Ser
500

<210> 168
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 168

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Arg Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Leu Leu Gly Gln Ile
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Ser Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His

130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Pro Gln Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala

325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ser Ala Ala Met Met Met Gln Arg Gly Asn Phe
370 375 380

Arg Asn Ser Arg Lys Pro Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly
385 390 395 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
405 410 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
420 425 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
435 440 445

Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe
450 455 460

Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Pro Glu Pro Ile
465 470 475 480

Asp Arg Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 169

<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 169

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Lys Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80


Thr Ile Ala Thr Leu Tyr Cys Val His Gln Gly Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Thr Gln Gln Ala Ala Ala Gly Ala Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175
```

```
Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Val Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365
```

```
Gln Ala Thr Ser Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Thr Gln Arg Arg Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Ser Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Val Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 170
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 170

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Arg Trp
1               5                   10                  15
```

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Pro Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Ala Gly Asn Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205
```

```
Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Asn Ser Val Ser Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400
```

```
His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415


Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430


Asn Phe Leu Gly Lys Ile Trp Pro Ser Arg Lys Gly Arg Pro Gly Asn
        435                 440                 445


Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460


Arg Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Asp Pro Ile
465                 470                 475                 480


Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
                485                 490                 495


Asp Pro Ser Ser Gln
            500


<210>  171
<211>  503
<212>  PRT
<213>  Human immunodeficiency virus

<400>  171

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45
```

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ile Lys
            100                 105                 110

Lys Arg Val Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Asn Ser Ser
        115                 120                 125

Gln Val Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240
```

```
Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Asn Pro Ala Asn Ile Met Met Gln Arg Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Glu Gly His Gln Ile Lys Asp Cys Thr Glu Arg
            420                 425                 430
```

Gln Ala Asn Phe Leu Gly Arg Ile Trp Pro Ser Asn Lys Gly Arg Pro
435 440 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
450 455 460

Ser Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu
465 470 475 480

Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
485 490 495

Gly Ser Asp Pro Ser Ser Gln
500

<210> 172
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 172

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp

85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ile Lys
100 105 110

Lys Arg Thr Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Pro Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

Glu Lys Asn Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Ile Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Asp Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly Pro Ala Ala
210 215 220

Pro Gly Gln Val Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly

```
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Gln Asn Ser Asn Ser Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Pro Thr Ala Pro
    450                 455                 460

Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln
```

465 470 475 480

Lys Gln Gly Pro Ile Asp Lys Glu Leu Tyr Pro Ser Ala Ser Leu Arg
485 490 495

Ser Leu Phe Gly Asn Asp Pro
500

<210> 173
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 173

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Thr Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Val Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Glu Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Lys Lys
100 105 110

Asn Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Lys Pro Val
115 120 125

```
Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320
```

```
Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Thr Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Ser Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 174
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 174

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Pro Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Thr Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

```
Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Thr His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
```

```
Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365


Gln Val Thr Asn Ala Pro Asn Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380


Ser Gln Arg Arg Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Leu Val Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500
```

<210> 175
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 175

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Lys Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ala Leu Lys Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Arg Val Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Lys
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190
```

```
Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly
    210                 215                 220

Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Asn Ser Pro Thr Val Met Met Gln Lys Gly
    370                 375                 380
```

Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys
385 390 395 400

Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
405 410 415

Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
420 425 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
435 440 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu
450 455 460

Ser Phe Gly Phe Gly Glu Glu Thr Thr Ala Pro Pro Gln Lys Gln Glu
465 470 475 480

Pro Ile Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe
485 490 495

Gly Asn Asp Pro Ser Ser Gln
500

<210> 176
<211> 511
<212> PRT
<213> Human immunodeficiency virus

<400> 176

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro

```
        35                  40                  45

Gly Leu Leu Glu Thr Ala Gln Gly Cys Thr Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Glu Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
```

225 230 235 240

Ser Thr Leu Ala Glu Gln Met Ala Trp Ile Thr Gly Asn Pro Pro Val
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Thr Thr Asn Ile Met Met Gln Lys Ser Asn Phe Arg
370 375 380

Gly Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn

420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Pro Gln Ser Arg Leu
450 455 460

Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr
465 470 475 480

Thr Ala Leu Pro Gln Arg Gln Glu Leu Ile Asp Lys Glu Gln His His
485 490 495

Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
500 505 510

<210> 177
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<400> 177

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr His Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Phe Lys Ser Leu Tyr Asn
65 70 75 80

```
Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Gln Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Ser Gly Ser
        115                 120                 125

Ser Pro Ala Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln
    130                 135                 140

Met Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ala Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly
    210                 215                 220

Pro Val Ala Pro Gly Gln Val Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270
```

```
Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Gly Ser Ala Ala Thr Val Met Met Gln Arg
    370                 375                 380

Gly Asn Phe Lys Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly
                405                 410                 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu
            420                 425                 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
        435                 440                 445

Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala
    450                 455                 460
```

```
Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln
465                 470                 475                 480


Glu Leu Val Asp Lys Glu Met Tyr Pro Pro Leu Thr Ser Leu Arg Ser
                485                 490                 495


Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505


<210>  178
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus

<400>  178

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Lys Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Gln Ser Leu His Asn
65                  70                  75                  80


Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ile Lys
            100                 105                 110
```

```
Lys Arg Ala Gln Gln Ala Ala Ala Asp Thr Lys Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Val Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Gly Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Ala Glu Glu Thr Ala Thr Pro Pro Gln Lys Arg Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495
```

Pro Ser Ser Gln
500

<210> 179
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 179

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Thr Leu Gly Ala Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Asn Ile Glu Ile Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Arg Val Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Arg Thr Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

```
Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220


Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Thr Thr Ser Thr Asn Ile Met Met Gln Arg Gly Asn Phe Arg Asn
    370                 375                 380

Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
    450                 455                 460

Gly Glu Glu Thr Met Ala Ala Ala Pro Ser Gln Lys Gln Glu Pro Lys
465                 470                 475                 480

Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
                485                 490                 495

Asp Pro Leu Ser Gln
            500
```

<210> 180
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 180

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                  10                  15


Glu Arg Ile Arg Leu Arg Pro Gly Gly Asn Lys Arg Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Thr Leu Tyr Cys Val His Gln Gln Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Asn Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Ser Ser Gln Asn
        115                 120                 125


Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala Leu
    130                 135                 140


Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala
145                 150                 155                 160


Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly Ala
                165                 170                 175


Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln
```

180 185 190

Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu
195 200 205

Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln
210 215 220

Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu
225 230 235 240

Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile Pro Val Gly
245 250 255

Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg
260 265 270

Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu
275 280 285

Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu
290 295 300

Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val
305 310 315 320

Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro
325 330 335

Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly
340 345 350

Pro Ala His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Ala Thr
355 360 365

Gly Ala Ala Ala Asn Ile Met Met Gln Lys Gly Asn Phe Arg Asn Gln

370 375 380

Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala
385 390 395 400

Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Glu
405 410 415

Glu Gly His Gln Met Lys Asn Cys Pro Gly Arg Gln Ala Asn Phe Leu
420 425 430

Gly Lys Val Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu Gln
435 440 445

Ser Arg Pro Glu Pro Thr Ala Pro Ser Ala Pro Pro Ala Glu Ser Phe
450 455 460

Arg Phe Gly Glu Glu Met Thr Ala Pro Ser Gln Lys Gln Glu Thr Pro
465 470 475 480

Lys Glu Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 181
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 181

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

```
His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Ala Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Thr Gln Gln Ala Ala Ala Asp Thr Gly Ser Ser Ser Gln Val
        115                 120                 125

Ser His Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Thr Thr Asn Thr Thr Ala Met Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

```
Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Val Ala Thr Pro Val Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Met Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
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<210> 182
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 182

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Gly Glu Leu
    50                  55                  60
```

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Ala Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Pro Gly Lys Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Met His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Val
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys His Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Gln Asn Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Val Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
450 455 460

Val Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Pro Thr Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Ser Asp
485 490 495

Pro Ser Ser Gln
500

<210> 183
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

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<220>
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<222> (486)..(487)
<223> Xaa can be any naturally occurring amino acid

<400> 183

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Gly Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Xaa Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Xaa
35 40 45

Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

```
His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Xaa Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Asn Gly Asn
        115                 120                 125

Ser Xaa Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly
    130                 135                 140

Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala
    210                 215                 220

Gly Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Ile Thr Asn
                245                 250                 255
```

```
Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp
        275                 280                 285

Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Xaa Ser Gln Glu Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Xaa Gln Met Thr Ser Ser Ala Thr Ile Met Met Gln Arg
    370                 375                 380

Gly Asn Phe Arg Asn Xaa Arg Arg Thr Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly
                405                 410                 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Xaa Glu
            420                 425                 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
        435                 440                 445
```

Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu
450 455 460

Glu Ser Phe Arg Phe Gly Xaa Glu Lys Thr Thr Pro Ser Gln Lys Gln
465 470 475 480

Glu Xaa Ile Asp Lys Xaa Xaa Tyr Pro Leu Ala Ser Leu Lys Ser Leu
485 490 495

Phe Gly Asn Asp Pro Ser Ser Gln
500

<210> 184
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<220>
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<400> 184

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

```
Thr Val Ala Thr Leu Tyr Cys Val His Arg Lys Ile Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Arg Gln Val Ser
        115                 120                 125

Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln
    130                 135                 140

Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190

His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala Pro
    210                 215                 220

Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240

Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro
                245                 250                 255

Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
            260                 265                 270
```

```
Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg
    290                 295                 300

Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320

Leu Val Gln Asn Xaa Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Lys Asn
    370                 375                 380

Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Asp Cys Met Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
    450                 455                 460
```

Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp Lys
465 470 475 480

Glu Gln Tyr Pro Leu Thr Ala Leu Arg Ser Leu Phe Gly Ser Asp Pro
485 490 495

Ser Ser Gln

<210> 185
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<400> 185

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Xaa Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Xaa Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Ile Gln Leu
50 55 60

```
Gln Pro Ser Leu Xaa Thr Gly Ser Glu Glu Leu Xaa Ser Leu Xaa Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Xaa Cys Val His Gln Asn Ile Glu Val Xaa Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Thr Xaa Ala Gln Gln Ala Ala Ala Asn Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Asn Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Ile Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Ser Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Xaa Thr Xaa Val Met Met Gln Arg Gly Asn Xaa Arg
    370                 375                 380

Asn Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

```
Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Ser Xaa Lys Gln Glu Gln Ile Asp
465                 470                 475                 480


Lys Asp Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500


<210>  186
<211>  499
<212>  PRT
<213>  Human immunodeficiency virus


<220>
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<223>  Xaa can be any naturally occurring amino acid
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<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 186

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Met Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Leu Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Xaa Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Xaa Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
```

```
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Glu Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
```

355 360 365

Gln Val Thr Ser Ser Ala Asn Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Xaa
385 390 395 400

Ala Lys Asn Cys Arg Ala Pro Xaa Lys Arg Gly Cys Trp Lys Cys Gly
405 410 415

Lys Xaa Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
420 425 430

Leu Xaa Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
435 440 445

Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
450 455 460

Gly Glu Glu Thr Thr Thr Cys Ser Gln Lys Gln Glu Gln Ile Asp Lys
465 470 475 480

Glu Met Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
485 490 495

Ser Ser Gln

<210> 187
<211> 499
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<400> 187

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Arg Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20   25   30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

Gly Leu Leu Glu Ser Ser Glu Gly Cys Lys Gln Ile Leu Ala Gln Leu
    50   55   60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65   70   75   80

Thr Val Ser Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85   90   95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100   105   110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Ser Gln
        115   120   125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130   135   140

His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile
145   150   155   160

```
Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Arg Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Xaa Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Cys Thr Gln Asp Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350
```

```
Gly Val Gly Xaa Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Lys Ala Asn Ser Thr Thr Ile Met Val Gln Arg Gly Gln Phe Lys
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Val Glu Ser Phe Gly
    450                 455                 460

Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu Pro Asp Lys
465                 470                 475                 480

Asp Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495

Leu Ser Gln
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<210> 188
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>

<221> misc_feature
<222> (15)..(15)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (190)..(190)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (216)..(216)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (269)..(269)
<223> Xaa can be any naturally occurring amino acid

<400> 188

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Xaa Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Lys Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Glu Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

```
Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Gly Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Xaa Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu Xaa Pro Ala Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Thr Thr Gly Asn Pro Ala Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Xaa Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

His Leu Thr Asn Ser Ala Val Met Met Gln Arg Gly Asn Phe Lys Asn
    370                 375                 380

Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Asp Gly His Leu
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Asp Cys Asp Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg Phe
    450                 455                 460

Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp Lys
465                 470                 475                 480

Glu Pro Leu Tyr Pro Ser Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495
```

Pro Leu Leu Gln
500

<210> 189
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 189

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Ala Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Arg Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
130 135 140

```
Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220


Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Ala Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Asp Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Ile Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Gln Ile Asp
465                 470                 475                 480

Lys Glu Lys Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 190
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (58)..(58)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (63)..(63)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (79)..(79)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (82)..(82)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (90)..(90)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (94)..(94)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (122)..(122)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (216)..(216)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (268)..(268)
<223> Xaa can be any naturally occurring amino acid

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<221> misc_feature
<222> (292)..(292)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (307)..(307)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (384)..(384)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (389)..(389)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (409)..(409)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (462)..(462)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (486)..(486)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (488)..(488)
<223> Xaa can be any naturally occurring amino acid

<400> 190

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Xaa Gln Ile Leu Gly Xaa Leu
    50                  55                  60

Gln Pro Ser Leu Gln Ala Gly Ser Glu Glu Leu Lys Ser Leu Xaa Asn
65                  70                  75                  80

Thr Xaa Ala Val Leu Tyr Cys Val His Xaa Arg Ile Glu Xaa Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Gln Ala Gln Gln Ala Ala Ala Asp Xaa Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Asp Trp Asp Arg Leu Xaa Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Xaa Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Xaa Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Xaa Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Asn Thr Ile Met Met Gln Arg Gly Asn Phe Xaa
    370                 375                 380

Asn Gln Arg Lys Xaa Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Xaa Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415
```

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Xaa Phe Arg
450 455 460

Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu Gln Thr Asp
465 470 475 480

Lys Glu Leu Tyr Pro Xaa Thr Xaa Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Leu Ser Gln
500

<210> 191
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (207)..(207)
<223> Xaa can be any naturally occurring amino acid

<400> 191

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Ser Pro Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Gln Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Pro Gln Ala Gln Ala Ala Ala Ala Asp Thr Gly Asn Arg
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Xaa Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240
```

```
Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Ser Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Ser Pro Ala Thr Val Met Met Gln Arg Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Asp Gly His Ile Ala Arg Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Pro Asn Arg
            420                 425                 430
```

```
Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Gly Thr Thr Thr Pro Pro Gln Lys Gln Glu
465                 470                 475                 480

Leu Ile Asp Lys Asp Leu Tyr Pro Ser Ala Ser Leu Lys Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Leu Leu Gln
            500
```

<210> 192
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 192

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80
```

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Ser Ser Gln Ser
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Ala Ile Met Met Gln Arg Gly Asn Ser Arg
    370                 375                 380

Pro Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Ile Gln Asn Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Ile Phe Arg
    450                 455                 460
```

```
Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Arg Asp
465                 470                 475                 480


Lys Glu Gln Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500


<210>  193
<211>  507
<212>  PRT
<213>  Human immunodeficiency virus


<220>
<221>  misc_feature
<222>  (166)..(166)
<223>  Xaa can be any naturally occurring amino acid

<220>
<221>  misc_feature
<222>  (325)..(325)
<223>  Xaa can be any naturally occurring amino acid

<400>  193

Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
```

65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Thr Gln Gln Ala Ala Ala Gly Ala Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
130 135 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145 150 155 160

Val Val Glu Glu Lys Xaa Phe Ser Pro Glu Val Ile Pro Met Phe Ser
165 170 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
180 185 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
195 200 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
210 215 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225 230 235 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
245 250 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly

260 265 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
275 280 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
290 295 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305 310 315 320

Thr Glu Thr Leu Xaa Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
325 330 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
340 345 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
355 360 365

Ala Met Ser Gln Val Thr Gly Pro Ala Ala Val Met Met Gln Arg Gly
370 375 380

Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys
385 390 395 400

Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
405 410 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
420 425 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
435 440 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro

450 455 460

Pro Glu Glu Ile Phe Arg Phe Gly Glu Glu Thr Thr Asn Pro Ser Gln
465 470 475 480

Lys Gln Glu Thr Met Glu Lys Glu Leu Tyr Pro Pro Leu Ala Ser Leu
485 490 495

Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 194
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (493)..(493)
<223> Xaa can be any naturally occurring amino acid

<400> 194

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Leu Val Trp Val Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Ile Glu Gln Leu
50 55 60

Pro Pro Ser Leu Pro Thr Gly Ser Glu Glu Leu Arg Ser Val Tyr Asn
65 70 75 80

```
Ala Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser
        115                 120                 125

Arg Gln Val Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Ile Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly
    210                 215                 220

Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270
```

```
Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly
    370                 375                 380

Asn Val Arg Asn Gln Arg Arg Ile Ile Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
    450                 455                 460
```

Ser Phe Arg Phe Gly Glu Glu Thr Ala Ala Pro Ser Gln Lys Gln Glu
465 470 475 480

Thr Ile Asp Lys Glu Met Tyr Pro Ile Thr Ser Leu Xaa Ser Leu Phe
485 490 495

Gly Asn Asp Pro Ser Ser Gln
500

<210> 195
<211> 497
<212> PRT
<213> Human immunodeficiency virus

<400> 195

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Lys Gln Ile Leu Asn Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Glu Ser Lys
100 105 110

Lys Lys Thr Gln Gln Ala Ala Ala Gly Thr Ser Gln Val Ser Gln Asn

```
        115                 120                 125

Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala Ile
    130                 135                 140

Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala
145                 150                 155                 160

Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly Ala
                165                 170                 175

Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln
            180                 185                 190

Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu
        195                 200                 205

Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln
    210                 215                 220

Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu
225                 230                 235                 240

Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile Pro Val Gly
                245                 250                 255

Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg
            260                 265                 270

Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu
        275                 280                 285

Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu
    290                 295                 300

Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val
```

```
305                 310                 315                 320

Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro
                325                 330                 335

Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly
            340                 345                 350

Pro Ala His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Val Thr
        355                 360                 365

Asn Pro Ala Thr Thr Met Met Gln Arg Gly Asn Phe Arg Asn Gln Arg
    370                 375                 380

Arg Val Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala Lys
385                 390                 395                 400

Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Gln Glu
                405                 410                 415

Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly
            420                 425                 430

Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser
        435                 440                 445

Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg Phe Gly Glu
    450                 455                 460

Glu Ile Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys Glu Leu
465                 470                 475                 480

Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser
                485                 490                 495

Gln
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<210> 196
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (91)..(91)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (125)..(125)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (127)..(127)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (130)..(130)
<223> Xaa can be any naturally occurring amino acid

<400> 196

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Leu Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn

65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Xaa Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Ala Gln Gln Ala Ala Ala Asp Thr Xaa Asn Xaa Ser
115 120 125

Gln Xaa Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
130 135 140

Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145 150 155 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
165 170 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
180 185 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
195 200 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Pro Gln Ala Gly Pro
210 215 220

Ile Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225 230 235 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Asn Asn Pro
245 250 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu

260 265 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
275 280 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
290 295 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305 310 315 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
325 330 335

Lys Ala Leu Gly Pro Gly Ala Ser Leu Glu Glu Met Met Thr Ala Cys
340 345 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
355 360 365

Met Ser Gln Met Thr Gly Ala Ala Asn Ser Ile Met Met Gln Arg Gly
370 375 380

Asn Phe Lys Asn Asn Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys
385 390 395 400

Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
405 410 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
420 425 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
435 440 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu

```
    450                 455                 460

Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Cys Gln Lys Gln Glu
465                 470                 475                 480

Pro Lys Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Ser Ser Gln
            500
```

<210> 197
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<400> 197

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Lys Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Gly Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Ile Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110
```

```
Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300
```

```
Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Ile Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Gln Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Thr Pro Pro Asn Ala Ile Met Met Gln Arg Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415

Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Thr Ala Pro
    450                 455                 460

Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr His Ser Gln
465                 470                 475                 480

Lys Gln Glu Thr Ile Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Lys
                485                 490                 495
```

Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 198
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<400> 198

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Pro Ala Ala Ala Ala Ala Ser Ala Gly Ser Asn Ser
115 120 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
130 135 140

```
Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335
```

```
Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Ala Thr Asn Ser Val Asn Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Arg Ser Pro Lys Arg Ile Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser
    450                 455                 460

Phe Lys Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Ile
465                 470                 475                 480

Ile Asp Arg Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu
                485                 490                 495

Phe Gly Ser Asp Pro Ser Ser Gln
            500
```

<210> 199
<211> 503
<212> PRT

<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (165)..(165)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (232)..(232)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (264)..(264)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (310)..(310)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (373)..(373)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (479)..(479)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (482)..(482)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (486)..(486)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (501)..(501)
<223> Xaa can be any naturally occurring amino acid

<400> 199

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Ala Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Ser Gln
115 120 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val
130 135 140

His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145 150 155 160

Glu Glu Lys Asn Xaa Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu
165 170 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Ile
180 185 190

```
Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Xaa Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Xaa Arg Trp Ile Val Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Xaa Ser Gln Glu Val Lys Gly Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Met Gly Pro Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Ser Xaa Ala Asn Ile Met Met Gln Arg Ser Asn Phe Arg
    370                 375                 380
```

```
Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Lys Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Gly Thr Thr Thr Pro Pro Gln Lys Xaa Glu
465                 470                 475                 480

Gln Xaa Asp Lys Glu Xaa Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Xaa Ser Gln
            500
```

<210> 200
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (116)..(116)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (298)..(298)

<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (407)..(407)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (477)..(477)
<223> Xaa can be any naturally occurring amino acid

<400> 200

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Arg Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

Gly Leu Leu Glu Ser Ala Gln Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50   55   60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65   70   75   80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Ile Lys Asp
                85   90   95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Thr Lys Ser Lys
            100   105   110

Lys Lys Ala Xaa Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115   120   125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Ala Val His
    130   135   140

```
Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Asp Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Xaa Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Gly Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg Ala
                325                 330                 335
```

```
Leu Gly Pro Gly Ala Gln Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Ser Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Asn Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Xaa Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Asp Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Gly
    450                 455                 460

Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Xaa Ser Ile Asp
465                 470                 475                 480

Lys Asp Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 201
<211> 502

<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (163)..(163)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (448)..(448)
<223> Xaa can be any naturally occurring amino acid

<400> 201

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ala Leu Lys Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Thr Ser
115 120 125

```
Thr Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Xaa Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Arg
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320
```

```
Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Met Thr Gln Pro Ala Thr Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Xaa
        435                 440                 445

Asn Phe Pro Gln Gly Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Gly
    450                 455                 460

Phe Arg Met Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Gly Ser
465                 470                 475                 480

Met Asn Lys Glu Leu Asn Pro Leu Val Ser Leu Lys Ser Leu Phe Gly
                485                 490                 495

Asn Asp Pro Ser Ser Gln
            500
```

<210> 202
<211> 509
<212> PRT
<213> Human immunodeficiency virus

<400> 202

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Gln Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Trp Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Leu Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Ala Gln Gln Ala Ala Ala Gly Thr
        115                 120                 125


Gly Asn Asn Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu
    130                 135                 140


Gln Gly Gln Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala
145                 150                 155                 160


Trp Val Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro
```

```
                165                 170                 175

Met Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr
            180                 185                 190

Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys
        195                 200                 205

Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val
    210                 215                 220

His Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser
225                 230                 235                 240

Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met
                245                 250                 255

Thr His Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile
            260                 265                 270

Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile
        275                 280                 285

Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp
    290                 295                 300

Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys
305                 310                 315                 320

Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys
                325                 330                 335

Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met
            340                 345                 350

Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val
```

```
        355                 360                 365

Leu Ala Glu Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met
    370                 375                 380

Gln Lys Gly Asn Phe Asn Tyr Gln Arg Lys Pro Ile Lys Cys Phe Asn
385                 390                 395                 400

Cys Gly Lys Ala Gly His Ile Ala Lys His Cys Lys Ala Pro Arg Lys
                405                 410                 415

Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys
            420                 425                 430

Asn Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys
        435                 440                 445

Gly Arg Pro Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro
    450                 455                 460

Pro Glu Glu Ile Phe Arg Phe Gly Glu Glu Thr Thr Pro Ser Gln Lys
465                 470                 475                 480

Gln Glu Thr Arg Asp Arg Asp Arg Asp Lys Glu Leu Tyr Pro Ser Ala
                485                 490                 495

Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Leu Leu Gln
            500                 505
```

<210> 203
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 203

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15
```

```
Glu Gly Ile Arg Leu Arg Pro Gly Gly Asn Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Pro Ala Ala Ala Asp Thr Gly Asn Ser Ser Ser Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205
```

```
Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Asn Leu Gln Glu Gln Ile Asn Trp Met Thr Gly Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Asn Gln Thr Asn Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400
```

```
His Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415


Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430


Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445


Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460


Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Arg
465                 470                 475                 480


Asp Arg Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe
                485                 490                 495


Gly Asn Asp Pro Ser Ser Gln
            500


<210>  204
<211>  499
<212>  PRT
<213>  Human immunodeficiency virus

<400>  204

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45
```

```
Gly Leu Leu Glu Thr Ala Gly Gly Cys Lys Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Lys Asp Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn His Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Met His Pro Val Gln Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Val Ala Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Thr Pro Gly Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Lys Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Ile Glu Arg Gln Ala Asn
            420                 425                 430
```

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Thr Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Val Glu Glu Lys Asn Pro Ser Gln Lys Gln Glu Gln Ile Asp Lys
465 470 475 480

Glu Leu Tyr Pro Ser Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
485 490 495

Ser Ser Gln

<210> 205
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 205

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Met Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

```
Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Asn Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Ser Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Ile Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Gly Ser Ala Asn Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460
```

Phe Gly Glu Glu Thr Thr Pro Pro Gln Lys Gln Glu Thr Thr Asp Lys
465 470 475 480

Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
485 490 495

Ser Ser Gln

<210> 206
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 206

Met Gly Ala Arg Ala Ser Val Ile Ser Gly Ala Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Ser Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Val Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Val Thr Leu Tyr Cys Val His Arg Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Asn Ala Gln Gln Val Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser

115 120 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
130 135 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145 150 155 160

Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
165 170 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
180 185 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
195 200 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
210 215 220

Pro Ala Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225 230 235 240

Gly Ser Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn
245 250 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
260 265 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
275 280 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
290 295 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met

```
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Ala Thr Gln Ser Asn Ala Ile Met Met Gln Arg Gly
    370                 375                 380

Asn Phe Lys Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415

Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro
    450                 455                 460

Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Lys Thr Ala Pro Val Gln
465                 470                 475                 480

Lys Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys
                485                 490                 495

Ser Leu Phe Gly Asn Asp Pro
```

500

<210> 207
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 207

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Thr Gly Thr Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

```
Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Ser Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Val Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
```

```
Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Asn Pro Asn Ala Ile Met Met Gln Arg Gly Asn Phe Arg Asn
    370                 375                 380

Gln Lys Arg Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His Leu
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu Ser
    450                 455                 460

Phe Arg Phe Gly Glu Gly Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro
465                 470                 475                 480

Lys Asp Lys Glu Leu Tyr Pro Val Thr Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495

Asn Asp Pro Ser Ser Gln
            500
```

<210> 208
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 208

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Ala Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Ile Arg Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Lys
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Ile Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Asp Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ile Ala Thr Pro Pro Ala Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380
```

```
Asn Gln Arg Lys Val Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Lys His Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu Pro Pro Val
465                 470                 475                 480


Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
                485                 490                 495


Asp Pro Ser Ser Gln
            500
```

<210> 209
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 209

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Leu Gly Arg Lys Lys Tyr Arg Leu Lys
            20                  25                  30
```

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Val Val Leu Tyr Cys Val His Gln Gly Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Glu Lys Ala Gln Gln Ala Ala Ala Asp Thr Arg Asn Lys Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335


Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350


Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365


Gln Val Thr Asn Pro Thr Asn Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380


Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

```
Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Met Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 210
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 210

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Thr Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Lys Gln Ile Leu Ala Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
```

65 70 75 80

Ala Val Ala Val Leu Tyr Cys Val His Arg Lys Ile Asp Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Val Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Arg Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Pro Ile Thr Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Asp Trp Met Thr His Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys

260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Gln Gly Thr Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys His Cys Lys Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Gly

```
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Gly Thr Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 211
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 211

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Thr Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110
```

```
Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Ser Asn Ser
        115                 120                 125

Lys Val Ser Gln Asn Tyr Pro Val Val Gln Asn Met Gln Gly Gln Met
    130                 135                 140

Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Ile Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Asp Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Arg
    290                 295                 300
```

```
Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Ile Ala Thr Pro Pro Thr Val Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Val Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Pro Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser
    450                 455                 460

Leu Arg Glu Glu Thr Ile Thr Pro Pro Gln Arg Gln Glu Pro Pro Val
465                 470                 475                 480

Asp Lys Glu Met Tyr Pro Trp Ala Ser Leu Lys Ser Leu Phe Gly Asn
                485                 490                 495
```

Asp Pro Ser Ser Gln
500

<210> 212
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 212

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Ser Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Val Glu Arg Leu Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Pro Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Ala Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Asp Thr Gly Asn Ser Asn Gln
115 120 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
130 135 140

```
His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Val Gly Trp Met Thr Ser Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335
```

```
Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Asn Gln Thr Ala Val Met Met Gln Arg Gly Lys Phe
    370                 375                 380

Thr Asn Gln Arg Lys Pro Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Ser Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Met Glu Ser Phe
    450                 455                 460

Arg Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Gln Thr
465                 470                 475                 480

Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
                485                 490                 495

Asp Pro Ser Ser Gln
            500
```

<210> 213
<211> 504
<212> PRT

<213> Human immunodeficiency virus

<400> 213

```
Met Gly Ala Arg Ala Ser Val Ile Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Ser Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Tyr Ala Ile Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Gly Ala Gly Cys Lys Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Ala Ile Ala Val Leu Phe Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Arg Ile Gln Gln Ala Gln Gln Ala Ala Ala Ala Asp Thr Gly Asn
        115                 120                 125


Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly
    130                 135                 140


Gln Met Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160


Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175
```

```
Ser Ala Leu Ala Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala
    210                 215                 220

Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His
                245                 250                 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp
        275                 280                 285

Ile Arg Gln Gly Pro Lys Glu Ser Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
        355                 360                 365
```

```
Glu Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys
    370                 375                 380

Gly Asn Phe Arg Asn Gln Arg Lys Val Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly
                405                 410                 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Ser Glu
            420                 425                 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
        435                 440                 445

Pro Gly Asn Phe Leu Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Glu
    450                 455                 460

Glu Ser Phe Arg Phe Gly Glu Glu Lys Ala Pro Pro Pro Gln Lys Gln
465                 470                 475                 480

Glu Ala Val Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu
                485                 490                 495

Phe Gly Asn Asp Pro Ser Ser Gln
            500
```

<210> 214
<211> 508
<212> PRT
<213> Human immunodeficiency virus

<400> 214

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15

Glu Lys Ile Gln Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
```

```
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Lys Gln Ile Leu Ala Gln Leu
    50                  55                  60

Gln Pro Ser Leu Lys Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Gln Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Lys Ser Glu
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser
        115                 120                 125

Arg Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
```

```
    210                 215                 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Asn Ser Ala Thr Val Met Met Gln Lys Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
```

405 410 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Met Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Lys Pro Glu Pro Thr Ala Pro Leu Glu Pro Thr
450 455 460

Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Arg Thr Thr Pro
465 470 475 480

Ser Gln Lys Gln Glu Pro Ile Asp Lys Gly Leu Tyr Pro Leu Ala Ser
485 490 495

Leu Arg Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
500 505

<210> 215
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 215

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Ser Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

```
His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Gln Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Lys Asn Asn Ser Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255
```

```
Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Gly Ser Gln Glu Val Lys Thr Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Lys Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Arg Glu Gly
385                 390                 395                 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445
```

```
Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460


Arg Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu Pro Ile
465                 470                 475                 480


Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
                485                 490                 495


Asp Pro Ser Ser Gln
            500


<210>  216
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus

<400>  216

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ala Leu Asn Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95
```

```
Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Lys Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Thr Asn Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Gly Thr Thr Ile Pro Ser Gln Lys Gln Glu Gln Ile Asp
465                 470                 475                 480
```

```
Lys Glu Met Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500
```

<210> 217
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 217

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Thr Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Lys Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Arg Glu Gln Gln Val Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125
```

```
Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ser Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Asp Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ala Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Gly Trp Met Thr Glu Thr
305                 310                 315                 320
```

```
Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Val Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Gly Thr Ile Asp
465                 470                 475                 480

Lys Asp Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 218
<211> 508
<212> PRT
<213> Human immunodeficiency virus

<400> 218

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Arg Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Ser Ser Gln Val
        115                 120                 125


Ser Gln Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly
    130                 135                 140


Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160


Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
```

```
                165                 170                 175

Ser Ala Leu Ser Glu Gly Ala Thr Pro Gly Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Ile Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala
    210                 215                 220

Gly Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser
                245                 250                 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp
        275                 280                 285

Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
```

355 360 365

Glu Ala Met Ser Gln Val Thr Thr Pro Pro Ala Ile Met Met Gln Arg
370 375 380

Gly Asn Phe Arg Asn Gln Arg Lys Val Val Lys Cys Phe Asn Cys Gly
385 390 395 400

Lys Glu Gly His Val Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly
405 410 415

Cys Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu
420 425 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg
435 440 445

Pro Gly Asn Phe Leu Gln Asn Arg Thr Glu Asn Arg Ile Glu Pro Thr
450 455 460

Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro
465 470 475 480

Pro Gln Lys Gln Glu Pro Ile Asp Lys Glu Thr Tyr Pro Leu Thr Ser
485 490 495

Leu Arg Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
500 505

<210> 219
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 219

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
            20                  25                  30

His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly His Leu
    50                  55                  60

Gln Ser Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asp Ser Ser Lys Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205
```

```
Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Pro
    210                 215                 220

Ala Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Thr Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Ile Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Pro Thr Leu Glu Glu Met Met Ser Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser His Met Thr Asn Ala Asn Thr Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400
```

```
His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415


Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala
            420                 425                 430


Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445


Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460


Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Arg
465                 470                 475                 480


Asp Arg Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn
                485                 490                 495


Asp Pro Ser Ser Gln
            500
```

<210> 220
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (190)..(190)
<223> Xaa can be any naturally occurring amino acid

<400> 220

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
```

```
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Lys Ile Asp Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Ala Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Xaa Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
```

```
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Thr Ala Ser Ala Ala Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Lys Asn Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Arg Glu Gly
385                 390                 395                 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys
```

405 410 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
420 425 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
435 440 445

Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Ala Pro Pro Glu
450 455 460

Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Cys Gln Lys Gln
465 470 475 480

Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu
485 490 495

Phe Gly Asn Asp Pro Ser Ser Gln
500

<210> 221
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 221

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Ile Gly Gln Leu
50 55 60

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Thr Lys Val Gln Gln Ala Ala Ala Ala Ala Asn Ser Ser Gln Val Ser
        115                 120                 125

Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln
    130                 135                 140

Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190

His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro
    210                 215                 220

Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240

Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile Pro
                245                 250                 255
```

```
Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu Asn Lys Ile
            260                 265                 270

Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg
    290                 295                 300

Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Ile Arg Asn
    370                 375                 380

Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445
```

```
Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
    450                 455                 460


Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp Lys
465                 470                 475                 480


Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495


Ser Ser Gln



<210>  222
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus


<220>
<221>  misc_feature
<222>  (64)..(64)
<223>  Xaa can be any naturally occurring amino acid

<220>
<221>  misc_feature
<222>  (219)..(219)
<223>  Xaa can be any naturally occurring amino acid

<220>
<221>  misc_feature
<222>  (391)..(391)
<223>  Xaa can be any naturally occurring amino acid

<400>  222

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30
```

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Gly Gln Xaa
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Xaa Ala Gly Pro Ile Ala
    210                 215                 220
```

```
Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Met Thr Asn Ser Thr Asn Ile Met Met Gln Arg Gly Asn Ile Arg
    370                 375                 380

Asn Gln Lys Arg Thr Val Xaa Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

```
Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Ser
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Lys Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 223
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<400> 223

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Glu Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Ser Ser Leu Gln Thr Gly Ser Glu Asp Leu Lys Ser Val Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Arg Ala Gln Gln Ala Ala Ala Ala Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Gly
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Thr Asp Pro Thr Ala Pro
450 455 460

Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln
465 470 475 480

Lys Gln Glu Gln Thr Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg
485 490 495

Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 224
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (23)..(23)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (61)..(61)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (188)..(188)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (281)..(281)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (363)..(363)
<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature
<222> (370)..(370)
<223> Xaa can be any naturally occurring amino acid

<400> 224

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Xaa Gly Gly Lys Lys Gln Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Ala Gly Cys Arg Gln Ile Xaa Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Gln Val Ser Asp
85 90 95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Lys Ile Lys
100 105 110

Lys Lys Ala Gln Gln Glu Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Pro Met Ser Ala Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

```
Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Xaa Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Xaa Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Xaa Ala Glu Ala Met Ser
        355                 360                 365
```

```
Gln Xaa Thr Asn Ser Ala Thr Val Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Arg Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Gly Ala Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Gly Thr Thr Thr Pro Ser Gln Lys Gln Glu
465                 470                 475                 480

Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Ser Ser Gln
            500
```

<210> 225
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (472)..(472)
<223> Xaa can be any naturally occurring amino acid

<400> 225

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Ser Ser Pro Ala
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
```

180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Ala Asn Ile Met Met Gln Lys Gly Asn Phe

370 375 380

Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385 390 395 400

His Met Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
405 410 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala
420 425 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
435 440 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe
450 455 460

Arg Phe Gly Glu Glu Thr Thr Xaa Pro Ala Pro Lys Gln Glu Pro Ile
465 470 475 480

Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 226
<211> 507
<212> PRT
<213> Human immunodeficiency virus

<400> 226

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Ile Gln Leu
    50                  55                  60

Gln Pro Ser Leu Lys Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Asp Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Thr Gln Gln Ala Ala Ala Asp Ala Gly Asn Ser Asn Thr Gly
        115                 120                 125

Asn Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Val Gln
    130                 135                 140

Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp
145                 150                 155                 160

Val Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met
                165                 170                 175

Phe Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
            180                 185                 190

Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu
        195                 200                 205

Thr Ile Asn Asp Glu Ala Ala Glu Trp Asp Arg Thr His Pro Val His
    210                 215                 220
```

```
Ala Gly Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp
225                 230                 235                 240

Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr
                245                 250                 255

His Asn Pro Pro Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile
            260                 265                 270

Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu
        275                 280                 285

Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg
    290                 295                 300

Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn
305                 310                 315                 320

Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys
                325                 330                 335

Thr Ile Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met
            340                 345                 350

Thr Ala Cys Gln Gly Val Gly Gly Pro Ala His Lys Ala Arg Val Leu
        355                 360                 365

Ala Glu Ala Met Ser Gln Val Thr Asn Ser Thr Ser Ala His Ile Met
    370                 375                 380

Met Gln Lys Gly Asn Phe Arg Asn Gln Arg Lys Asn Val Lys Cys Phe
385                 390                 395                 400

Asn Cys Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg
                405                 410                 415
```

```
Arg Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp
            420                 425                 430

Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His
        435                 440                 445

Lys Gly Arg Pro Gly Asn Phe Pro Gln Ser Arg Leu Glu Pro Thr Ala
    450                 455                 460

Pro Pro Glu Glu Ser Ile Arg Phe Gly Glu Glu Thr Thr Ala Pro Pro
465                 470                 475                 480

Gln Lys Gln Glu Thr Thr Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu
                485                 490                 495

Arg Ser Leu Phe Gly Ser Asp Pro Ser Leu Gln
            500                 505
```

<210> 227
<211> 494
<212> PRT
<213> Human immunodeficiency virus

<400> 227

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Glu Lys Leu Asp Lys Trp
1               5                   10                  15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Lys Gln Ile Leu Ala Gln Leu
    50                  55                  60
```

```
Gln Pro Ser Leu Pro Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Ala Ile Ala Val Leu Tyr Cys Val His Arg Gly Ile Glu Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Gln Ala Gln Gln Ala Ala Ala Asp Asn Ser Gln Val Ser Gln Asn
        115                 120                 125

Phe Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His Gln Ala Ile
    130                 135                 140

Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala
145                 150                 155                 160

Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly Ala
                165                 170                 175

Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln
            180                 185                 190

Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu
        195                 200                 205

Trp Asp Arg Val His Pro Val His Ala Gly Pro Val Ala Pro Gly Gln
    210                 215                 220

Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu
225                 230                 235                 240

Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro Val Gly
                245                 250                 255
```

```
Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg
            260                 265                 270

Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu
        275                 280                 285

Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu
    290                 295                 300

Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val
305                 310                 315                 320

Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro
                325                 330                 335

Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly
            340                 345                 350

Pro Gly His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser Gln Val Thr
        355                 360                 365

Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg Gly Gln Arg
    370                 375                 380

Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala Lys
385                 390                 395                 400

Asn Cys Lys Ala Pro Arg Arg Arg Gly Cys Trp Lys Cys Gly Lys Glu
                405                 410                 415

Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly
            420                 425                 430

Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser
        435                 440                 445
```

```
Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu
    450                 455                 460


Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Lys Asp Lys Glu Met
465                 470                 475                 480


Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
                485                 490


<210>  228
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus

<400>  228

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Asn Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Ile Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110
```

```
Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Asn Ser Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Pro Arg Lys Ala Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495
```

Pro Ser Ser Gln
500

<210> 229
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 229

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Pro Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln
115 120 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
130 135 140

His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val

```
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Ala
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
```

340 345 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
355 360 365

Ser Gln Val Thr Asn Gln Thr Thr Ile Met Met Gln Arg Gly Asn Phe
370 375 380

Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385 390 395 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
405 410 415

Cys Gly Glu Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
420 425 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
435 440 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
450 455 460

Arg Phe Gly Glu Glu Thr Ala Thr Pro Thr Gln Lys Gln Glu Pro Ile
465 470 475 480

Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
485 490 495

Asp Pro Leu Ser Gln
500

<210> 230
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 230

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Ala Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Thr Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Ala Ala Val Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380
```

```
Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Ala Ala Ala Pro Pro Gln Lys Gln Glu Pro Thr Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Phe Ser Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500


<210>  231
<211>  502
<212>  PRT
<213>  Human immunodeficiency virus


<220>
<221>  misc_feature
<222>  (372)..(372)
<223>  Xaa can be any naturally occurring amino acid

<400>  231

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
```

```
1               5                   10                  15

Glu Lys Ile Tyr Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
```

195 200 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
210 215 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225 230 235 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
245 250 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
260 265 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg
275 280 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
290 295 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305 310 315 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
325 330 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
340 345 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
355 360 365

Met Asn Gln Xaa Thr Asn Ser Asn Thr Ile Met Met Gln Arg Gly Asn
370 375 380

Phe Arg Asn Gln Gly Lys Asn Ile Lys Cys Phe Asn Cys Gly Lys Val

385 390 395 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
405 410 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Gly Thr Ala Pro Pro Ala Pro Lys Gln Glu Gln
465 470 475 480

Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 232
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 232

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Gly Ile Glu Ile Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Ala Ala Ala Ala Asp Thr Glu Ser Ser Arg Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Val Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Val
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Lys Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Ala Val Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Ser Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Arg Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Ser Glu Arg Gln Ala Asn
            420                 425                 430
```

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Ala Pro Pro Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 233
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 233

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Tyr Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Arg Ala Gln Pro Ala Ala Ala Ala Asp Thr Gly Asn Asn Ser Asn
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ser Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro His Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Asp
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Thr Thr Asn Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270
```

```
Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Asn Ala Asn Ala Ile Met Ile Gln Arg Gly Asn Phe
    370                 375                 380

Lys Gly Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Gln Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Lys Ser Leu
    450                 455                 460
```

```
Arg Phe Gly Glu Gly Thr Thr Pro Pro Ser Gln Lys Gln Glu Pro Ile
465                 470                 475                 480


Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
                485                 490                 495


Asp Pro Ser Ser Gln
            500


<210>  234
<211>  512
<212>  PRT
<213>  Human immunodeficiency virus

<400>  234

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Ala Ile Ala Val Leu Tyr Cys Val His Gln Asn Ile Glu Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110
```

```
Lys Lys Thr Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Gly Asn Thr
        115                 120                 125

Gly Asn Ser Ser His Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu
    130                 135                 140

Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala
145                 150                 155                 160

Trp Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro
                165                 170                 175

Met Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr
            180                 185                 190

Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys
        195                 200                 205

Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val
    210                 215                 220

His Ala Gly Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser
225                 230                 235                 240

Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met
                245                 250                 255

Thr Asn Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile
            260                 265                 270

Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile
        275                 280                 285

Leu Asp Ile Lys Gln Gly Pro Lys Glu Ser Phe Arg Asp Tyr Val Asp
    290                 295                 300
```

```
Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys
305                 310                 315                 320


Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys
                325                 330                 335


Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met
            340                 345                 350


Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val
        355                 360                 365


Leu Ala Glu Ala Met Ser Gln Val Thr Asn Ser Thr Ala Ile Met Met
    370                 375                 380


Gln Lys Gly Asn Phe Lys Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn
385                 390                 395                 400


Cys Gly Lys Glu Gly His Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys
                405                 410                 415


Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys
            420                 425                 430


Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys
        435                 440                 445


Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro
    450                 455                 460


Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu
465                 470                 475                 480


Thr Ala Thr Pro Pro Gln Gly Gln Arg Gln Thr Asp Lys Asp Leu Tyr
                485                 490                 495
```

Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505 510

<210> 235
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 235

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Val Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Val Lys
100 105 110

Lys Lys Thr Gln Gln Ala Ala Ala Asp Thr Glu Ser Lys Ser Pro Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu

```
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Arg Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
```

340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Gly
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Lys Lys Ile Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His Ile
385 390 395 400

Ala Arg Asn Cys Lys Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys Gly
405 410 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
420 425 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
435 440 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
450 455 460

Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Thr Val Asp Lys
465 470 475 480

Glu His Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
485 490 495

Ser Ser Gln

<210> 236
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 236

```
Met Gly Ala Gly Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Phe Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Ala Gly Thr Gly Thr Ser Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190
```

```
Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser His Val Thr Asn Ala Asn Thr Ile Met Met Gln Arg Gly Asn
    370                 375                 380
```

```
Phe Lys Asn Gln Lys Lys Val Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400


Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
                405                 410                 415


Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430


Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445


Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser
    450                 455                 460


Phe Gly Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro
465                 470                 475                 480


Ile Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495


Ser Asp Pro Ser Ser Gln
            500


<210>  237
<211>  501
<212>  PRT
<213>  Human immunodeficiency virus

<400>  237

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30
```

```
His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Tyr Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Lys Gln Ile Ile Ala Gln Leu
    50                  55                  60

Gln Pro Ser Ile Pro Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Ala Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Asp Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Met Thr Gly Ser Ala Thr Val Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

```
Gly Arg Glu Gly His Gln Met Lys Asp Cys Asn Asn Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460

Arg Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu Pro Arg
465                 470                 475                 480

Asp Lys Asp Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
                485                 490                 495

Asp Pro Ser Ser Gln
            500
```

<210> 238
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 238

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ala Leu Gly Thr Gly Thr Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Ala Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Thr Gln Gln Ala Glu Ala Asp Thr Gly Asn Arg Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ala Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Asp Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Thr Val Met Val Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 239
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 239

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Arg Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys

100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Asn Ser Lys Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Pro Met Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Ser Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu

290 295 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Thr Asn Ile Met Met Gln Arg Gly Asn Phe Arg Asn
370 375 380

Gln Arg Gln Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385 390 395 400

Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys Gly
405 410 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
420 425 430

Leu Gly Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro Gly Asn Phe Leu
435 440 445

Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Arg Gly Glu Thr Thr Thr Pro Pro Gln Arg Gln Glu Pro
465 470 475 480

Thr Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly

485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 240
<211> 497
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (193)..(193)
<223> Xaa can be any naturally occurring amino acid

<400> 240

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ala Lys
100 105 110

```
Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Gln Val Ser
        115                 120                 125

Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His Gln
    130                 135                 140

Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190

Xaa Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Asp Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala Pro
    210                 215                 220

Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240

Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile Pro
                245                 250                 255

Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
            260                 265                 270

Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg
    290                 295                 300
```

```
Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320


Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335


Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350


Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365


Ala Thr Gly Pro Ala Ala Ile Met Met Gln Arg Gly Asn Phe Arg Gly
    370                 375                 380


Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400


Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys Gly
                405                 410                 415


Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430


Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Pro
        435                 440                 445


Gln Asn Arg Leu Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg Glu
    450                 455                 460


Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp Lys Glu Leu
465                 470                 475                 480


Tyr Pro Ile Pro Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser
                485                 490                 495
```

Gln

<210> 241
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 241

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Asn Ser
115 120 125

Gln Ile Ser Gln Asn Tyr Pro Ile Val Gln Asn Val Gln Gly Gln Met
130 135 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val

```
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
```

340 345 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
355 360 365

Met Ser Gln Val Thr Asn Ser Thr Ala Thr Ala Met Met Gln Arg Gly
370 375 380

Asn Phe Arg Asn Gln Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Ala
385 390 395 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
405 410 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro
465 470 475 480

Lys Asp Lys Asp Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 242
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 242

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Ile Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Asp Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Thr Val Ala Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380
```

```
Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Arg Glu Gly His
385                 390                 395                 400


Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480


Lys Asp Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500
```

<210> 243
<211> 497
<212> PRT
<213> Human immunodeficiency virus

<400> 243

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Gln Tyr Lys Leu Lys
            20                  25                  30
```

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Ala Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220
```

```
Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Cys
        355                 360                 365

Gln Val Thr Asn Pro Ala Thr Val Met Met Gln Arg Gly Asn Leu Lys
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

```
Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Lys
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Gly Thr Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Gln
```

<210> 244
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 244

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Ser Tyr Gln Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Lys Gln Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Gln Ala Ala Ala Gly Thr Gly Ser Ser Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Ala His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro
                245                 250                 255
```

```
Pro Ile Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Ala Thr Asn Ser Ala Ala Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Tyr Lys Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445
```

Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Thr Thr Ala Pro Ser Gln Lys Gln Glu Pro
465 470 475 480

Thr Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 245
<211> 508
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (283)..(283)
<223> Xaa can be any naturally occurring amino acid

<400> 245

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Leu Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Val Tyr Asn
65 70 75 80

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Gln Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Asp Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270
```

```
Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Xaa Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Ser Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Lys Asn Gln Lys Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
    450                 455                 460
```

```
Phe Arg Phe Gly Glu Gly Thr Thr Thr Pro Thr Gln Lys Thr Thr Pro
465                 470                 475                 480


Ser Gln Glu Gln Glu Pro Ile Asp Lys Asp Leu Tyr Pro Leu Ala Ser
                485                 490                 495


Leu Lys Ser Leu Phe Gly Ser Asp Pro Ser Ser Gln
            500                 505


<210>  246
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus


<220>
<221>  misc_feature
<222>  (108)..(108)
<223>  Xaa can be any naturally occurring amino acid

<400>  246

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Ala Asp
                85                  90                  95
```

```
Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Xaa Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Pro Gly Ser Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Val Gln Gly Gly Asn Phe Lys
    370                 375                 380

Ser Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Thr Ile Asp
465                 470                 475                 480
```

Lys Glu Gly Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 247
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (170)..(170)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (192)..(192)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (246)..(246)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (249)..(249)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (252)..(252)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (277)..(277)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature

<222> (286)..(286)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (300)..(300)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (401)..(401)
<223> Xaa can be any naturally occurring amino acid

<400> 247

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Ile Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Asn
115 120 125

Gln Ala Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met

130 135 140

Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145 150 155 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Xaa Ile Pro Met Phe Ser Ala
165 170 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Xaa
180 185 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
195 200 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
210 215 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225 230 235 240

Thr Thr Ser Thr Leu Xaa Glu Gln Xaa Ala Trp Xaa Thr Asn Asn Pro
245 250 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
260 265 270

Asn Lys Ile Val Xaa Met Tyr Ser Pro Val Ser Ile Leu Xaa Ile Arg
275 280 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Xaa Arg Phe Tyr Lys
290 295 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305 310 315 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu

325 330 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
340 345 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
355 360 365

Met Ser Gln Val Asn Ser Thr Thr Ile Met Met Gln Lys Gly Lys Phe
370 375 380

Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385 390 395 400

Xaa Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
405 410 415

Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
420 425 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn
435 440 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe
450 455 460

Gly Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Asp Gln Lys
465 470 475 480

Glu Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
485 490 495

Asp Pro Leu Ser Gln
500

<210> 248

<211> 501
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (81)..(81)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (118)..(118)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (353)..(353)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (484)..(484)
<223> Xaa can be any naturally occurring amino acid

<400> 248

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Leu Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Xaa Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp

85 90 95

Thr Lys Asp Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Arg
100 105 110

Lys Lys Ala Gln Gln Xaa Ala Ala Asp Thr Gly Asn Asn Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly

```
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Xaa Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ser Asn Thr Ile Met Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460

Arg Phe Gly Lys Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile
```

465 470 475 480

Asp Lys Asp Xaa Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 249
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (462)..(462)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (469)..(469)
<223> Xaa can be any naturally occurring amino acid

<400> 249

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Val Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ala Met Val Gln Arg Ser Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Xaa Phe Arg
    450                 455                 460
```

Phe Gly Glu Glu Xaa Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu His Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 250
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (72)..(72)
<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 250

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Ala Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Met Gly Gln Leu
    50                  55                  60


His Pro Ser Leu Gln Thr Gly Xaa Glu Glu Leu Lys Ser Leu Xaa Asn
65                  70                  75                  80


Ala Ile Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Tyr Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Phe Pro Ile Xaa Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140
```

```
Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Xaa Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Val
                245                 250                 255

Pro Val Xaa Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Xaa Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Xaa His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ser Val Ala Met Thr Met Met Gln Arg Gly Xaa Phe
    370                 375                 380

Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Ser Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Val Pro Thr Ala Pro Pro Ala
    450                 455                 460

Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln
465                 470                 475                 480

Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu
                485                 490                 495

Phe Gly Asn Asp Pro Ser Ser Gln
            500
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<210> 251
<211> 500
<212> PRT

<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 251

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Leu Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Val Tyr Asn
65 70 75 80

Thr Ile Ala Thr Leu Xaa Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Arg Val Gln Gln Ala Ala Ala Ala Thr Gly Ile Ser Gly Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
130 135 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

```
Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
```

```
Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Ala Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Pro Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser Leu Arg
    450                 455                 460

Phe Gly Glu Glu Thr Ala Thr Pro His Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 252
<211> 497
<212> PRT
<213> Human immunodeficiency virus

<400> 252

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Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Asn Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Lys Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Ser Asn Gln Val Ser Gln Asn
        115                 120                 125

Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala Ile
    130                 135                 140

Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala
145                 150                 155                 160

Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly Ala
                165                 170                 175

Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln
            180                 185                 190
```

```
Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu
        195                 200                 205

Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln
    210                 215                 220

Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu
225                 230                 235                 240

Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro Val Gly
                245                 250                 255

Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg
            260                 265                 270

Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu
        275                 280                 285

Ser Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu
    290                 295                 300

Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val
305                 310                 315                 320

Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro
                325                 330                 335

Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly
            340                 345                 350

Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Val Thr
        355                 360                 365

Asn Pro Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg Asn Gln Arg
    370                 375                 380
```

```
Lys Thr Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His Ile Ala Lys
385                 390                 395                 400


Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Lys Glu
                405                 410                 415


Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly
            420                 425                 430


Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser
        435                 440                 445


Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu
    450                 455                 460


Glu Ala Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys Glu Leu
465                 470                 475                 480


Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser
                485                 490                 495


Gln
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<210> 253
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 253

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30
```

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Val Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Arg Ala Gln Gln Thr Ala Asp Thr Gly Lys Ser Ser Gln Val Ser
        115                 120                 125

Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln
    130                 135                 140

Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190

His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro
    210                 215                 220
```

```
Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240


Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro
                245                 250                 255


Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys Ile
            260                 265                 270


Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro
        275                 280                 285


Lys Glu Ser Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg
    290                 295                 300


Ala Glu Gln Cys Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320


Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335


Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350


Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365


Val Thr Asn Ser Thr Thr Ile Met Met Gln Arg Gly Asn Phe Arg Ser
    370                 375                 380


Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400


Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415
```

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
420 425 430

Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe Leu
435 440 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg Phe
450 455 460

Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp Arg
465 470 475 480

Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
485 490 495

Ser Ser Gln

<210> 254
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (69)..(69)
<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (148)..(148)

<223> Xaa can be any naturally occurring amino acid

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<222> (214)..(214)
<223> Xaa can be any naturally occurring amino acid

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<222> (252)..(252)
<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (478)..(478)
<223> Xaa can be any naturally occurring amino acid

<400> 254

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Xaa Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50   55   60

Gln Pro Ala Leu Xaa Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65   70   75   80

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Xaa Ala Ala Gly Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Leu Xaa Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Xaa Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Xaa Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Xaa Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Xaa Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Ser Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460
```

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Xaa Ile Asp
465 470 475 480

Lys Asp Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 255
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
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<400> 255

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Val Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

```
Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Thr Gly Asn Ser
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285
```

```
Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Arg Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Xaa Ile
                325                 330                 335

Leu Lys Ala Leu Gly Gln Gly Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Ala Thr Ser Val Asn Ile Met Met Gln Lys Gly Asn
    370                 375                 380

Phe Arg Gly Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Arg Glu
385                 390                 395                 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Ser Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Arg Ile Trp Ser Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Asn Arg Thr Glu Pro Thr Ala Pro Pro Glu Glu Ile
    450                 455                 460

Val Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Ser
465                 470                 475                 480
```

Gly Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Leu
500

<210> 256
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

<400> 256

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Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Phe Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Ala Val Ala Thr Leu Tyr Cys Val His Gln Xaa Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Gln Lys Ala Lys Gln Ala Ala Ala Gly Pro Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Xaa Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Xaa Met Leu Asn Thr Xaa Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Xaa Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Ser Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Ser Ser Ala Thr Val Met Met Gln Lys Gly Asn Phe Lys
    370                 375                 380
```

```
Ser Gln Lys Arg Asn Ile Lys Cys Phe Asn Cys Gly Arg Glu Gly His
385                 390                 395                 400


Leu Ala Arg Xaa Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser Ser Arg Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Thr Lys Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500


<210>  257
<211>  502
<212>  PRT
<213>  Human immunodeficiency virus


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<221> misc_feature
<222> (286)..(286)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (333)..(333)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (392)..(392)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (407)..(407)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (454)..(454)
<223> Xaa can be any naturally occurring amino acid

<400> 257

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Xaa Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Ala Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Val Gln Gln Ala Thr Ala Asp Thr Gly Asn Ser Asn Ser Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Xaa Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Xaa Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240
```

```
Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Xaa Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Asn Ile Leu Xaa Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Xaa Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Ser Ser Ala Thr Ile Met Met Gln Lys Gly Asn
    370                 375                 380

Phe Lys Asn Gln Arg Lys Ala Xaa Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Arg Asn Xaa Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430
```

```
Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445


Asn Phe Leu Gln Ser Xaa Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
    450                 455                 460


Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro
465                 470                 475                 480


Ile Asp Lys Asp Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495


Asn Asp Pro Ser Ser Gln
            500


<210>  258
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus

<400>  258

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Gly Gly Cys Lys Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Ser Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80
```

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Lys Ser Ser Leu Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Ile Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Lys Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460
```

Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Gly Thr Ile Asp
465 470 475 480

Lys Glu Leu Pro Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Leu Ser Gln
500

<210> 259
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (324)..(324)
<223> Xaa can be any naturally occurring amino acid

<400> 259

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ser Ile Asn Pro
35 40 45

Asn Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val Gln Gln Arg Ile Asp Val Lys Asp
85 90 95

```
Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Ala Lys Thr Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Ala Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Xaa Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu Lys Ala
                325                 330                 335


Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350


Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365


Gln Ala Gln Asn Ser Asn Ile Val Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380


Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Arg Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Ala Pro Ser Gln Lys Lys Glu Gln Gly Asp
465                 470                 475                 480
```

Lys Asp Lys Asp Leu Tyr Pro Leu Asn Ser Leu Arg Ser Leu Phe Gly
485 490 495

Asn Asp Pro Leu Ser Gln
500

<210> 260
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (195)..(195)
<223> Xaa can be any naturally occurring amino acid

<400> 260

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Leu
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Lys Gln Ile Leu Ile Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

```
Lys Lys Val Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Asn Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ser Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Xaa His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Val Ala Trp Met Thr Ser Asn Pro
                245                 250                 255

Pro Val Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300
```

```
Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Pro Ala Asn Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Lys Asn Gln Arg Arg Ile Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Val Ala Lys His Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Val Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ile
    450                 455                 460

Phe Arg Phe Gly Glu Glu Pro Thr Ala Pro Pro Gln Lys Gln Glu Ala
465                 470                 475                 480

Arg Asp Glu Lys Tyr Pro Leu Thr Ala Leu Arg Ser Leu Phe Gly Asn
                485                 490                 495
```

Asp Pro Ser Ser Gln
500

<210> 261
<211> 509
<212> PRT
<213> Human immunodeficiency virus

<400> 261

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr
115 120 125

Gly Asn Ser Lys Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met
130 135 140

```
Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala
145                 150                 155                 160

Trp Val Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro
                165                 170                 175

Met Phe Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr
            180                 185                 190

Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys
        195                 200                 205

Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Val His Pro Val
    210                 215                 220

His Ala Gly Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser
225                 230                 235                 240

Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Val Gly Trp Met
                245                 250                 255

Thr Ser Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile
            260                 265                 270

Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile
        275                 280                 285

Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp
    290                 295                 300

Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys
305                 310                 315                 320

Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys
                325                 330                 335
```

```
Lys Thr Ile Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met
            340                 345                 350

Met Thr Ala Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val
        355                 360                 365

Leu Ala Glu Ala Met Ser Gln Ala Thr Asn Ala Ala Thr Ile Met Met
    370                 375                 380

Gln Lys Gly Asn Phe Arg Asn Gln Arg Lys Pro Val Lys Cys Phe Asn
385                 390                 395                 400

Cys Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys
                405                 410                 415

Arg Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys
            420                 425                 430

Thr Glu Arg Gln Val Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys
        435                 440                 445

Gly Arg Pro Gly Asn Phe Leu Gln Asn Arg Leu Glu Pro Thr Ala Pro
    450                 455                 460

Ser Ala Pro Pro Ala Glu Ser Phe Gly Phe Gly Glu Glu Thr Ala Thr
465                 470                 475                 480

Pro Pro Gln Lys Gln Glu Gln Ile Asp Lys Glu Leu Tyr Pro Leu Thr
                485                 490                 495

Ser Leu Lys Ser Leu Phe Gly Asn Asp Leu Leu Ser Gln
            500                 505
```

<210> 262
<211> 499
<212> PRT

<213> Human immunodeficiency virus

<400> 262

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Arg Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Asn Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175
```

```
Glu Gly Ala Thr Pro Gly Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Cys Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365
```

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Lys
370 375 380

Asn Gln Arg Lys Asn Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Arg Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Ser Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Leu Gly Glu Glu Thr Thr Pro Pro Gln Arg Arg Glu Ser Ile Asp Lys
465 470 475 480

Glu Lys Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
485 490 495

Leu Ser Gln

<210> 263
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 263

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys

```
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Phe Arg Ser Leu Tyr Asn
65                  70                  75                  80

Ala Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Thr Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Ala Thr Gly Asn Ser
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Leu Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
```

```
    210                 215                 220

Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn
                245                 250                 255

Pro Pro Ile Gln Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Arg Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Asn Pro Thr Thr Ile Met Met Gln Lys Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Arg Ser Ile Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Thr Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
```

405 410 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
420 425 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
435 440 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu
450 455 460

Ser Phe Gly Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu
465 470 475 480

Thr Val Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe
485 490 495

Gly Asn Asp Pro Ser Ser Gln
500

<210> 264
<211> 507
<212> PRT
<213> Human immunodeficiency virus

<400> 264

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Tyr Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

```
Gln Pro Ser Leu Pro Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Val Gln Gln Glu Ala Ala Ala Ala Asp Thr Gly Asn Asn Asn
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln His
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro
                245                 250                 255
```

```
Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Asn Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn
    370                 375                 380

Phe Arg Asp Lys Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Arg Glu
385                 390                 395                 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly
        435                 440                 445
```

```
Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Pro Ser
    450                 455                 460

Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Pro Ala
465                 470                 475                 480

Gln Lys Gln Glu Arg Thr Asp Arg Glu Leu Tyr Pro Leu Ala Ser Leu
                485                 490                 495

Arg Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
            500                 505
```

<210> 265
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 265

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Met Glu Ile Lys Asp
                85                  90                  95
```

```
Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Arg Thr Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Ala Gln Gln Ala Ala Ala Ala Asp Thr Gly Asn Ser
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ala Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Asn Pro Glu Val Ile Pro Met Phe Ala
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly
            260                 265                 270

Leu Asn Lys Ile Val Lys Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile
        275                 280                 285
```

```
Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu
465                 470                 475                 480
```

Gln Thr Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
485 490 495

Gly Asn Asp Pro Ser Ser Gln
500

<210> 266
<211> 497
<212> PRT
<213> Human immunodeficiency virus

<400> 266

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Asn Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Lys Gln Leu
50 55 60

His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Gln Cys Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Ser Ser Ser Gln Ala
115 120 125

```
Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Ala Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320
```

```
Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Ser Ser Ala Ala Ile Met Met Gln Arg Gly Asn Phe Gly
    370                 375                 380

Asp Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His
385                 390                 395                 400

Val Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Gly Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ala His Arg Asp Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Gly Lys Glu Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Ser Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro
```

<210> 267
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 267

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Lys Leu
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Thr Lys Ser Lys
            100                 105                 110


Lys Lys Thr Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Gln Val
        115                 120                 125


Lys Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140


Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160


Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
```

```
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala
```

```
        355                 360                 365

Met Ser Gln Ala Thr Asn Ser Asn Thr Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Ile Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Pro Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
    450                 455                 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Pro Lys Gln Glu Pro
465                 470                 475                 480

Ile Asp Lys Gly Leu Tyr Pro Ser Val Ser Leu Lys Ser Leu Phe Gly
                485                 490                 495

Asn Asp Pro Leu Ser Gln
            500
```

<210> 268
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 268

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Thr Trp
1               5                   10                  15
```

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Thr Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Met Gln Ser Lys Ser Lys
            100                 105                 110

Lys Pro Thr Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Arg Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205
```

```
Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Ala Val Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His
385                 390                 395                 400
```

```
Ile Ala Arg Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Gly
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Gln Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 269
<211> 508
<212> PRT
<213> Human immunodeficiency virus

<400> 269

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Ala Leu Asp Lys Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Gln Phe Lys
            20                  25                  30

His Ile Ile Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45
```

```
Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Thr Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Ile Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser
        115                 120                 125

Ser Thr Gly Asn Asn Ser Lys Val Ser Gln Asn Tyr Pro Ile Val Gln
    130                 135                 140

Asn Leu Gln Gly Gln Met Val His Gln Pro Ile Ser Pro Arg Thr Leu
145                 150                 155                 160

Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val
                165                 170                 175

Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu
            180                 185                 190

Asn Thr Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met
        195                 200                 205

Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His
    210                 215                 220

Pro Val Gln Ala Gly Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg
225                 230                 235                 240
```

```
Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly
                245                 250                 255

Trp Met Thr Ser Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg
            260                 265                 270

Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr
        275                 280                 285

Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr
    290                 295                 300

Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu
305                 310                 315                 320

Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro
                325                 330                 335

Asp Cys Arg Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu
            340                 345                 350

Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala
        355                 360                 365

Arg Val Leu Ala Glu Ala Met Ser Gln Val Thr Asn Ser Asn Thr Val
    370                 375                 380

Met Met Gln Lys Gly Asn Phe Lys Asn Gln Arg Lys Thr Val Lys Cys
385                 390                 395                 400

Phe Asn Cys Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro
                405                 410                 415

Arg Lys Arg Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys
            420                 425                 430
```

Asp Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser
435 440 445

His Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser
450 455 460

Ala Pro Pro Ala Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro
465 470 475 480

Pro Gln Lys Gln Glu Pro Met Asp Lys Glu Leu Tyr Pro Leu Ala Ser
485 490 495

Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 270
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<400> 270

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Asn Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Thr Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser
        115                 120                 125

Gln Gly Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270
```

```
Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Ala Thr Gly Ala Ala Thr Ile Leu Met Gln Arg Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Lys Asn Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
    450                 455                 460
```

Ser Phe Arg Phe Gly Glu Glu Thr Met Thr Pro Pro Gln Lys Lys Gln
465 470 475 480

Glu Pro Thr Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu
485 490 495

Phe Gly Asn Asp Pro Ser Ser Gln
500

<210> 271
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<400> 271

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Asp Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Thr Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asn Thr Gly Ala Ala Ala Ala Thr

```
        115                 120                 125

Gly Thr Ser Ser Gln Asp Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu
    130                 135                 140

Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala
145                 150                 155                 160

Trp Val Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro
                165                 170                 175

Met Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr
            180                 185                 190

Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys
        195                 200                 205

Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val
    210                 215                 220

His Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser
225                 230                 235                 240

Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met
                245                 250                 255

Thr Asn Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile
            260                 265                 270

Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile
        275                 280                 285

Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp
    290                 295                 300

Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys
```

305 310 315 320

Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys
325 330 335

Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met
340 345 350

Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val
355 360 365

Leu Ala Glu Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met
370 375 380

Gln Arg Gly Asn Phe Arg Ser Gln Arg Lys Ile Val Lys Cys Phe Asn
385 390 395 400

Cys Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys
405 410 415

Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys
420 425 430

Thr Asn Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His
435 440 445

Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala
450 455 460

Pro Pro Ala Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Ala Thr Ala
465 470 475 480

Pro Pro Gln Lys Gln Glu Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser
485 490 495

Leu Phe Gly Asn Asp Pro Leu Ser Gln

500 505

<210> 272
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<400> 272

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr His Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Thr Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Gly Val Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Ala Gly Asn Ser Ser Ser Gln
115 120 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
130 135 140

His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145 150 155 160

```
Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Val
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350
```

```
Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Cys Leu Val Thr Ser Pro Ala Thr Ile Met Met Gln Lys Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Arg Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys
                405                 410                 415

Cys Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Leu Trp Pro Ser His Arg Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460

Arg Phe Gly Glu Glu Thr Ile Thr Pro Ser Gln Lys Gln Glu Pro Pro
465                 470                 475                 480

Gln Lys Gln Glu Pro Glu Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser
                485                 490                 495

Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505
```

<210> 273
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 273

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Asn Val Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380
```

```
Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Leu Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Pro Ser Gln Lys Gln Gly Thr Ile Asp Lys
465                 470                 475                 480


Glu Leu Tyr Pro Trp Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495


Ser Ser Gln
```

<210> 274
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 274

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30
```

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Lys Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Ser Ser
        115                 120                 125

Gln Ala Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220
```

```
Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240


Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
                245                 250                 255


Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270


Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
        275                 280                 285


Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300


Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320


Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335


Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350


Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365


Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn
    370                 375                 380


Phe Arg Asn Gln Lys Lys Met Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400


Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415
```

Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro
465 470 475 480

Ile Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 275
<211> 498
<212> PRT
<213> Human immunodeficiency virus

<400> 275

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn

```
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asp Ser Ser Lys Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Ile Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Asp Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Ile Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
```

260 265 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Gln Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Asn Ile Met Met Gln Arg Gly Asn Phe Lys
370 375 380

Asn Gln Arg Arg Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ser Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg

450 455 460

Glu Glu Thr Thr Thr Leu Ser Gln Lys Gln Glu Pro Ile Asp Lys Glu
465 470 475 480

Met Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Leu
485 490 495

Ser Gln

<210> 276
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 276

Met Gly Ala Arg Ala Ser Val Leu Arg Gly Glu Lys Leu Asp Asp Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Asn Lys Lys Tyr Gln Leu Arg
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Ala Gly Cys Arg Gln Ile Ile Thr Gln Leu
50 55 60

Gln Pro Ser Ile Gln Thr Gly Ser Glu Glu Ile Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Glu Arg Ile Lys Val Ala Asp
85 90 95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Ala Lys Ser Lys
100 105 110

```
Lys Lys Ala Gln Gln Ala Thr Ala Asp Ala Lys Asp Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Ile Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Met Gly Pro Gly Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Thr Gly Ala Ala Met Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Lys Gly Pro Lys Arg Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Arg Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Asn Arg Leu Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe
    450                 455                 460

Gly Phe Gly Glu Glu Ile Val Pro Ser Gln Lys Gln Glu Gln Lys Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495
```

Pro Met Ser Gln
500

<210> 277
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 277

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Lys Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Glu Ala Ala Ala Asp Thr Arg Asn Arg Ser Gln
115 120 125

Val Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
130 135 140

```
His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Val Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Asp
        195                 200                 205

Glu Ile Ala Asp Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro His
    210                 215                 220

Pro Ala Gly Gln Leu Arg Glu Pro Arg Gly Thr Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Val
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Ser Ile Leu Lys
                325                 330                 335
```

```
Ala Leu Gly Pro Ala Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Ala Asn Ser Asn Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu
465                 470                 475                 480

Pro Arg Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Ser Ser Gln
            500
```

<210> 278
<211> 499
<212> PRT

<213> Human immunodeficiency virus

<400> 278

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Lys Leu Asp His Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Pro Val Ala Ala Asp Thr Gly Ser Asn Ser Lys Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175
```

```
Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365
```

Gln Val Asn Ser Asn Asn Ile Met Met Gln Arg Gly Asn Phe Arg Asp
370 375 380

Gln Arg Lys Lys Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385 390 395 400

Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
405 410 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
420 425 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
435 440 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
450 455 460

Gly Glu Glu Thr Thr Asn Pro Pro Gln Lys Gln Glu Pro Ile Asp Lys
465 470 475 480

Glu Leu Tyr Pro Ser Ile Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
485 490 495

Ser Ser Gln

<210> 279
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 279

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys

```
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Ala Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Thr Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Thr Ala Ala Ala Ala Asp Thr Gly Glu Ser Ser
        115                 120                 125

Lys Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Arg Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
```

```
    210                 215                 220

Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Ser Ala Asn Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Ala Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
```

405 410 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro
465 470 475 480

Ile Asp Lys Glu Met Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 280
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 280

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

```
Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Trp Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Val Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255
```

```
Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Cys Thr Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Asn Ser Thr Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Asn Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Glu Glu Gly His Gln Met Lys Asp Cys Thr Gly Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

```
Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Thr Asp
465                 470                 475                 480

Lys Glu Met Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 281
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 281

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Ala Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu His Asn
65                  70                  75                  80

Ala Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95
```

```
Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Arg Asn Lys Ser Lys
            100                 105                 110

Lys Lys Glu Gln Gln Ala Thr Ala Asp Thr Gly Asn Ser Asn Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Thr Met Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Ile Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Gly Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Asn Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Thr Asp
465                 470                 475                 480
```

```
Lys Glu Gln Tyr Pro Leu Ala Ala Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500


<210>  282
<211>  506
<212>  PRT
<213>  Human immunodeficiency virus

<400>  282

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Arg Trp
1               5                   10                  15


Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Ile Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Thr Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125
```

```
Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320
```

```
Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Met Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Pro Gln Ser Arg Leu Ala Pro Gln Ser Arg Leu Glu Pro Thr Ala Pro
    450                 455                 460

Pro Glu Glu Ser Phe Arg Ile Gly Glu Glu Thr Ala Thr Pro Ser Gln
465                 470                 475                 480

Lys Gln Glu Gln Ile Asp Arg Glu Met Pro Pro Leu Thr Ser Leu Arg
                485                 490                 495

Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505
```

<210> 283
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 283

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Ile Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
```

165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Pro Gln Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser

```
        355                 360                 365

Gln Ala Ser Gln Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg Asn
    370                 375                 380

Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Arg Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Asn Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg Phe
    450                 455                 460

Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys
465                 470                 475                 480

Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495

Leu Ser Gln
```

<210> 284
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 284

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15
```

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Tyr Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Thr Glu Glu Ile Lys Ser Leu Tyr Asn
65                  70                  75                  80

Ala Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Glu Thr Gln Gln Ala Ala Ala Asp Thr Glu Asn Asn Ser Lys Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205
```

```
Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Val Ala Trp Met Thr Gly Asn Pro Ala Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Arg Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Asn Ser Ala Asn Ala Asn Val Met Met Gln Arg Ser Asn Phe
    370                 375                 380

Lys Asn Gln Arg Arg Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400
```

```
His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Pro Gln Ser Arg Thr Glu Pro Thr Ala Pro Pro Glu Glu Ile Phe
    450                 455                 460

Gly Phe Gly Glu Glu Ala Thr Pro Ser Gln Lys Gln Glu Ser Ile Asp
465                 470                 475                 480

Lys Glu Lys Tyr Pro Leu Ser Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 285
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<400> 285

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Gly Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45
```

```
Gly Leu Leu Glu Thr Ala Glu Gly Cys Lys Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Lys Thr Gly Ser Glu Glu Ile Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Asn Lys Ile Glu Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser His Thr
        115                 120                 125

Gly Asp Asn Ser Gln Val Ser His Asn Tyr Pro Ile Val Gln Asn Met
    130                 135                 140

Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala
145                 150                 155                 160

Trp Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro
                165                 170                 175

Met Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr
            180                 185                 190

Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys
        195                 200                 205

Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Val His Pro Val
    210                 215                 220

His Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser
225                 230                 235                 240
```

```
Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met
                245                 250                 255

Thr Asn Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile
            260                 265                 270

Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile
        275                 280                 285

Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp
    290                 295                 300

Arg Phe Tyr Lys Val Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys
305                 310                 315                 320

Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys
                325                 330                 335

Lys Thr Ile Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met
            340                 345                 350

Met Thr Ala Cys Gln Gly Val Gly Gly Pro Ala His Lys Ala Arg Val
        355                 360                 365

Leu Ala Glu Ala Met Ser Gln Ala Thr Asn Ala Ala Ala Ile Met Met
    370                 375                 380

Gln Lys Gly Asn Tyr Gly Asn Gln Lys Lys Ile Val Lys Cys Phe Asn
385                 390                 395                 400

Cys Gly Lys Ile Gly His Ile Ala Lys His Cys Lys Ala Pro Arg Lys
                405                 410                 415

Arg Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys
            420                 425                 430
```

```
Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys
        435                 440                 445


Gly Arg Pro Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro
    450                 455                 460


Pro Glu Glu Ser Phe Lys Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln
465                 470                 475                 480


Lys Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys
                485                 490                 495


Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
            500                 505


<210>  286
<211>  501
<212>  PRT
<213>  Human immunodeficiency virus

<400>  286

Met Gly Ala Arg Ala Ser Ile Leu Arg Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Ser Ser Glu Gly Cys Arg Lys Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80
```

```
Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Lys Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Asp Trp Asp Arg Thr His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Asp Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Asn Val Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Ser Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Glu Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu Ser Phe
    450                 455                 460
```

Arg Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu Pro Ile
465 470 475 480

Asp Gln Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 287
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 287

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Tyr Ser Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Thr Ala Ala Asp Thr Gly Asn Ser Ser Gln

```
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu
```

```
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Ile Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Asn Ser Asn Val Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460

Arg Phe Gly Glu Glu Thr Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro
465                 470                 475                 480

Val Asp Lys Glu Leu Tyr Pro Pro Leu Ala Ser Leu Arg Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Ser Ser Gln
```

500

<210> 288
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 288

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly His Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gln Lys Ser Ser Gln Val
115 120 125

Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

```
Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Val
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
```

```
Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ser Ala Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Gly Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460

Arg Tyr Gly Glu Gly Thr Ile Ala Pro Pro Gln Lys Gln Glu Gln Ile
465                 470                 475                 480

Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn
                485                 490                 495

Asp Pro Ser Ser Gln
            500
```

<210> 289
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 289

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190
```

```
Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly
    370                 375                 380
```

```
Asn Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400


Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415


Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430


Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445


Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
    450                 455                 460


Ser Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu
465                 470                 475                 480


Pro Thr Asp Lys Glu Leu Tyr Pro Leu Val Ser Leu Lys Ser Leu Phe
                485                 490                 495


Gly Asn Asp Pro Ser Ser Gln
            500


<210>  290
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus

<400>  290

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30
```

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Lys Gln Ile Met Glu Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Thr Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Pro Ala Ala Asp Thr Gly Ser Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270


Ile Val Lys Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Arg Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335


Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350


Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365


Gln Val Thr Asn Ser Ala Ala Val Met Met Gln Lys Gly Asn Phe Lys
    370                 375                 380


Asn Gln Arg Lys Ala Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

Gly Arg Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Val Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Ala Pro Pro Gln Lys Gln Glu Pro Thr Asp
465 470 475 480

Lys Glu Leu His Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 291
<211> 507
<212> PRT
<213> Human immunodeficiency virus

<400> 291

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Ser Ala Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Ala Ser Glu Glu Leu Arg Ser Leu Tyr Asn

65 70 75 80

Met Val Ala Thr Leu Tyr Cys Val His Gln Gln Ile Glu Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Thr Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Lys Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys

260 265 270

Val Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Ala Asn Ser Ala Ser Ile Met Met Gln Lys Gly Asn Phe Lys Asn
370 375 380

Gln Gly Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Ala Gly His Ile
385 390 395 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
405 410 415

Lys Glu Gly His Gln Met Lys Asp Cys Ser Asn Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro Pro Glu Pro Ser Ala Pro

```
    450                 455                 460

Pro Glu Glu Ser Phe Arg Phe Gly Glu Gly Thr Thr Thr Pro Ser Gln
465                 470                 475                 480

Lys Gln Glu Thr Thr Asp Lys Asp Leu Tyr Pro Pro Leu Ala Ser Leu
                485                 490                 495

Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505
```

<210> 292
<211> 496
<212> PRT
<213> Human immunodeficiency virus

<400> 292

```
Met Gly Ala Arg Ala Ser Ile Ile Ser Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Ile Trp Ala Ser Arg Glu Leu Glu Arg Tyr Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Ile Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Phe Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110
```

```
Lys Arg Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Pro Val Ser
        115                 120                 125

Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln
    130                 135                 140

Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190

His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Glu Trp Asp Arg Leu His Pro Pro Gln Ala Gly Pro His Pro Pro
    210                 215                 220

Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240

Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro
                245                 250                 255

Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
            260                 265                 270

Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg
    290                 295                 300
```

```
Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Val Thr Thr Pro Pro Ala Ile Met Met Gln Arg Gly Asn Phe Arg Asn
    370                 375                 380

Gln Gly Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Val Gly His Ile
385                 390                 395                 400

Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Arg Asp Cys Ile Glu Gly Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg Phe
    450                 455                 460

Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu Ser Ile Asp Lys
465                 470                 475                 480

Glu Lys Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495
```

<210> 293
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<400> 293

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Gln Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Pro Ala Ala Ala Ala Ala Asp Thr Gly Asn Asn Ser
        115                 120                 125


Asn Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140


Ile His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160
```

```
Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ala Glu Gly Ala Thr Pro Gly Asp Leu Asn Leu Met Leu Asn Ala
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Asp Trp Asp Arg Gln His Pro Val Gln Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Ala Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350
```

```
Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Ser Thr Ala Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Ser Ile Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Thr
    450                 455                 460

Ala Pro Pro Glu Glu Ser Phe Arg Phe Val Glu Glu Thr Thr Thr Pro
465                 470                 475                 480

Ser Pro Lys Gln Glu Gln Arg Asp Lys Glu Leu Tyr Pro Pro Leu Ala
                485                 490                 495

Ser Leu Arg Ser Leu Phe Gly Ser Asp Pro
            500                 505
```

<210> 294
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 294

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Arg Ala Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser
        115                 120                 125

Ser Gln Val Ser His Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln
    130                 135                 140

Met Val His Gln Pro Ile Ser Pro Arg Thr Phe Lys Ala Trp Val Lys
145                 150                 155                 160

Val Ile Glu Glu Asn Val Phe Leu Phe Gly Leu Ile Pro Met Phe Thr
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190
```

```
Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Asn Ser Ala Ala Ile Met Met Gln Lys Gly
    370                 375                 380
```

```
Asn Phe Arg Asn Gln Arg Arg Ser Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400


Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415


Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430


Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445


Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
    450                 455                 460


Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu
465                 470                 475                 480


Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe
                485                 490                 495


Gly Asn Asp Pro Ser Ser Gln
            500


<210>  295
<211>  502
<212>  PRT
<213>  Human immunodeficiency virus

<400>  295

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
```

```
        35                  40                  45

Ser Leu Leu Glu Thr Ala Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu His Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Ala Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Arg Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
```

```
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Asp Ile Tyr Lys Gln Trp Ile Ile Met Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Asn Ala Ala Thr Ile Met Met Gln Lys Gly
    370                 375                 380

Asn Phe Arg Gly Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
```

420 425 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
435 440 445

Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu
450 455 460

Ser Phe Arg Phe Gly Glu Glu Thr Ala Ala Pro Ser Gln Lys Gln Glu
465 470 475 480

Gln Ile Asp Lys Glu Leu Tyr Pro Thr Thr Ser Leu Arg Ser Leu Phe
485 490 495

Gly Asn Asp Pro Ser Leu
500

<210> 296
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 296

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Gln Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

```
Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Pro Ala Ala Ala Ala Ala Asp Thr Gly Asn Asn Ser
        115                 120                 125

Asn Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ala Glu Gly Ala Thr Pro Gly Asp Leu Asn Leu Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Asp Trp Asp Arg Gln His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Val Ala Trp Met Thr Ala Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270
```

```
Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Ile Thr Asn Pro Thr Ala Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Lys Asn Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Ile Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
    450                 455                 460
```

```
Phe Arg Phe Val Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro
465                 470                 475                 480


Thr Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly
                485                 490                 495


Asn Asp Pro
```

<210> 297
<211> 508
<212> PRT
<213> Human immunodeficiency virus

<400> 297

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Asp Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Gln Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Asn Gly Cys Arg Gln Ile Leu Ala Gln Leu
    50                  55                  60


Gln Ser Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110
```

```
Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Asn
        115                 120                 125

Ser Gln Ile Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Val Ala Trp Met Thr Gly Asn
                245                 250                 255

Pro Gly Val Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Met Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300
```

```
Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met
305                 310                 315                 320


Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335


Leu Lys Ala Met Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350


Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365


Ala Met Ser Gln Val Asn Ser Asn Ala Ile Met Met Gln Arg Gly Asn
    370                 375                 380


Phe Arg Gly Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400


Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415


Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Asn Glu Arg
            420                 425                 430


Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445


Gly Asn Phe Leu Gln Ser Arg Pro Gly Pro Thr Ala Leu Glu Pro Thr
    450                 455                 460


Ala Pro Pro Glu Glu Ser Ile Arg Phe Gly Glu Gly Thr Thr Thr Ser
465                 470                 475                 480


Ser Gln Lys Gln Glu Pro Arg Asp Lys Glu Leu Tyr Pro Leu Thr Ser
                485                 490                 495
```

Leu Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 298
<211> 510
<212> PRT
<213> Human immunodeficiency virus

<400> 298

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Gly Ile Glu Ile Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Glu Ala Gln Gln Ala Ala Ala Ala Thr Gly Asn Asn Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

```
Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220


Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Ala Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Leu Ala Thr Asn Pro Ala Ala Ile Met Met Gln Lys Gly Asn Phe Lys
    370                 375                 380

Ser Pro Arg Lys Gly Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Leu Arg
    450                 455                 460

Pro Thr Ala Pro Pro Ala Glu Ser Leu Arg Phe Gly Glu Glu Thr Thr
465                 470                 475                 480

Thr Pro Ser Gln Lys Gln Gly Thr Ile Asp Lys Glu Leu Tyr Pro Leu
                485                 490                 495

Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505                 510
```

<210> 299
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 299

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Gln Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Ile Gly Lys Asn Asn Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
```

180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Ala Thr Asn Thr Ala Ala Ser Ile Met Met Gln Arg Gly Asn Pro

370 375 380

Lys Thr Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Ile Gly
385 390 395 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys
405 410 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Glu Gly Gln Ala
420 425 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
435 440 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
450 455 460

Arg Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Pro Lys
465 470 475 480

Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 300
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<400> 300

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Ala Tyr Lys Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ala Leu Lys Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Gln Pro Ala Ala Ala Asp Thr Gly Asn Asn
        115                 120                 125

Asn Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ala Gln Gly Gln
    130                 135                 140

Met Val His Gln Gly Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Asp Trp Asp Arg Met His Pro Val His Ala Gly
    210                 215                 220
```

```
Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gln Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Ile Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile
        275                 280                 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Ser Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Asn Ser Ala Ala Ile Met Met Gln Asn Ser
    370                 375                 380

Asn Phe Lys Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415
```

```
Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro
    450                 455                 460

Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Ala Ala Pro Ser Gln
465                 470                 475                 480

Gln Gln Gly Thr Met Asp Lys Asp Leu Tyr Pro Leu Ala Ser Leu Lys
                485                 490                 495

Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505
```

<210> 301
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<400> 301

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Thr Gly Asn
        115                 120                 125

Asn Ser Lys Val Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly
    130                 135                 140

Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala
    210                 215                 220

Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn
                245                 250                 255
```

```
Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Gly Ile Leu Asp
        275                 280                 285

Ile Arg Gln Gly Pro Lys Glu Ser Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser His Val Thr Asn Pro Val Asn Ile Met Met Gln Arg
    370                 375                 380

Gly Ser Phe Arg Asn Gln Arg Arg Met Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly
                405                 410                 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Glu
            420                 425                 430

Arg Gln Val Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
        435                 440                 445
```

```
Pro Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro Pro Ala
    450                 455                 460


Glu Ser Leu Gly Phe Gly Glu Glu Ala Thr Thr Pro Pro Gln Lys Gln
465                 470                 475                 480


Glu Thr Met Thr Val Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg
                485                 490                 495


Ser Leu Phe Gly Ser Asp Pro Ser Ser Gln
            500                 505


<210>  302
<211>  501
<212>  PRT
<213>  Human immunodeficiency virus

<400>  302

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Glu Val Arg Asp
                85                  90                  95
```

```
Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Asp Thr Gly Asn Ser Gly Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gly Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Thr His Pro Val His Ala Gly Pro Val
    210                 215                 220

Ala Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285
```

```
Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Leu Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe
    370                 375                 380

Arg Asn Gln Lys Arg Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Ile Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Arg Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu Ser Phe
    450                 455                 460

Gly Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Leu Ile
465                 470                 475                 480
```

Asp Lys Glu Gln Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Met
500

<210> 303
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 303

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Gln Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Lys Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Val Ala Ala Asp Ala Gly Thr Ser Asn
115 120 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met

130 135 140

Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145 150 155 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
165 170 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
180 185 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
195 200 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
210 215 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225 230 235 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro
245 250 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu
260 265 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
275 280 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
290 295 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305 310 315 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu

325 330 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
340 345 350

Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala
355 360 365

Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Thr Gly Lys
370 375 380

Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu
385 390 395 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
405 410 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Ile Thr Thr Pro Ser Gln Lys Gln Glu Leu
465 470 475 480

Thr Asp Lys Glu Met Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 304

<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 304

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Arg Gly Lys Lys Arg Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Ser Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Ala Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Glu Val Arg Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Gly Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175
```

```
Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Phe Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365
```

```
Gln Val Thr Asn Ser Ala Thr Ile Met Leu Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asp Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Val Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Asn Glu Gly Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
    450                 455                 460

Phe Arg Phe Gly Glu Glu Thr Thr Pro Ser Gln Lys Gln Glu Lys Ile
465                 470                 475                 480

Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
                485                 490                 495

Asp Pro Ser Ser Gln
            500
```

<210> 305
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<400> 305

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15
```

```
Glu Asn Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Arg Gly Asn Ser
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Glu Gly Gln
    130                 135                 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205
```

```
Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Ile Thr Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Arg Thr
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400
```

```
Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys
                405                 410                 415


Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430


Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Cys Lys Gly Arg Arg
        435                 440                 445


Asn Phe Pro Gln Ser Arg Thr Glu Pro Thr Ala Pro Pro Glu Glu Ser
    450                 455                 460


Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Tyr Gln Lys Gln Glu Lys
465                 470                 475                 480


Lys Gln Glu Thr Ile Asp Lys Asp Leu Tyr Pro Leu Ala Ser Leu Lys
                485                 490                 495


Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
            500                 505


<210>  306
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus

<400>  306

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45
```

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Arg Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Ala Thr Ile Met Ile Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Lys Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
```

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Ser Asp
485 490 495

Pro Ser Ser Gln
500

<210> 307
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 307

Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Ile Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp

85 90 95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Lys Gly Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Pro Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly

```
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Lys Lys Pro Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Glu Thr Ile Thr Pro Ser Gln Lys Gln Glu
```

465 470 475 480

Ser Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe
485 490 495

Gly Asn Asp Pro Ser Ser Gln
500

<210> 308
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 308

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Pro Ala Ala Ala Asp Thr Gly Asn Ser Thr Gln Val
115 120 125

```
Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320
```

```
Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Ser Ser Ala Asn Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Arg Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 309
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 309

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Gly Gln Val
        115                 120                 125


Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160
```

```
Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Pro Ile Asn Glu Glu
        195                 200                 205

Ala Ala Arg Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Ile Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
```

```
Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu
465                 470                 475                 480

Leu Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Ser Ser Gln
            500
```

<210> 310
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 310

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Glu Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Thr Ala Asp Ile Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Ser Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380
```

Asn Gln Lys Arg Thr Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Ile Ala Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 311
<211> 498
<212> PRT
<213> Human immunodeficiency virus

<400> 311

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Thr Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro

```
        35                  40                  45

Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu Gln Pro
    50                  55                  60

Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn Thr Val
65                  70                  75                  80

Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp Thr Lys
                85                  90                  95

Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Gly Lys Lys Lys
            100                 105                 110

Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Thr Val Ser Gln
        115                 120                 125

Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His Gln Ala
    130                 135                 140

Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys
145                 150                 155                 160

Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly
                165                 170                 175

Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His
            180                 185                 190

Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala
        195                 200                 205

Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala Pro Gly
    210                 215                 220

Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr
```

225 230 235 240

Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile Pro Val
245 250 255

Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys Ile Val
260 265 270

Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys
275 280 285

Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala
290 295 300

Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr Leu Leu
305 310 315 320

Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly
325 330 335

Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly
340 345 350

Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser Gln Val
355 360 365

Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Val Arg Asn Gln
370 375 380

Arg Lys Ala Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala
385 390 395 400

Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Lys
405 410 415

Glu Gly His Gln Met Lys Asp Cys Ile Glu Arg Gln Ala Asn Phe Leu

420 425 430

Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe Leu Gln
435 440 445

Ser Arg Pro Glu Pro Ser Ala Pro Pro Asp Glu Ser Phe Gly Phe Gly
450 455 460

Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp Lys Glu
465 470 475 480

Lys Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser
485 490 495

Ser Gln

<210> 312
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 312

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Glu Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Arg Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Val Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Leu Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460
```

```
Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500
```

<210> 313
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 313

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Phe Tyr Asn
65                  70                  75                  80


Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110
```

```
Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Lys Gly Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495
```

Pro Ser Ser Gln
500

<210> 314
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 314

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Asp Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Ala Glu Lys Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

```
Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220


Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 315
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<400> 315

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Ser Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Lys Thr Gly Ser Glu Glu Leu Thr Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Thr Lys Ser Met
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
```

180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Pro Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg

370 375 380

Asn Gln Arg Lys Asn Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Gln Lys Gln
465 470 475 480

Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu
485 490 495

Phe Gly Asn Asp Pro Ser Ser Gln
500

<210> 316
<211> 498
<212> PRT
<213> Human immunodeficiency virus

<400> 316

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Gln Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Thr Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Lys Val Ser Gln
        115                 120                 125

Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His Gln Ala
    130                 135                 140

Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys
145                 150                 155                 160

Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly
                165                 170                 175

Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His
            180                 185                 190

Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala
        195                 200                 205

Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala Pro Gly
    210                 215                 220
```

```
Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr
225                 230                 235                 240

Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro Val
                245                 250                 255

Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val
            260                 265                 270

Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys
        275                 280                 285

Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala
    290                 295                 300

Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu
305                 310                 315                 320

Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly
                325                 330                 335

Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly
            340                 345                 350

Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Val
        355                 360                 365

Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg Asn Gln
    370                 375                 380

Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His Ile Ala
385                 390                 395                 400

Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys Gly Lys
                405                 410                 415
```

```
Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe Leu
            420                 425                 430

Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe Leu Gln
        435                 440                 445

Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly
    450                 455                 460

Glu Glu Thr Thr Thr Pro Ala Gln Lys Gln Glu Pro Thr Asp Lys Glu
465                 470                 475                 480

Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser
                485                 490                 495

Ser Gln
```

<210> 317
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 317

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Met Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Asn Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Arg Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Ser Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Lys Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

```
Pro Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Arg Glu Asp
465                 470                 475                 480


Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500


<210>  318
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus

<400>  318

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95
```

```
Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Thr Ala Ala Asp Thr Gly Asn Ser Asn Gln Val
        115                 120                 125

Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Ser Ser Ala Thr Ile Met Ile Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Ser
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480
```

Gln Gly Arg Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 319
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 319

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Ser Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His

130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala

325 330 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 320

<211> 498
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (30)..(30)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (43)..(43)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (149)..(149)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (392)..(392)
<223> Xaa can be any naturally occurring amino acid

<400> 320

Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp Glu Arg
1 5 10 15

Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Xaa His Val
20 25 30

Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Xaa Val Asn Pro Gly Leu
35 40 45

Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu Gln Pro
50 55 60

Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn Thr Val
65 70 75 80

Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp Thr Lys

85 90 95

Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys Lys Lys
100 105 110

Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val Ser Gln
115 120 125

Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala
130 135 140

Leu Ser Pro Arg Xaa Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys
145 150 155 160

Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly
165 170 175

Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His
180 185 190

Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala
195 200 205

Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Ile Ala Pro Gly
210 215 220

Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr
225 230 235 240

Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro Val
245 250 255

Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys Ile Val
260 265 270

Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys

```
        275                 280                 285

Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala
    290                 295                 300

Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu
305                 310                 315                 320

Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly
                325                 330                 335

Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly
            340                 345                 350

Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Ile
        355                 360                 365

Thr Ser Pro Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg Asn Gln
    370                 375                 380

Arg Lys Ile Val Lys Cys Phe Xaa Cys Gly Lys Glu Gly His Ile Ala
385                 390                 395                 400

Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Lys
                405                 410                 415

Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn Phe Leu
            420                 425                 430

Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu Gln
        435                 440                 445

Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly
    450                 455                 460

Glu Glu Thr Ile Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys Glu
```

465 470 475 480

Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Ser
485 490 495

Ser Gln

<210> 321
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 321

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Asn Ser Ser Gln Val Ser
115 120 125

```
Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln
    130                 135                 140

Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190

His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro
    210                 215                 220

Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240

Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro
                245                 250                 255

Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
            260                 265                 270

Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg
    290                 295                 300

Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320
```

```
Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Val Thr Asn Ser Ala Thr Val Met Met Gln Arg Gly Asn Phe Arg Asn
    370                 375                 380

Gln Lys Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
    450                 455                 460

Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Thr Ile Asp Lys
465                 470                 475                 480

Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495

Ser Ser Gln
```

<210> 322
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (64)..(64)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (106)..(106)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (275)..(275)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (287)..(287)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (366)..(366)
<223> Xaa can be any naturally occurring amino acid

<400> 322

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Xaa

50 55 60

Gln Pro Ala Leu Lys Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Glu Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Xaa Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile

245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Xaa Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Xaa Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Xaa Met Ser
355 360 365

Gln Val Thr Asn Pro Ser Thr Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Gln Lys Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe

435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Asn Pro Ser Pro Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Leu Gln
500

<210> 323
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (219)..(219)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (331)..(331)
<223> Xaa can be any naturally occurring amino acid

<400> 323

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ala Asp Gly Cys Lys Gln Ile Ile Ala Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Val Thr Leu Tyr Cys Val His Lys Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Asn Ser Pro Val
        115                 120                 125

Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val Xaa Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Xaa Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Thr Pro Pro Ala Ile Met Met Gln Lys Gly Asn Tyr Arg
    370                 375                 380

Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
```

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Pro Pro Gln Lys Gln Glu Arg Thr Asp Lys
465 470 475 480

Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
485 490 495

Ser Ser Gln

<210> 324
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 324

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Asn Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

```
Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Glu Asn Arg Asn Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Asp Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Thr Ala Thr Met Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Ser Pro Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Ser Ser Gln Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Pro Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460
```

Phe Arg Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 325
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 325

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Lys Asn Ser Ser Gln Val

115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
245 250 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Val Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr

```
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Glu Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Ser Asn Ser Ala Thr Val Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Gly Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Arg Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Arg Glu Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Gln Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Ala Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
```

500

<210> 326
<211> 495
<212> PRT
<213> Human immunodeficiency virus

<400> 326

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Ser Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Glu Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
130 135 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

```
Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
```

```
Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ile Thr Asn Thr Ser Ala Thr Ile Met Met Gln Gly Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ser Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Glu Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Pro Lys Glu
465                 470                 475                 480

Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495
```

<210> 327
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 327

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15
```

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Ala Gly Asn Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205
```

```
Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

His Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400
```

```
Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480


Gln Gly Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500
```

<210> 328
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (184)..(184)
<223> Xaa can be any naturally occurring amino acid

<400> 328

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30
```

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Gln Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Val Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Xaa Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val Gln Ala Gly Pro Ile Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Thr Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415
```

```
Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro
    450                 455                 460

Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys
465                 470                 475                 480

Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser
                485                 490                 495

Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505
```

<210> 329
<211> 507
<212> PRT
<213> Human immunodeficiency virus

<400> 329

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Lys Pro Gly Gly Lys Lys Thr Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Gln Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Lys Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Gln Lys Ala Gln Gln Glu Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp
        115                 120                 125

Ala Gly Lys Asn Thr Gln Ala Ser Gln Asn Tyr Pro Ile Val Gln Asn
    130                 135                 140

Ile Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn
145                 150                 155                 160

Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile
                165                 170                 175

Pro Met Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn
            180                 185                 190

Thr Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu
        195                 200                 205

Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro
    210                 215                 220

Val His Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly
225                 230                 235                 240

Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp
                245                 250                 255
```

```
Met Thr Asn Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp
            260                 265                 270

Ile Ile Met Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser
        275                 280                 285

Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val
    290                 295                 300

Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val
305                 310                 315                 320

Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp
                325                 330                 335

Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu
            340                 345                 350

Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg
        355                 360                 365

Val Leu Ala Glu Ala Met Ser Gln Val Thr Ser Ser Ala Asn Ile Met
    370                 375                 380

Met Gln Arg Gly Asn Phe Arg Asn Gln Arg Arg Ile Val Lys Cys Phe
385                 390                 395                 400

Asn Cys Gly Lys Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg
                405                 410                 415

Lys Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp
            420                 425                 430

Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His
        435                 440                 445
```

```
Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala
    450                 455                 460


Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Ala Pro Pro
465                 470                 475                 480


Gln Lys Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu
                485                 490                 495


Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505


<210>  330
<211>  498
<212>  PRT
<213>  Human immunodeficiency virus

<400>  330

Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Lys Trp Glu Lys
1               5                   10                  15


Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Gln Leu Lys His Ile
            20                  25                  30


Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro Gly Leu
        35                  40                  45


Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu Gln Pro
    50                  55                  60


Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn Thr Val
65                  70                  75                  80


Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Arg Asp Thr Lys
                85                  90                  95
```

```
Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys Lys Lys
            100                 105                 110

Thr Gln Gln Ala Ala Ala Asp Thr Glu Asn Ser Ser Gln Val Ser Gln
        115                 120                 125

Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala
    130                 135                 140

Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys
145                 150                 155                 160

Ser Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser Glu Gly
                165                 170                 175

Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His
            180                 185                 190

Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala
        195                 200                 205

Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala Pro Gly
    210                 215                 220

Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr
225                 230                 235                 240

Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro Val
                245                 250                 255

Gly Asp Ile Tyr Lys Lys Trp Ile Ile Ile Gly Leu His Lys Ile Val
            260                 265                 270

Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys
        275                 280                 285
```

```
Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala
    290                 295                 300

Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu
305                 310                 315                 320

Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu Lys Ala Leu Gly
                325                 330                 335

Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly
            340                 345                 350

Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Val
        355                 360                 365

Thr Gly Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg Asn Gln
    370                 375                 380

Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Val Gly His Ile Ala
385                 390                 395                 400

Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Lys
                405                 410                 415

Glu Gly His Gln Met Lys Glu Cys Asp Glu Arg Gln Ala Asn Phe Leu
            420                 425                 430

Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu Gln
        435                 440                 445

Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly
    450                 455                 460

Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys Glu
465                 470                 475                 480
```

Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser
485 490 495

Ser Gln

<210> 331
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 331

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Ser Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Lys Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ala Leu Arg Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His

130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala

325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Gly Pro Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Asp Leu Tyr Pro Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 332

<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 332

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Ala Val Ala Val Leu Tyr Cys Val His Gln Gly Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Arg Ile Glu Glu Glu Gln Glu Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Pro Gly Lys Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140


Gln Ser Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175
```

```
Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365
```

```
Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Thr Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Phe Arg Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu
465                 470                 475                 480

Pro Ile Asp Arg Glu Met Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Ser Ser Gln
            500
```

<210> 333
<211> 498
<212> PRT
<213> Human immunodeficiency virus

<400> 333

```
Arg Ala Ser Ile Leu Ser Gly Gly Lys Leu Asp Arg Trp Glu Lys Ile
1               5                   10                  15
```

```
Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys His Ile Val
            20                  25                  30

Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro Gly Leu Leu
        35                  40                  45

Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu Gln Pro Ser
    50                  55                  60

Leu Pro Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn Thr Val Ala
65                  70                  75                  80

Thr Leu Tyr Cys Val His Gln Asn Ile Asp Val Lys Asp Thr Lys Glu
                85                  90                  95

Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys Lys Lys Ala
            100                 105                 110

Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Gly Ser Gln Asn
        115                 120                 125

Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His Gln Ala Ile
    130                 135                 140

Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala
145                 150                 155                 160

Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala
                165                 170                 175

Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln
            180                 185                 190

Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu
        195                 200                 205
```

```
Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala Pro Gly Gln
    210                 215                 220

Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu
225                 230                 235                 240

Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro Val Gly
                245                 250                 255

Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg
            260                 265                 270

Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu
        275                 280                 285

Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu
    290                 295                 300

Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val
305                 310                 315                 320

Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro
                325                 330                 335

Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly
            340                 345                 350

Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Val Thr
        355                 360                 365

Asn Ser Ala Thr Val Met Met Gln Arg Gly Asn Phe Arg Asn Gln Arg
    370                 375                 380

Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala Arg
385                 390                 395                 400
```

Asn Cys Lys Ala Pro Arg Arg Arg Gly Cys Trp Lys Cys Gly Lys Glu
405 410 415

Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly
420 425 430

Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser
435 440 445

Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu
450 455 460

Glu Thr Thr Thr Pro Ser Pro Lys Gln Glu Pro Ile Asp Lys Asp Leu
465 470 475 480

Tyr Pro Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Leu
485 490 495

Ser Gln

<210> 334
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<400> 334

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Thr Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Thr Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asp Lys Ser Lys
            100                 105                 110

Gln Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Asn Asn Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240
```

```
Thr Ser Thr Leu Gln Glu Gln Val Gly Trp Met Thr Ser Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Arg Val Thr Asn Ser Asn Ala Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Lys Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430
```

```
Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445


Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe
    450                 455                 460


Arg Phe Gly Glu Glu Thr Thr Ala Pro Pro Gln Lys Gln Glu Pro Ile
465                 470                 475                 480


Asp Lys Glu Gln Gly Gln Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser
                485                 490                 495


Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505


<210>  335
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus


<220>
<221>  misc_feature
<222>  (50)..(50)
<223>  Xaa can be any naturally occurring amino acid

<220>
<221>  misc_feature
<222>  (55)..(55)
<223>  Xaa can be any naturally occurring amino acid

<220>
<221>  misc_feature
<222>  (191)..(191)
<223>  Xaa can be any naturally occurring amino acid

<220>
<221>  misc_feature
<222>  (271)..(271)
<223>  Xaa can be any naturally occurring amino acid

<220>
<221>  misc_feature
```

<222> (295)..(295)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (304)..(304)
<223> Xaa can be any naturally occurring amino acid

<400> 335

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
        35                  40                  45


Gly Xaa Leu Glu Thr Ser Xaa Gly Cys Arg Gln Ile Leu Gly Gln Ile
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Arg Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Glu Gln Gln Ala Ala Ala Asn Thr Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160
```

```
Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Leu Met Leu Asn Thr Xaa Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Xaa Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Xaa Tyr Val Asp Arg Phe Tyr Arg Thr Xaa
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
```

```
Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Met Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu Pro Lys Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 336
<211> 494
<212> PRT
<213> Human immunodeficiency virus

<400> 336

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Pro Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Ser Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380
```

```
Gly Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Pro Ser Gln Lys Gln Glu Arg Ile Pro Leu
465                 470                 475                 480


Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
                485                 490


<210>  337
<211>  505
<212>  PRT
<213>  Human immunodeficiency virus

<400>  337

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45
```

```
Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Thr Ala Ala Asp Thr Gly Asn Ser Ser Gln Asn
        115                 120                 125

Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly
    130                 135                 140

Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala
    210                 215                 220

Gly Pro Ala Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240
```

```
Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn
                245                 250                 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp
        275                 280                 285

Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Ser
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser Gln Ala Thr Asn Ser Ala Ala Ala Ile Met Met Gln
    370                 375                 380

Arg Gly Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys
385                 390                 395                 400

Gly Lys Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys
                405                 410                 415

Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr
            420                 425                 430
```

Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly
435 440 445

Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro
450 455 460

Glu Tyr Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys
465 470 475 480

Gln Glu Pro Ile Asp Lys Glu Thr Tyr Pro Leu Ala Ser Leu Lys Ser
485 490 495

Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 338
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<400> 338

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Thr Leu Gln Thr Gly Ser Glu Glu Ile Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp

85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Gly Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly

```
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Thr Ala Thr Ile Met Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Ala Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Gln Gly Gln Asn Arg Leu Glu Pro Thr Ala Pro
    450                 455                 460

Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln
```

465 470 475 480

Lys Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys
485 490 495

Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 339
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (313)..(313)
<223> Xaa can be any naturally occurring amino acid

<400> 339

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
85 90 95

```
Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Ala Gly Asn Asn Ser Ser Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140

His Gln Ser Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285
```

```
Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Thr Gln Xaa Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Ser Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460

Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile
465                 470                 475                 480
```

Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 340
<211> 498
<212> PRT
<213> Human immunodeficiency virus

<400> 340

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Asn Ile Glu Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Glu Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Ser Gln
115 120 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val

130 135 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145 150 155 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
165 170 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
180 185 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
195 200 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
210 215 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225 230 235 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
245 250 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
260 265 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
275 280 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
290 295 300

Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu
305 310 315 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys

325 330 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
340 345 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
355 360 365

Ser Gln Met Thr Asn Ser Ala Ala Ile Met Val Gln Arg Gly Asn Phe
370 375 380

Arg Asp Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys Gln Gly
385 390 395 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
405 410 415

Cys Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
420 425 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
435 440 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
450 455 460

Arg Phe Gly Glu Glu Thr Thr Pro Pro Ser Gln Lys Gln Glu Pro Ile
465 470 475 480

Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
485 490 495

Asp Pro

<210> 341

<211> 494
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (17)..(17)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (28)..(28)
<223> Xaa can be any naturally occurring amino acid

<400> 341

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Gln Trp
1 5 10 15

Xaa Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Xaa Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Glu Ala Ala Asp Thr Gly Lys Ser Ser Gln Val
115 120 125

```
Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Ser Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320
```

```
Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Gly Thr Ala Asn Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Pro Gln Ser Arg Thr Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Glu Glu Pro Pro Leu
465                 470                 475                 480

Val Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
                485                 490
```

<210> 342
<211> 500
<212> PRT

<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (15)..(15)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (267)..(267)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (331)..(331)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (343)..(343)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (374)..(374)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (453)..(453)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (473)..(473)
<223> Xaa can be any naturally occurring amino acid

<400> 342

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Xaa Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Thr Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220
```

```
Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Xaa Leu Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Xaa Thr Ile Leu Lys Ala
                325                 330                 335


Leu Gly Pro Gly Ala Thr Xaa Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350


Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365


Gln Ala Thr Ala Ala Xaa Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380


Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415
```

Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Leu Trp Pro Ser Gln Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Asn Arg Xaa Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Xaa Gln Lys Gln Glu Gln Ile Asp
465 470 475 480

Lys Glu Leu Asn His Ser Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Leu Leu Gln
500

<210> 343
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (384)..(384)
<223> Xaa can be any naturally occurring amino acid

<400> 343

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Gln Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Leu Ile Trp Ala Gly Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Ile Lys Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Ala Glu Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Thr Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Thr Val Met Met Gln Arg Gly Asn Phe Xaa
    370                 375                 380

Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
```

```
Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Thr Ile Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Tyr Gln
            500


<210>  344
<211>  501
<212>  PRT
<213>  Human immunodeficiency virus

<400>  344

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45


Ser Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80
```

```
Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Thr Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Met Thr Ser Pro Ala Asn Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Leu Met
    450                 455                 460
```

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Arg Asp
465 470 475 480

Lys Glu Leu Tyr Pro Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 345
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 345

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Ile Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Val Ala Gly Thr Gly Asn Asn Ser Gln Val

```
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Ser Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
```

```
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ser Ala Ala Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe
    450                 455                 460

Gly Phe Gly Glu Glu Lys Thr Thr Pro Ser Gln Lys Pro Glu Thr Thr
465                 470                 475                 480

Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
                485                 490                 495

Asp Pro Ser Ser Gln
```

500

<210> 346
<211> 493
<212> PRT
<213> Human immunodeficiency virus

<400> 346

Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Thr Trp Glu Lys Ile Arg
1 5 10 15

Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys His Ile Val Trp
20 25 30

Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro Gly Leu Leu Glu
35 40 45

Thr Ala Glu Gly Cys Arg Gln Leu Leu Gly Gln Leu Gln Pro Ser Leu
50 55 60

Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn Thr Ile Ala Thr
65 70 75 80

Leu Tyr Cys Val His Gln Arg Ile Glu Val Arg Asp Thr Lys Glu Ala
85 90 95

Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys Lys Lys Ala Gln
100 105 110

Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val Ser Gln
115 120 125

Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala
130 135 140

Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys
145 150 155 160

```
Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser Glu Gly
                165                 170                 175

Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His
            180                 185                 190

Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala
        195                 200                 205

Glu Trp Asp Arg Ile His Pro Ala Gln Ala Gly Pro Ile Ala Pro Gly
    210                 215                 220

Gln Ile Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr
225                 230                 235                 240

Leu Gln Glu Gln Ile Thr Trp Met Thr Asn Asn Pro Pro Ile Pro Val
                245                 250                 255

Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu Asn Lys Ile Val
            260                 265                 270

Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys
        275                 280                 285

Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala
    290                 295                 300

Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu
305                 310                 315                 320

Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly
                325                 330                 335

Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly
            340                 345                 350
```

```
Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Val
        355                 360                 365

Thr Asn Ser Gly Ala Ile Met Met Gln Lys Gly Asn Phe Arg Asn Gln
    370                 375                 380

Val Val Arg Cys Phe Asn Cys Gly Lys Val Gly His Ile Ala Lys Asn
385                 390                 395                 400

Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly
                405                 410                 415

His Gln Met Lys Asp Cys Asp Gln Arg Gln Ala Asn Phe Leu Gly Lys
            420                 425                 430

Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg
        435                 440                 445

Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg Phe Gly Glu Glu
    450                 455                 460

Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Gln Glu Tyr Pro Leu Ala
465                 470                 475                 480

Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
                485                 490
```

<210> 347
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 347

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                   10                  15
```

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Asn Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Met Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Gly
        115                 120                 125

Asn Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Lys Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205
```

```
Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro
                245                 250                 255

Ala Ile Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Ser Ala Thr Val Met Met Gln Arg Gly Asn
    370                 375                 380

Pro Arg Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400
```

```
Gly His Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
                405                 410                 415


Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430


Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445


Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser
    450                 455                 460


Phe Arg Phe Gly Glu Glu Thr Thr Ala Pro Pro Gln Lys Gln Glu Pro
465                 470                 475                 480


Arg Asp Lys Glu Leu Tyr Pro Val Thr Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495


Asn Asp Pro Ser Ser Gln
            500
```

<210> 348
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 348

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45
```

```
Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Gly Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Val Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Ile Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys His Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Ile Met Met Gln Lys Gly Asn Phe Arg Asn
    370                 375                 380

Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Asp Cys Ser Glu Arg Gln Ala Asn Phe
            420                 425                 430
```

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
435 440 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
450 455 460

Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys
465 470 475 480

Glu Gln Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
485 490 495

Ser Ser Gln

<210> 349
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<400> 349

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Arg Asp

85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Gln Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Asn Thr Gly Asn
115 120 125

Asn Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly
130 135 140

Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145 150 155 160

Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
165 170 175

Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
180 185 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
195 200 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Pro Gln Ala
210 215 220

Gly Pro Ile Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile
225 230 235 240

Ala Gly Thr Thr Ser Asn Leu Gln Glu Gln Ile Thr Trp Met Thr Asn
245 250 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met
260 265 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp

```
        275                 280                 285

Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp
305                 310                 315                 320

Met Thr Lys Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser Gln Val Thr Asn Ser Ala Thr Val Met Met Gln Arg
    370                 375                 380

Gly Asn Phe Lys Gly Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly
                405                 410                 415

Cys Trp Lys Cys Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Gly
            420                 425                 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
        435                 440                 445

Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala
    450                 455                 460

Glu Ser Phe Arg Phe Gly Glu Glu Thr Pro Thr Pro Ser Gln Lys Gln
```

465 470 475 480

Glu Thr Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu
485 490 495

Phe Gly Asn Asp Pro Ser Ser Gln
500

<210> 350
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 350

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Lys Gln Val
115 120 125

```
Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Val
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320
```

```
Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Ser Ser Asn Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 351
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 351

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Ile Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Val Gln Gln Glu Ala Ala Asp Thr Gly Ser Lys Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140


Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160
```

```
Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
```

```
Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Met Asn Ser Ala Thr Ile Met Met Gln Lys Ser Asn Phe Arg Asn
    370                 375                 380

Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
    450                 455                 460

Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys
465                 470                 475                 480

Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495

Ser Ser Gln
```

<210> 352
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 352

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Met Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Thr Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Leu Thr Asn Ser Ala Asn Ile Met Met Gln Arg Gly Asn Met Arg
    370                 375                 380
```

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Val Phe Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 353
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 353

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Asn Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro

```
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Thr Gly Asn Asn Ser Gln Ser
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala
```

```
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Ser Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Asn Ser Asn Thr Ile Met Met Gln Arg Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg
```

420 425 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
435 440 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
450 455 460

Ser Phe Arg Phe Gly Glu Glu Ala Pro Ala Pro Ser Gln Lys Gln Glu
465 470 475 480

Thr Ile Asp Lys Glu Leu Tyr Pro Ser Ala Ser Leu Arg Ser Leu Phe
485 490 495

Gly Asn Asp Pro Ser Ser Gln
500

<210> 354
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 354

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Ala Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Ala Gly Asn Asn Arg Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Val Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Ser Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Lys Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Asp Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460
```

```
Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500
```

<210> 355
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 355

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ala Leu Lys Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110
```

```
Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser His Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Ala His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335


Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350


Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365


Gln Val Thr Asn Leu Pro Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380


Gly Gln Arg Lys Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His Leu
385                 390                 395                 400


Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys Gly
                405                 410                 415


Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430


Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445


Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg Phe
    450                 455                 460


Gly Glu Gly Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys
465                 470                 475                 480


Glu Thr Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495
```

Ser Ser Gln

<210> 356
<211> 463
<212> PRT
<213> Human immunodeficiency virus

<400> 356

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Ala Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Ala Gly Cys Arg Gln Ile Leu Asn Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Val Ala Asp Ala Gly Asn Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140
```

```
Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220


Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Glu Ile Tyr Lys Ser Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Ile Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460
```

<210> 357
<211> 462
<212> PRT
<213> Human immunodeficiency virus

<400> 357

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
```

```
        35                  40                  45

Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu His Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asn Thr Gly Asn Ser Asn Gln Ile
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
```

225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Thr Thr Ile Met Met Gln Arg Gly Asn Asp Arg
370 375 380

Asn Gln Arg Lys Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His Leu
385 390 395 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys Gly
405 410 415

Gln Glu Gly His Gln Met Lys Glu Cys Pro Gly Arg Gln Ala Asn Phe

420 425 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
435 440 445

Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
450 455 460

<210> 358
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 358

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Asp Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Met Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Val Leu Glu Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Gly Val His Gln Lys Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly His Ser Ser Gln Val
115 120 125

```
Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val Gln Ala Gly Leu Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320
```

```
Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Ala Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Met Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Val Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Ile Glu Ser Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Leu Arg
    450                 455                 460

Ser Gly Ile Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Val Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 359
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 359

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Glu Gly Lys Lys Arg Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Ile Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Tyr
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Arg Asn Ile Gln Gly Gln Met Val His
    130                 135                 140


Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160
```

```
Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Ser Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ala Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Val Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
```

```
Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Asn Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Val Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Ala Thr Thr Ser Pro Gln Lys Gln Glu Leu Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Leu Ser Gln
            500
```

<210> 360
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 360

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Lys Gln Ile Ile Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Lys Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Thr Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Asn Asn Phe Arg
    370                 375                 380
```

```
Asp Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Arg Val Gly His
385                 390                 395                 400


Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Pro Pro Gln Lys Gln Glu Gln Ile Asp Lys
465                 470                 475                 480


Glu Met Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495


Leu Ser Gln
```

<210> 361
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (40)..(40)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (96)..(96)
<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<222> (437)..(437)
<223> Xaa can be any naturally occurring amino acid

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<221> misc_feature
<222> (453)..(453)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (468)..(468)
<223> Xaa can be any naturally occurring amino acid

<400> 361

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Xaa Leu Glu Arg Phe Ala Leu Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50   55   60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Ile Lys Ser Leu Tyr Asn
65   70   75   80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Arg Xaa
                85   90   95

```
Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Xaa Ala Gln Gln Ala Ala Ala Asp Ala Glu Xaa Ser Ser Arg Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Xaa Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140

His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Ile Val
            180                 185                 190

Gly Gly His Gln Ala Xaa Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Met His Pro Val His Xaa Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Xaa
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Thr Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285
```

```
Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Xaa Lys
                325                 330                 335

Ala Xaa Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Xaa Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Asn Ser Thr Ala Xaa Met Met Gln Lys Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Arg Glu Gly
385                 390                 395                 400

His Ile Ala Lys Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Xaa Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Xaa Ile Trp Ser Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Xaa Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460

Arg Phe Gly Xaa Gly Thr Ile Thr Pro Ser Gln Lys Gln Glu Pro Ile
465                 470                 475                 480
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Glu Lys Asp Lys Asp Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe
485 490 495

Gly Asn Asp Pro Leu Ser Gln
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<210> 362
<211> 502
<212> PRT
<213> Human immunodeficiency virus

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<400> 362

Met Gly Ala Arg Ala Ser Val Leu Xaa Gly Xaa Asp Leu Asp Arg Trp
1 5 10 15

Xaa Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Xaa Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Gln Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Xaa Leu Asp Lys Ile Glu Glu Glu Gln Ser Lys Ser Lys
            100                 105                 110

Lys Lys Val Gln Gln Ala Ala Ala Asp Ala Gly Thr Ser Ser Xaa Ser
        115                 120                 125

Gln Val Ser His Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Xaa Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Xaa Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240
```

```
Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Xaa Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Asn Asn Pro Thr Asn Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Lys Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Arg Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430
```

```
Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Xaa Gly Arg Pro Gly
        435                 440                 445

Xaa Phe Leu Gln Ser Arg Xaa Glu Pro Ser Xaa Pro Pro Xaa Glu Ser
    450                 455                 460

Phe Arg Phe Gly Glu Glu Lys Pro Thr Pro Pro Gln Lys Gln Glu Pro
465                 470                 475                 480

Ile Asp Lys Asp Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495

Asn Asp Pro Ser Ser Gln
            500
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<210> 363
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 363

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Met Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Ser Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80
```

```
Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Arg Lys Thr Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Thr Ile Met Met Gln Arg Gly Asn Phe Arg Asn
    370                 375                 380

Gln Arg Arg Ile Ile Lys Cys Phe Asn Cys Gly Lys Asp Gly His Ile
385                 390                 395                 400

Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Leu Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
    450                 455                 460
```

Gly Glu Glu Ala Thr Ala Pro Pro Gln Lys Gln Glu Pro Ile Asp Gln
465 470 475 480

Glu Arg Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
485 490 495

Leu Ser Gln

<210> 364
<211> 499
<212> PRT
<213> Human immunodeficiency virus

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<400> 364

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Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Xaa Tyr Arg Leu Lys
            20                  25                  30


His Ile Xaa Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Xaa Ser Glu Glu Leu Arg Ser Leu His Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Xaa His Gln Asn Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Lys Lys Ser Gln
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Lys Asn Asn Pro Val Ser
        115                 120                 125


Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His Gln
    130                 135                 140
```

```
Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Xaa
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190

His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro
    210                 215                 220

Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240

Thr Leu Gln Glu Gln Ile Asn Trp Met Thr Asn Asn Pro Pro Ile Pro
                245                 250                 255

Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
            260                 265                 270

Val Arg Met Tyr Ser Pro Ala Ser Ile Leu Asp Ile Lys Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg
    290                 295                 300

Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335
```

```
Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Val Thr Asn Ser Asn Thr Ile Met Met Gln Arg Gly Asn Phe Arg Asn
    370                 375                 380

Gln Arg Lys Met Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Asp Xaa Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Asn Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu Ser Phe Arg Phe
    450                 455                 460

Gly Glu Glu Thr Thr Xaa Pro Xaa Gln Lys Gln Glu Pro Ile Asp Lys
465                 470                 475                 480

Glu Leu Tyr Pro Ser Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495

Ser Ser Gln
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<210> 365
<211> 501
<212> PRT

<213> Human immunodeficiency virus

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<400> 365

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp His Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly His Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Ala Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Glu Ser Lys
100 105 110

Lys Arg Thr Gln Pro Ala Ala Ala Gly Ala Gly Asn Asn Ser Xaa Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His

```
    130                 135                 140

Gln Ser Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
```

325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Leu Ala Thr Asn Asn Gln Ala Thr Ile Met Met Gln Lys Gly Asn Phe
370 375 380

Lys Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly
385 390 395 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
405 410 415

Cys Gly Lys Glu Gly His Gln Ile Lys Asp Cys Thr Glu Arg Gln Ala
420 425 430

Asn Phe Leu Gly Lys Val Trp Pro Ser Arg Asn Gly Arg Pro Gly Asn
435 440 445

Phe Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu Gly Ile
450 455 460

Lys Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Gly Pro Val
465 470 475 480

Glu Glu Gly Leu Tyr Pro Xaa Ala Ser Leu Arg Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 366

<211> 498
<212> PRT
<213> Human immunodeficiency virus

<400> 366

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Met Gly Ala Arg Ala Ser Val Ile Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Arg Ile Arg Leu Arg Gln Gly Gly Ser Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Tyr Ala Ile Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Ile Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Arg Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Lys Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175
```

```
Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365
```

```
Gln Val Thr Asn Ser Thr Ala Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ala Val Lys Arg Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Gln Lys Gln Gly Pro Lys Asp Lys Glu
465                 470                 475                 480

Leu Tyr Pro Leu Asp Ser Leu Lys Ser Leu Phe Gly Ser Asp Pro Ser
                485                 490                 495

Leu Gln
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<210> 367
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Glu Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

His Pro Ser Leu Pro Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Xaa Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Xaa Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Xaa Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Xaa Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Xaa
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Xaa Cys Gln Gly
            340                 345                 350

Xaa Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Xaa Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Ile Glu Arg Gln Ala Asn
            420                 425                 430
```

```
Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Val Glu Glu Thr Thr Thr Pro Ser Gln Lys Pro Glu Thr Ile Asp
465                 470                 475                 480


Lys Glu Val Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500


<210>  368
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<212>  PRT
<213>  Human immunodeficiency virus


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<400> 368

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp His Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Ile Glu Gln Leu
    50                  55                  60


Gln Ser Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Thr Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Lys Ala Ala Asp Ala Gly Asn Ser Ser Thr
        115                 120                 125


Val Ser Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ala Gln Gly Gln
    130                 135                 140


Met Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160


Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
```

165 170 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
180 185 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
195 200 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Val His Pro Ala Gln Ala Gly
210 215 220

Xaa Val Ala Pro Gly Gln Ile Arg Asp Pro Arg Gly Ser Asp Ile Ala
225 230 235 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn
245 250 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
260 265 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
275 280 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
290 295 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met
305 310 315 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Xaa Pro Asp Cys Lys Thr Ile
325 330 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
340 345 350

Cys Gln Gly Val Gly Gly Pro Xaa His Lys Ala Arg Val Leu Ala Glu

355 360 365

Ala Met Ser Gln Val Thr Asn Ser Thr Ala Ala Ala Met Met Gln Arg
370 375 380

Gly Asn Phe Arg Asp Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly
385 390 395 400

Lys Val Gly His Ile Ala Lys Asn Cys Arg Gly Pro Arg Lys Lys Gly
405 410 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Glu
420 425 430

Arg Gln Gly Gln Ala Asn Phe Leu Xaa Lys Ile Trp Pro Ser His Lys
435 440 445

Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro
450 455 460

Pro Xaa Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln
465 470 475 480

Lys Gln Glu Thr Ile Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Lys
485 490 495

Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
500 505

<210> 369
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<400> 369

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Xaa Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Xaa Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Xaa
35 40 45

Gly Leu Leu Glu Ser Ser Gly Gly Cys Lys Gln Ile Xaa Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Ile Val Val Leu Tyr Tyr Val His Gln Arg Ile Glu Ile Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Leu Glu Glu Glu Gln Asn Lys Cys Lys
100 105 110

```
Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Val Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Xaa Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Xaa Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Xaa Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Xaa Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Xaa Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Xaa Thr Xaa Thr Pro Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Gly Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Arg Asn Cys Arg Ala Pro Xaa Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ala Trp Ser Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Xaa Glu Ser Phe Xaa
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Arg Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Val Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495
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Pro Ser Ser Gln
500

<210> 370
<211> 502
<212> PRT
<213> Human immunodeficiency virus

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<400> 370

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Asp Leu Asp Arg Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Gln Leu Lys
            20                  25                  30

His Ile Ile Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
    50                  55                  60

His Pro Ser Leu Glu Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Leu Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Xaa Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Asp Thr Gly Asn Ser Asn Pro
        115                 120                 125

Gly Ser Gly Gly Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly
    130                 135                 140

Gln Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Xaa
                165                 170                 175

Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190
```

```
Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala
    210                 215                 220

Gly Pro Val Xaa Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn
                245                 250                 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp
        275                 280                 285

Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser Gln Val Thr Gly Ala Asn Thr Ile Met Met Gln Arg
    370                 375                 380
```

```
Gly Asn Phe Lys Asn Gln Arg Lys Ala Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400


Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly
                405                 410                 415


Cys Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Xaa Thr Glu
            420                 425                 430


Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
        435                 440                 445


Pro Gly Asn Phe Leu Gln Asn Arg Thr Glu Pro Thr Ala Pro Pro Glu
    450                 455                 460


Glu Ser Xaa Arg Phe Gly Xaa Glu Lys Thr Xaa Pro Pro Gln Lys Gln
465                 470                 475                 480


Glu Pro Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495


Asn Asp Pro Ser Pro Gln
            500


<210>  371
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus


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<223>  Xaa can be any naturally occurring amino acid
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<400> 371

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ser Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Lys Thr Gly Ser Glu Glu Phe Arg Ser Leu Tyr Asn
65                  70                  75                  80

Ala Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Glu Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Lys Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gly Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Thr Xaa Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ala His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Ala Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380
```

```
Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Xaa Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Thr Asp
465                 470                 475                 480


Lys Glu His Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Leu Ser Gln
            500


<210>  372
<211>  503
<212>  PRT
<213>  Human immunodeficiency virus

<400>  372

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30
```

```
His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Asn
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Val Thr
225                 230                 235                 240


Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Asp Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335


Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350


Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365


Gln Val Pro Gly Ser Ala Asn Ile Met Met Gln Arg Gly Asn Tyr Arg
    370                 375                 380


Asn Gln Lys Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Val Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Pro Thr Ala Pro
450 455 460

Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln
465 470 475 480

Lys Gln Gly Met Thr Asp Lys Glu Met Tyr Pro Leu Thr Ser Leu Lys
485 490 495

Ser Leu Phe Gly Asn Asp Pro
500

<210> 373
<211> 507
<212> PRT
<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 373

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Ala Trp
1 5 10 15

Xaa Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser
        115                 120                 125

Ser Gln Thr Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240
```

```
Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser His Ile Thr Asn Ser Ala Thr Val Met Met Gln Arg Gly
    370                 375                 380

Thr Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Arg Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415

Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430
```

```
Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445


Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Leu Glu Pro
    450                 455                 460


Thr Ala Pro Pro Glu Glu Ser Phe Arg Arg Glu Thr Ile Ala Pro Ser
465                 470                 475                 480


Gln Lys Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu
                485                 490                 495


Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505


<210>  374
<211>  510
<212>  PRT
<213>  Human immunodeficiency virus


<220>
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<222>  (389)..(389)
<223>  Xaa can be any naturally occurring amino acid

<400>  374

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Gln Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Leu Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
```

```
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Phe Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gly Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Gly Gly Asn
        115                 120                 125

Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly
    130                 135                 140

Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala
    210                 215                 220

Gly Pro Asn Pro Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser
```

245 250 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
260 265 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp
275 280 285

Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
290 295 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Ala Glu Val Lys Gly Trp
305 310 315 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
325 330 335

Ile Leu Arg Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr
340 345 350

Ala Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala
355 360 365

Glu Ala Met Gly Gln Val Thr Asn Thr Ala Ala Thr Met Met Met Gln
370 375 380

Lys Gly Asn Phe Xaa Asn Gln Gly Lys Ile Val Lys Cys Phe Asn Cys
385 390 395 400

Gly Lys Thr Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys
405 410 415

Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr
420 425 430

Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly

435 440 445

Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro
450 455 460

Ala Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg Phe Gly Glu Glu Ala
465 470 475 480

Thr Ala Pro Ser Gln Lys Pro Glu Thr Arg Asp Glu Leu Tyr Pro Leu
485 490 495

Ala Ser Leu Lys Ser Leu Phe Gly Ser Asp Pro Ser Ser Gln
500 505 510

<210> 375
<211> 497
<212> PRT
<213> Human immunodeficiency virus

<400> 375

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Asn Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ser Ile Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gln Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Ile Lys Asp
85 90 95

```
Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Gln Lys Thr Gln Gln Ala Ala Ala Asp Thr Arg Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Gly Ser Ala Asn Val Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Ser Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Thr Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Val Trp Pro Phe His Lys Glu Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Arg Glu Glu Thr Thr Ala Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480
```

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro

<210> 376
<211> 513
<212> PRT
<213> Human immunodeficiency virus

<400> 376

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Thr Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Thr Lys Ser Lys
100 105 110

Lys Gln Ala Gln Gln Lys Gln Ala Gln Gln Ala Ala Ala Asp Thr Gly
115 120 125

```
Ser Ser Ser Asn Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln
    130                 135                 140

Gly Gln Leu Val His Gln Ala Met Ser Pro Arg Thr Leu Asn Ala Trp
145                 150                 155                 160

Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met
                165                 170                 175

Phe Ala Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
            180                 185                 190

Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu
        195                 200                 205

Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Ile His
    210                 215                 220

Ala Gly Pro Ala Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp
225                 230                 235                 240

Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr
                245                 250                 255

Ser Asn Pro Pro Ile Gln Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile
            260                 265                 270

Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu
        275                 280                 285

Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg
    290                 295                 300

Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn
305                 310                 315                 320
```

```
Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys
                325                 330                 335

Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met
            340                 345                 350

Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu
        355                 360                 365

Ala Glu Ala Met Ser Gln Val Asn Ala Ala Thr Val Met Met Gln Arg
    370                 375                 380

Gly Asn Phe Arg Ser Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Asp Gly His Ile Ala Arg Asn Cys Lys Ala Pro Arg Arg Lys Gly
                405                 410                 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Asn
            420                 425                 430

Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly
        435                 440                 445

Arg Pro Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Ser
    450                 455                 460

Arg Thr Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu
465                 470                 475                 480

Glu Thr Ala Thr Ser Ser Gln Lys Gln Glu Pro Ile Asp Lys Gly Leu
                485                 490                 495

Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Leu Ser
            500                 505                 510
```

Gln

<210> 377
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 377

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Ile Lys Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
100 105 110

Lys Lys Val Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Phe Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
130 135 140

```
Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Ile Ala
    210                 215                 220


Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Ser Lys Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Ser Asp
                485                 490                 495

Pro Ser Leu Gln
            500
```

<210> 378
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<400> 378

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Asn Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
```

180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Ala Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg

370 375 380

Gly Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Thr Ala Pro Thr Ala Pro
450 455 460

Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Met Thr Pro Ser Gln Lys
465 470 475 480

Gln Glu Arg Ile Asp Lys Glu Pro Ser Pro Leu Ala Ser Leu Arg Ser
485 490 495

Leu Phe Gly Ser Asp Pro Ser Ser Gln
500 505

<210> 379
<211> 510
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (247)..(247)
<223> Xaa can be any naturally occurring amino acid

<400> 379

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Asn Lys Arg Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Thr Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Gln Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn
        115                 120                 125

Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly
    130                 135                 140

Gln Met Val His Gln Pro Ile Ala Ala Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190
```

```
Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala
    210                 215                 220

Gly Pro Val Ala Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Xaa Gln Glu Gln Ile Gly Trp Met Thr Asn
                245                 250                 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Val Leu
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp
        275                 280                 285

Ile Lys Gln Gly Pro Lys Glu Ser Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser Gln Ala Thr Asn Ser Ser Ala Ile Met Met Gln Lys
    370                 375                 380
```

```
Gly Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400


Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly
                405                 410                 415


Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Ser
            420                 425                 430


Gly Gln Ala Asn Phe Leu Gly Arg Leu Trp Pro Ser His Lys Gly Arg
        435                 440                 445


Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Thr Ala
    450                 455                 460


Pro Pro Glu Glu Ser Phe Arg Phe Val Glu Glu Thr Ala Thr Pro Ser
465                 470                 475                 480


Gln Lys Gln Glu Lys Gln Glu Pro Ile Asp Arg Glu Met Tyr Pro Leu
                485                 490                 495


Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505                 510


<210>  380
<211>  502
<212>  PRT
<213>  Human immunodeficiency virus


<220>
<221>  misc_feature
<222>  (59)..(59)
<223>  Xaa can be any naturally occurring amino acid

<220>
<221>  misc_feature
<222>  (102)..(102)
<223>  Xaa can be any naturally occurring amino acid
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<220>
<221> misc_feature
<222> (129)..(130)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (133)..(133)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (144)..(144)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (437)..(437)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (445)..(445)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (466)..(466)
<223> Xaa can be any naturally occurring amino acid

<400> 380

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Ser Ser Glu Gly Cys Lys Xaa Ile Leu Ile Gln Leu
    50                  55                  60
```

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Xaa Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser
        115                 120                 125

Xaa Xaa Val Ser Xaa Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Xaa
    130                 135                 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ala Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn
                245                 250                 255
```

```
Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Thr Asn Ser Ala Ser Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Arg Ser His Lys Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Ser Lys Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Xaa Lys Ile Trp Pro Pro Tyr Lys Xaa Arg Pro Gly
        435                 440                 445
```

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
450 455 460

Phe Xaa Phe Gly Glu Gly Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro
465 470 475 480

Ile Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 381
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (424)..(424)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (435)..(435)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (447)..(447)
<223> Xaa can be any naturally occurring amino acid

<400> 381

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gly Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro

```
        35                  40                  45

Ala Leu Leu Glu Ser Ser Gly Gly Cys Arg Gln Ile Leu Gln Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Ala Ala Asp Thr Gly Asn Ser
        115                 120                 125

Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly
    130                 135                 140

Gln Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala
    210                 215                 220

Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
```

225 230 235 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His
245 250 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
260 265 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp
275 280 285

Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
290 295 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp
305 310 315 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
325 330 335

Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
340 345 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
355 360 365

Glu Ala Met Gly Gln Val Asn Ser Gly Ala Ile Met Met Gln Lys Gly
370 375 380

Asn Phe Lys Ser Gln Arg Arg Asn Val Lys Cys Phe Asn Cys Gly Lys
385 390 395 400

Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys
405 410 415

Trp Lys Cys Gly Lys Glu Gly Xaa Gln Met Lys Asp Cys Thr Glu Arg

420 425 430

Gln Ala Xaa Phe Leu Gly Lys Leu Trp Pro Ser His Lys Gly Xaa Pro
435 440 445

Gly Asn Phe Pro Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Pro Pro
450 455 460

Ala Glu Ser Phe Arg Phe Gly Glu Glu Met Thr Thr Pro Ala Gln Lys
465 470 475 480

Gln Glu Pro Ile Asp Lys Glu Thr Tyr Pro Leu Ala Ser Leu Arg Ser
485 490 495

Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 382
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 382

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Ser Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Ile Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Arg Ala Gln Leu Ala Ala Ala Asp Thr Gly Ser Ser Ser Lys Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Leu Ala Thr Asn Ser Asn Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460
```

```
Phe Gly Glu Glu Thr Ala Ser Pro Pro Gln Lys Gln Asp Gln Thr Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Ser Asp
                485                 490                 495


Pro Ser Ser Gln
            500


<210>  383
<211>  497
<212>  PRT
<213>  Human immunodeficiency virus


<220>
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<223>  Xaa can be any naturally occurring amino acid

<400>  383

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Met Gly Arg Lys Lys Tyr Arg Xaa Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45
```

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Ala Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Xaa His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Xaa Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ala Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
```

```
Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Pro Pro Lys Gln Glu Gln Val Asp
465                 470                 475                 480


Asn Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Leu Ser
                485                 490                 495


Gln
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<210> 384
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<221> misc_feature
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<222> (486)..(486)
<223> Xaa can be any naturally occurring amino acid

<400> 384

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Xaa Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Thr Gly Xaa Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Arg Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Ser Ser Gln Val
        115                 120                 125
```

```
Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Xaa Gly Gln Xaa Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320
```

```
Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ser Val Ser Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Gly Gln Lys Xaa Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Xaa Asn Phe
        435                 440                 445

Leu Gln Asn Arg Thr Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Gly
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Lys Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Xaa Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Gln Ser Ser Gln
            500
```

<210> 385
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<400> 385

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ser Ile Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Ala Ile Ala Val Leu Phe Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser His Thr
        115                 120                 125


Gly Asn Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile
    130                 135                 140


Gln Gly Gln Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala
145                 150                 155                 160


Trp Val Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro
```

```
                165                 170                 175

Met Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr
            180                 185                 190

Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys
        195                 200                 205

Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Pro
    210                 215                 220

Gln Ala Gly Pro Val Ala Pro Gly Gln Met Arg Asp Pro Arg Gly Ser
225                 230                 235                 240

Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met
                245                 250                 255

Thr Ser Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile
            260                 265                 270

Ile Met Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile
        275                 280                 285

Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp
    290                 295                 300

Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys
305                 310                 315                 320

Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys
                325                 330                 335

Lys Thr Ile Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met
            340                 345                 350

Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val
```

355 360 365

Leu Ala Glu Ala Met Ser Gln Val Thr Asn Ala Gly Asn Ile Met Met
370 375 380

Gln Lys Gly Asn Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn
385 390 395 400

Cys Gly Lys Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys
405 410 415

Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys
420 425 430

Ala Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys
435 440 445

Gly Arg Pro Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro
450 455 460

Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln
465 470 475 480

Lys Gln Glu Val Asp Lys Glu Leu Tyr Pro Leu Ser Ser Leu Lys Ser
485 490 495

Leu Phe Gly Ser Asp Pro Ser Ser Gln
500 505

<210> 386
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 386

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Ile Asp Lys Ile Glu Glu Glu Lys Ala Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Thr Ala Ala Ala Ala Thr Gly Asn Ser Ser Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val
    130                 135                 140

His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205
```

```
Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro
                245                 250                 255

Ile Gln Val Gly Glu Val Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Asn Ser Ala Thr Val Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Lys Arg Gln Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400
```

```
Ile Ala Arg Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500
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<210> 387
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
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<220>
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<220>
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<222> (298)..(298)
<223> Xaa can be any naturally occurring amino acid

<400> 387

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Ala Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Thr Glu Glu Ile Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Glu Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Xaa Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140


Gln Pro Leu Thr Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ser Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175
```

```
Glu Gly Ala Thr Pro Gln Asp Leu Asn Xaa Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Pro Gln Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Thr Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Xaa Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365
```

```
Gln Ala Thr Asn Ser Ala Asn Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Thr Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser Leu Arg
    450                 455                 460

Phe Arg Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Thr Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 388
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 388

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Gln Gln Ala Ala Ala Ala Asp Thr Gly Asn
        115                 120                 125

Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly
    130                 135                 140

Gln Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190
```

```
Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala
    210                 215                 220

Gly Pro Ile Pro Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Asn
                245                 250                 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp
        275                 280                 285

Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Xaa Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Ala Cys Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser Gln Ala Thr His Thr Ala Ile Leu Met Gln Arg Gly
    370                 375                 380
```

```
Asn Phe Lys Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400


Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415


Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430


Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445


Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
    450                 455                 460


Ser Phe Arg Phe Gly Glu Glu Met Pro Ala Pro Ser Gln Lys Gln Glu
465                 470                 475                 480


Pro Ile Asp Lys Glu Leu Tyr Pro Ser Ala Ala Leu Arg Ser Leu Phe
                485                 490                 495


Gly Asn Asp Pro Leu Ser Gln
            500


<210>  389
<211>  504
<212>  PRT
<213>  Human immunodeficiency virus


<220>
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<220>
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<223> Xaa can be any naturally occurring amino acid

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<220>
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<222> (420)..(420)
<223> Xaa can be any naturally occurring amino acid

<400> 389

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50   55   60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65   70   75   80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
                85   90   95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100   105   110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Asn Ser
        115   120   125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130   135   140

```
Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335
```

```
Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Ser Ala Ser Ala Ala Ile Met Met Gln Arg
    370                 375                 380

Gly Asn Phe Arg Asn Gln Arg Lys Xaa Val Lys Cys Phe Asn Xaa Gly
385                 390                 395                 400

Lys Glu Gly His Ile Ala Lys Asn Cys Xaa Ala Pro Arg Lys Lys Gly
                405                 410                 415

Cys Trp Lys Xaa Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu
            420                 425                 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
        435                 440                 445

Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu
    450                 455                 460

Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln
465                 470                 475                 480

Glu Pro Arg Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu
                485                 490                 495

Phe Gly Asn Asp Pro Leu Ser Gln
            500
```

<210> 390
<211> 499

<212> PRT
<213> Human immunodeficiency virus

<220>
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<400> 390

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Xaa Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Lys Gln Leu
    50                  55                  60

Gln Pro Ser Leu Glu Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Glu Ala Gln Gln Thr Xaa Ala Ala Gly Thr Gly Asn Ser Ser Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Xaa Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly Pro Val
    210                 215                 220
```

```
Ala Pro Gly Gln Val Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ser Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Ala His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Ala Thr Asn Ser Pro Ala Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Leu Ala Arg Asn Cys Xaa Ala Pro Arg Xaa Lys Gly Cys Trp Lys
                405                 410                 415
```

```
Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Asn Glu Arg Gln
            420                 425                 430


Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Cys Lys Gly Arg Pro Gly
        435                 440                 445


Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser
    450                 455                 460


Leu Arg Xaa Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Ser
465                 470                 475                 480


Xaa Asp Lys Glu Lys Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly
                485                 490                 495


Asn Asp Pro



<210>  391
<211>  502
<212>  PRT
<213>  Human immunodeficiency virus


<220>
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<222>  (44)..(44)
<223>  Xaa can be any naturally occurring amino acid

<220>
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<223>  Xaa can be any naturally occurring amino acid

<220>
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<223>  Xaa can be any naturally occurring amino acid

<220>
<221>  misc_feature
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<222> (63)..(63)
<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (375)..(375)
<223> Xaa can be any naturally occurring amino acid

<400> 391

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Xaa Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Xaa Gly Cys Arg Xaa Ile Leu Gly Xaa Leu
    50                  55                  60


His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Xaa Ser Lys
            100                 105                 110


Lys Lys Ala Gln Xaa Ala Ala Ala Asp Thr Gly Asn Ser Ser Xaa Ser
        115                 120                 125


His Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140
```

```
Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Xaa Lys Val
145                 150                 155                 160


Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175


Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190


Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205


Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220


Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240


Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
                245                 250                 255


Pro Ile Pro Val Gly Glu Xaa Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270


Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg
        275                 280                 285


Gln Gly Pro Lys Glu Xaa Phe Arg Xaa Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300


Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320


Glu Thr Leu Leu Val Gln Asn Ser Xaa Pro Asp Cys Xaa Thr Ile Leu
                325                 330                 335
```

```
Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Xaa His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Ala Thr Asn Xaa Ala Ala Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Pro Ile Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Val Ala Arg Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser
    450                 455                 460

Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Pro
465                 470                 475                 480

Ile Asp Lys Asp Leu Tyr Pro Ser Ala Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495

Asn Asp His Ser Ser Gln
            500
```

<210> 392
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 392

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Val Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140


Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
```

180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asn Arg Leu His Pro Val His Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Ala Val Met Met Gln Lys Gly Asn Phe Arg

370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Gln Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Ile Thr Ala Pro Ser Gln Lys Gln Glu Leu Arg Asp
465 470 475 480

Lys Glu Gln His Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Leu Ser Gln
500

<210> 393
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (72)..(72)
<223> Xaa can be any naturally occurring amino acid

<400> 393

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Xaa Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Val Ala Ala Asp Thr Gly Ser Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Val Val Lys Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Pro Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Ser Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380
```

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 394
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 394

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Gln Leu Arg Pro Gly Gly Arg Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro

```
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Thr Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Val Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
```

225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn

420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Cys Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Leu Ser Gln
500

<210> 395
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (48)..(48)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (267)..(267)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (392)..(392)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (436)..(436)
<223> Xaa can be any naturally occurring amino acid

<400> 395

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                  10                  15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Xaa
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Ile Gly Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Phe Lys Ser Val Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Lys Gly Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
```

180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Xaa Met Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Arg Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Ala His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Asn Val Met Met Gln Arg Gly Asn Phe Lys

370 375 380

Asn Gln Arg Lys Ile Val Lys Xaa Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Xaa Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu
450 455 460

Ser Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu
465 470 475 480

Gln Ile Asp Arg Asp Arg Asp Leu Tyr Pro Leu Ala Ser Leu Arg Ser
485 490 495

Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 396
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 396

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Tyr Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu His Thr Gly Ser Glu Gly Phe Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Asp Thr Gly Asn Ser Asn Pro Val Ser
        115                 120                 125

Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln
    130                 135                 140

Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190

His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala Pro
    210                 215                 220
```

```
Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240

Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile Pro
                245                 250                 255

Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu Asn Lys Ile
            260                 265                 270

Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg
    290                 295                 300

Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Ala Thr Asn Ser Ala Ala Ile Met Met Met Gln Lys Gly Asn Gly Arg
    370                 375                 380

Asn Gln Arg Lys Gly Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Gly Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Pro Arg Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 397
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (112)..(112)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (118)..(118)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (380)..(380)
<223> Xaa can be any naturally occurring amino acid

<400> 397

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Ala Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Thr Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Gln Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Xaa
            100                 105                 110

Lys Lys Ala Gln Gln Xaa Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Thr Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Asp Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Met Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ala His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Gly Thr Ile Met Val Gln Xaa Gly Asn Phe Arg
    370                 375                 380
```

```
Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Phe Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Leu Ile Asp
465                 470                 475                 480


Lys Asp Lys Glu Gln Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495


Asn Asp Pro Ser Ser Gln
            500


<210>  398
<211>  506
<212>  PRT
<213>  Human immunodeficiency virus

<400>  398

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Ser Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30
```

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ala Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Arg Ala Gln Gln Ala Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly
        115                 120                 125

Ser Ser Ser Ser Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln
    130                 135                 140

Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp
145                 150                 155                 160

Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met
                165                 170                 175

Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
            180                 185                 190

Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu
        195                 200                 205

Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His
    210                 215                 220
```

```
Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp
225                 230                 235                 240


Ile Ala Gly Thr Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr
                245                 250                 255


Asn Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile
            260                 265                 270


Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu
        275                 280                 285


Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg
    290                 295                 300


Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn
305                 310                 315                 320


Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys
                325                 330                 335


Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met
            340                 345                 350


Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Lys Ile Leu
        355                 360                 365


Ala Glu Ala Met Ser Gln Val Thr Asn Ala Ala Thr Ile Met Met Thr
    370                 375                 380


Gln Lys Gly Asn Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn
385                 390                 395                 400


Cys Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys
                405                 410                 415
```

```
Arg Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys
            420                 425                 430

Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys
        435                 440                 445

Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro
    450                 455                 460

Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Ile Thr Pro Ser Gln
465                 470                 475                 480

Lys Gln Glu Val Met Asp Lys Glu Val Tyr Pro Leu Thr Ser Leu Arg
                485                 490                 495

Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505
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<210> 399
<211> 503
<212> PRT
<213> Human immunodeficiency virus

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<400> 399

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Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Arg Leu Lys
            20                  25                  30
```

```
His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Pro Ala Ala Ala Asp Thr Gly Lys Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu His Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Xaa Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Asn Ile Met Met Gln Lys Ser Ser Phe Arg
    370                 375                 380

Ser Pro Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Ala Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

```
Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Ser Glu Pro Thr Ala Pro Leu Glu Pro Thr Ala Pro
    450                 455                 460

Pro Ala Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln
465                 470                 475                 480

Thr Gln Gln Pro Ile Glu Lys Glu Leu Tyr Pro Leu Thr Ser Leu Xaa
                485                 490                 495

Ser Leu Phe Gly Asn Asp Pro
            500
```

<210> 400
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 400

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Gln Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ala Leu Gln Thr Gly Thr Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Leu His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Thr
        355                 360                 365

Gln Val Thr Lys Pro Ala Ala Thr Met Met Val Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser Cys Lys Gly Arg Pro Gly Asn
        435                 440                 445
```

```
Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460


Arg Phe Gly Glu Glu Thr Thr Asn Pro Ser Gln Lys Gln Glu Pro Ile
465                 470                 475                 480


Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn
                485                 490                 495


Asp Pro Ser Ser Gln
            500


<210>  401
<211>  499
<212>  PRT
<213>  Human immunodeficiency virus


<220>
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<223>  Xaa can be any naturally occurring amino acid

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<223>  Xaa can be any naturally occurring amino acid
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 401

Met Gly Ala Arg Ala Xaa Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Arg Xaa Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Thr Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Glu Lys Xaa Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Arg Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
130 135 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Xaa Glu
145 150 155 160

```
Glu Lys Xaa Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Xaa His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Xaa Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Xaa Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Xaa Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Xaa Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Xaa Asp Cys Xaa Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
```

```
Val Gly Gly Pro Gly His Lys Ala Arg Xaa Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Ile Met Met Gln Lys Gly Asn Phe Arg Asn
    370                 375                 380

Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Xaa Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly Xaa Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Arg Ile Trp Pro Ser Ser Xaa Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
    450                 455                 460

Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Gly Arg Ile Asp Thr
465                 470                 475                 480

Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495

Ser Ser Gln
```

<210> 402
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 402

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                  10                  15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Ile Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Val Gln Leu Ala Ala Thr Asp Lys Glu Lys Ser Gly Gln Val Ser
        115                 120                 125

Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln
    130                 135                 140

Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190
```

```
His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro
    210                 215                 220

Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240

Asn Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile Pro
                245                 250                 255

Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
            260                 265                 270

Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg
    290                 295                 300

Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Val Thr Ser Ser Ser Ala Thr Ile Met Met Gln Arg Gly Asn Pro Arg
    370                 375                 380
```

```
Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Thr Thr Pro Ser Gln Lys Gln Glu Gln
465                 470                 475                 480


Lys Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495


Asn Asp Pro Ser Ser Gln
            500


<210>  403
<211>  499
<212>  PRT
<213>  Human immunodeficiency virus

<400>  403

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
```

```
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Ile Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Thr Asp Thr Gly Asn Ser Asn Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Asn Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Thr His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
```

225 230 235 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Val Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ala Ala Ile Met Met Gln Lys Gly Asn
370 375 380

Phe Arg Thr Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu
385 390 395 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
405 410 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln

420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Pro
465 470 475 480

Ile Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly
485 490 495

Asn Asp Pro

<210> 404
<211> 498
<212> PRT
<213> Human immunodeficiency virus

<220>
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<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 404

```
Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Ala Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Xaa Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Ala Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140
```

```
Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Xaa His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Thr Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Ser Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Xaa
            340                 345                 350


Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365


Gln Val Thr Lys Ser Pro Thr Ile Met Val Gln Gly Gly Asn Phe Arg
    370                 375                 380


Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Arg Asn Cys Xaa Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Ser Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Ser Ser His Lys Gly Arg Pro Gly Xaa Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu Asp Lys Xaa
465                 470                 475                 480


Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Ser
                485                 490                 495


Ser Gln
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<210> 405
<211> 500
<212> PRT

<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (44)..(44)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (244)..(244)
<223> Xaa can be any naturally occurring amino acid

<400> 405

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Gln Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Xaa Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Pro Gln Gly Gln Met Ile His

130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Xaa Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala

325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Pro Ala Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His
385 390 395 400

Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Ser Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Ser Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Ser Asp
485 490 495

Pro Ser Ser Gln
500

<210> 406

<211> 503
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (114)..(114)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (125)..(125)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (486)..(486)
<223> Xaa can be any naturally occurring amino acid

<400> 406

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

His Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Arg Ser Lys
100 105 110

```
Lys Xaa Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Xaa Asn Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Leu Val His
    130                 135                 140

Gln Pro Met Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ser Phe Ser Pro Glu Val Ile Pro Met Phe Ile Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Gln Val Gly Asp Ile Tyr Lys Arg Trp Ile Val Ile Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ser Ala Asn Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Lys Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Glu Ala Thr Thr Pro Ser Gln Lys Gln Asp
465                 470                 475                 480

Pro Ile Asp Lys Glu Xaa Tyr Pro Leu Asp Ser Leu Arg Ser Leu Phe
                485                 490                 495
```

Gly Asn Asp Pro Ser Ser Gln
500

<210> 407
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (389)..(389)
<223> Xaa can be any naturally occurring amino acid

<400> 407

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Gln Ala Gln Gln Ala Ala Ala Asp Ala Gly Lys Ser Lys Gln Val

```
        115                 120                 125

Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys His Trp Met Thr Glu Thr
```

305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Ser Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Ser Pro Ala Thr Ile Met Leu Gln Lys Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Xaa Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Arg Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Gly Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln

500

<210> 408
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (76)..(76)
<223> Xaa can be any naturally occurring amino acid

<400> 408

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Ser Ser Leu Lys Thr Gly Ser Lys Glu Leu Xaa Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Gln Ile Glu Val Arg Asp
85 90 95

Thr Thr Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Glu Gln Gln Ala Ala Ala Asp Ala Gly Asn Arg
115 120 125

```
Asn Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Val Leu Arg Ala Glu Gln Gly Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320
```

```
Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Glu Val Thr Thr Pro Ser Gln Lys Gln Glu
465                 470                 475                 480

Pro Ala Asp Lys Glu Gln Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Ser Ser Gln
            500
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<210> 409
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (129)..(129)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (430)..(430)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (473)..(473)
<223> Xaa can be any naturally occurring amino acid

<400> 409

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Ser Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Glu Ser Lys

100 105 110

Arg Lys Lys Gln Gln Ala Val Ala Asp Thr Gly Asn Ser Thr Gln Asn
115 120 125

Xaa Lys Gln Asp Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly
130 135 140

Gln Met Val His Gln Ala Met Ser Pro Arg Thr Leu Asn Ala Trp Val
145 150 155 160

Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
165 170 175

Val Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
180 185 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
195 200 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala
210 215 220

Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225 230 235 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser
245 250 255

Asn Pro Pro Thr Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Val Met
260 265 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp
275 280 285

Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe

290 295 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp
305 310 315 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Thr
325 330 335

Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
340 345 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
355 360 365

Glu Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg
370 375 380

Asp Asn Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly
385 390 395 400

Lys Gln Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly
405 410 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Xaa Asn Glu
420 425 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
435 440 445

Pro Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu
450 455 460

Glu Ser Phe Arg Phe Gly Glu Glu Xaa Thr Thr Pro Pro Gln Lys Gln
465 470 475 480

Glu Pro Ile Asp Gln Gly Met Tyr Pro Leu Ala Ser Leu Lys Ser Leu

485 490 495

Phe Gly Asn Asp Pro Ser Ser Gln
500

<210> 410
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (42)..(42)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (95)..(95)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (164)..(164)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (218)..(218)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (258)..(258)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (268)..(268)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (271)..(271)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (293)..(293)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (344)..(344)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (473)..(474)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (479)..(479)
<223> Xaa can be any naturally occurring amino acid

<400> 410

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Gln Leu Arg Pro Gly Gly Arg Lys Arg Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Xaa Arg Phe Ala Ile Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Ile Ala Gln Leu
50 55 60

Gln Ser Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Ile Xaa Asp
85 90 95

Thr Lys Glu Ala Leu Glu Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

```
Lys Lys Ala Gln Gln Ala Thr Ala Asp Ile Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Xaa Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Ala Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Xaa His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Xaa Gly Glu Ile Tyr Lys Arg Trp Ile Ile Xaa Gly Leu Xaa Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Xaa Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Xaa Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Gly Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Xaa Xaa Lys Gln Glu Gln Xaa Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Gly Ala Ser Leu Lys Ser Leu Phe Gly Ser Asp
                485                 490                 495
```

Pro Leu Leu Gln
500

<210> 411
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 411

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Ala Gln Ile
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Arg Glu Ala Val Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Thr Gln Gln Ala Ala Ala Asn Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
130 135 140

```
Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Thr Ser Ala Thr Ile Met Thr Gln Arg Gly Asn Leu Arg
    370                 375                 380

Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Lys Gly Thr Thr Thr Leu Ser Gln Lys Gln Glu Gln Lys Asp
465                 470                 475                 480

Glu Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 412
<211> 495
<212> PRT

<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (429)..(429)
<223> Xaa can be any naturally occurring amino acid

<400> 412

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Tyr Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Gly Phe Arg Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Met Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
130 135 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

```
Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
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Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Ser Ile Met Met Gln Lys Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Leu Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Xaa Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Glu Glu Ile Thr Ala Pro Pro Gln Arg Gln Glu Pro Ile Asp Lys Glu
465 470 475 480

Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
485 490 495

<210> 413
<211> 499
<212> PRT
<213> Human immunodeficiency virus

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<400> 413

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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Xaa Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Xaa Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
```

100 105 110

Asn Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Met His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Xaa Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Xaa Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Xaa Thr Leu

```
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Gly Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Lys Lys Ile Lys Cys Phe Asn Cys Gly Arg Glu Gly His Leu
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Asn Arg Thr Glu Pro Thr Ala Pro Pro Glu Glu Ser Leu Arg Phe
    450                 455                 460

Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Gly Pro Ile Asp Lys
465                 470                 475                 480

Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
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485 490 495

Ser Ser Gln

<210> 414
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<212> PRT
<213> Human immunodeficiency virus

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<400> 414

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1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Xaa Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Xaa Gly Cys Lys Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Val Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140
```

```
Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Gln Ala Xaa Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220


Pro Gly Gln Met Xaa Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Xaa Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Xaa Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Xaa Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Xaa Asn Phe Arg
370 375 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ala Gln Lys Gln Glu Pro Val Asp
465 470 475 480

Lys Glu Leu Tyr Pro Ser Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 415
<211> 503
<212> PRT
<213> Human immunodeficiency virus

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<400> 415

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Xaa
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Val Gln Gln Ala Gln Gln Val Ala Ala Asp Thr Glu Asn Ser
        115                 120                 125


Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln
    130                 135                 140
```

```
Met Val His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile
        275                 280                 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Xaa Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335
```

```
Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Ala His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ala Thr Ile Met Met Gln
    370                 375                 380

Arg Gly Lys Val Arg Asn Gln Arg Arg Met Ile Lys Cys Phe Asn Cys
385                 390                 395                 400

Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys
                405                 410                 415

Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr
            420                 425                 430

Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly
        435                 440                 445

Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro
    450                 455                 460

Glu Glu Ser Phe Arg Phe Gly Glu Glu Ser Pro Ser Gln Lys Gln Asp
465                 470                 475                 480

Leu Ile Asp Lys Glu Gln Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Ser Ser Gln
            500
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<210> 416
<211> 502

<212> PRT
<213> Human immunodeficiency virus

<400> 416

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Glu Lys Trp
1               5                  10                  15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
        35                  40                  45

Val Phe Leu Glu Thr Ala Asp Gly Cys Ile Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Ile Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175
```

```
Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365
```

```
Gln Val Thr Asn Ser Ala Ala Thr Val Met Met Gln Lys Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Arg Glu Gly
385                 390                 395                 400

His Leu Ala Arg His Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Ser Ser His Lys Gly Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
    450                 455                 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro
465                 470                 475                 480

Ile Asp Lys Glu Val Tyr Pro Leu Thr Ala Leu Lys Ser Leu Phe Gly
                485                 490                 495

Asn Asp Pro Ser Ser Gln
            500
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<210> 417
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<400> 417

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Xaa Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu His Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp

85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Val Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val Xaa
130 135 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Xaa Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly

```
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Thr Val Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Xaa Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Xaa
    450                 455                 460

Phe Gly Glu Glu Thr Thr Ala Ser Ser Gln Lys Gln Xaa Pro Ile Asp
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465 470 475 480

Lys Asp Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 418
<211> 498
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

<400> 418

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Xaa Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Ser Lys Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser Asn
        115                 120                 125
```

```
Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140

His Gln Ser Leu Ser Pro Arg Thr Leu Asn Xaa Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Gly Phe Asn Pro Glu Val Ile Pro Met Phe Thr Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Xaa Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Xaa Leu His Pro Val His Ala Gly Pro Xaa
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Xaa Asn Pro Pro
                245                 250                 255

Val Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320
```

```
Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Xaa
                325                 330                 335

Ala Met Gly Xaa Gly Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Asn Ser Thr Thr Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Lys Gln Xaa Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460

Ser Phe Gly Glu Glu Thr Thr Ala Pro Pro Gln Lys Gln Glu Pro Ile
465                 470                 475                 480

Asn Lys Glu Leu Tyr Pro Ser Thr Ser Leu Arg Ser Leu Phe Gly Asn
                485                 490                 495

Asp Pro
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<210> 419
<211> 498
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

<400> 419

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Ile
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu His Asn
65 70 75 80

```
Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Xaa Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Gln Gln Ala Ala Ala Asp Thr Gly Ser Ser Ser Gln Val Ser
        115                 120                 125

Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln
    130                 135                 140

Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Xaa Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190

His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Val Ala Pro
    210                 215                 220

Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240

Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro
                245                 250                 255

Xaa Gly Glu Ile Tyr Xaa Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
            260                 265                 270
```

```
Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg
    290                 295                 300

Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Val Asn Ser Pro Ala Ile Met Met Gln Arg Gly Asn Phe Lys Gly Gln
    370                 375                 380

Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala
385                 390                 395                 400

Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Lys
                405                 410                 415

Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe Leu
            420                 425                 430

Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe Leu Gln
        435                 440                 445

Asn Arg Thr Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly
    450                 455                 460
```

Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Asp Gln Lys Asp Lys Glu
465 470 475 480

Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Ser Asp Pro Ser
485 490 495

Ser Gln

<210> 420
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 420

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Lys Val

```
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ala Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Ile Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Met Thr Trp Ile Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
```

305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Lys Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Lys Thr Ile Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln

500

<210> 421
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 421

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Phe Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

```
Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
```

```
Val Gly Gly Pro Ser His Lys Ala Lys Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Ser Ala Ser Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Arg Asn Gln Lys Arg Val Ile Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Leu Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Arg Ile Trp Pro Ser Leu Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser
    450                 455                 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro
465                 470                 475                 480

Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly
                485                 490                 495

Asn Asp Pro Ser Ser Gln
            500
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<210> 422
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (55)..(55)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (61)..(61)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (235)..(235)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (371)..(371)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (483)..(483)
<223> Xaa can be any naturally occurring amino acid

<400> 422

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Xaa Gly Cys Arg Gln Ile Xaa Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp

85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Arg Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Asp Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Xaa Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly

```
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Xaa Asn Pro Thr Thr Val Met Met Gln Arg Gly Asn Leu Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Met Asp
```

465 470 475 480

Lys Glu Xaa His Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 423
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (18)..(18)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (47)..(47)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (55)..(55)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (62)..(62)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (68)..(68)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (84)..(84)
<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature
<222> (88)..(88)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (122)..(122)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (125)..(125)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (173)..(173)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (186)..(186)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (216)..(216)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (246)..(246)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (256)..(256)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (283)..(283)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (286)..(286)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (298)..(298)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (302)..(302)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (309)..(309)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (337)..(337)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (357)..(357)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (366)..(366)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (457)..(457)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (500)..(500)
<223> Xaa can be any naturally occurring amino acid

<400> 423

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Xaa Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys

20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Xaa Pro
35 40 45

Gly Leu Leu Glu Thr Ser Xaa Gly Cys Arg Gln Ile Leu Xaa Gln Leu
50 55 60

Gln Pro Ala Xaa Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Xaa Leu Tyr Cys Xaa His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Pro Ala Ala Ala Asp Xaa Gly Asn Xaa Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Xaa Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Xaa Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Met Xaa Pro Val His Ala Gly Pro Ile Ala

210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Xaa Ile Gly Trp Met Thr Ser Asn Pro Pro Xaa
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Xaa Asp Ile Xaa Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Xaa Arg Phe Tyr Xaa Thr Leu
290 295 300

Arg Ala Glu Gln Xaa Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Xaa Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Xaa His Lys Ala Arg Val Leu Ala Glu Xaa Met Ser
355 360 365

Gln Val Thr Asn Ser Thr Ala Ile Met Met Gln Lys Gly Asn Phe Arg
370 375 380

Asn Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys

405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Xaa Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Leu Ile Asn
465 470 475 480

Leu Asp Gln Glu Leu Tyr Pro Ser Ala Ser Leu Lys Ser Leu Phe Gly
485 490 495

Asn Asp Pro Xaa Ser Lys
500

<210> 424
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (83)..(83)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (138)..(138)
<223> Xaa can be any naturally occurring amino acid

<400> 424

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Xaa Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Gln Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Val Ala Ala Asp Thr Gly Asn Ser Ser Gln Ala
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Xaa Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205
```

```
Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Asp Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Lys Phe Lys
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400
```

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Leu Ser Gln Lys Gln Glu Ser Ile Asp
465 470 475 480

Lys Glu Leu His Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 425
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 425

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Arg Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Pro Gln Gly Gln Met Ile His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ala Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Lys Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
```

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
435 440 445

Pro Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Lys Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Ser Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 426
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 426

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Lys Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Lys Asp Val Lys Asp

85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Arg
100 105 110

Glu Lys Ala Gln Leu Ala Ala Ala Asp Thr Gly Asn Ser Ser Pro Ala
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Ala Val His
130 135 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly

```
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Ile Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Lys Lys Val Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Arg Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Val Gly Glu Glu Thr Ala Thr Pro Ser Gln Arg Gln Glu Thr Ile Asp
```

465 470 475 480

Lys Glu Leu Cys Pro Leu Pro Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 427
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 427

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Arg Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Gln Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Val Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Asn
115 120 125

```
Ser Gln Asn Tyr Pro Ile Val Gln Asn Val Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320
```

```
Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Met Met Met Gln Arg Gly Asn Tyr Arg
    370                 375                 380

His Gln Lys Lys Ile Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Thr Ser Gln Lys Gln Lys Gln Glu Thr
465                 470                 475                 480

Val Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495

Asn Asp Pro Ser Ser Gln
            500
```

<210> 428
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (412)..(412)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (427)..(427)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (431)..(431)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (437)..(437)
<223> Xaa can be any naturally occurring amino acid

<400> 428

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Ser Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Lys Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Val Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Thr Ile Met Met Gln Arg Gly Thr Leu Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Xaa Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Xaa Glu Arg Gln Xaa Asn
            420                 425                 430

Phe Leu Gly Lys Xaa Trp Pro Ser Arg Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460
```

```
Phe Gly Glu Glu Thr Thr Pro Pro Ser Gln Lys Gln Glu Leu Ile Asp
465                 470                 475                 480


Lys Glu Ala Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500
```

<210> 429
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (464)..(464)
<223> Xaa can be any naturally occurring amino acid

<400> 429

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gly Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Pro Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Arg Asp
```

85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Val Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
130 135 140

Gln Ala Met Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly

```
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Gly Arg
    370                 375                 380

Thr Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Xaa
    450                 455                 460

Phe Gly Asp Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
```

465 470 475 480

Lys Asp Leu Tyr Pro Ser Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 430
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 430

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Leu Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Asn Ser
115 120 125

```
Lys Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ser Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Ile Ile Pro Met Phe Thr Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Val His Pro Val Gln Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320
```

```
Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys His Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Pro Thr Thr Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Lys Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Thr Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460

Arg Phe Gly Glu Gly Thr Ala Thr Pro Ser Gln Lys Gln Gly Pro Ile
465                 470                 475                 480

Asp Glu Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
                485                 490                 495

Asp Pro Ser Ser Gln
            500
```

<210> 431
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (76)..(76)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (147)..(147)
<223> Xaa can be any naturally occurring amino acid

<400> 431

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Ser Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Ala Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Xaa Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Arg Ser Lys
            100                 105                 110
```

```
Lys Arg Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Xaa Thr Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Asp Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335


Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350


Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365


Gln Val Thr Asn Ser Ala Asn Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380


Lys Gln Arg Lys Val Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415


Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Ile Thr Thr Pro Ser Gln Lys Gln Glu Pro Leu Asp
465                 470                 475                 480


Lys Glu Met Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495
```

Pro Ser Ser Gln
500

<210> 432
<211> 497
<212> PRT
<213> Human immunodeficiency virus

<400> 432

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Asn Lys Lys Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Gln Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Val Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu

```
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
```

340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

His Val Thr Ser Pro Ala Asn Val Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Leu Ala Asp
465 470 475 480

Lys Glu Gln Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro

<210> 433
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 433

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Asn Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
130 135 140

Gln Pro Met Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Ala Trp Ile Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gln Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Asn Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380
```

```
Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Ser Thr Pro Ser Gln Lys Gln Glu Ser Ile Asp
465                 470                 475                 480


Arg Asp Lys Asp Met Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495


Asn Asp Pro Ser Ser Gln
            500


<210>  434
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus

<400>  434

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30
```

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Lys Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Met Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ser Thr Thr Val Met Met Gln Arg Gly Lys Phe Arg
    370                 375                 380

Asn Gln Thr Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

```
Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Lys Thr Thr Pro Ser Gln Lys Gln Glu Thr Ile Asp
465                 470                 475                 480

Gln Asp Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 435
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 435

```
Met Gly Ala Arg Ala Ser Val Ile Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Ser Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 436
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 436

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His His Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys

100 105 110

Lys Lys Ala Gln Gln Ala Ala Asp Thr Gly Asn Ser Ser Lys Val Ser
115 120 125

Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln
130 135 140

Ala Met Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145 150 155 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu
165 170 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Ile Gly Gly
180 185 190

His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
195 200 205

Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Ile Ala Pro
210 215 220

Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225 230 235 240

Asn Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile Pro
245 250 255

Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
260 265 270

Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln Gly Pro
275 280 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg

```
    290                 295                 300

Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Met Thr Asn Pro Ala Thr Ile Met Met Gln Arg Gly Asn Phe Lys Asn
    370                 375                 380

Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
    450                 455                 460

Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp Gln
465                 470                 475                 480

Glu Arg Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
```

485 490 495

Ser Ser Gln

<210> 437
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (28)..(28)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (118)..(118)
<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (288)..(288)
<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (411)..(411)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (478)..(478)
<223> Xaa can be any naturally occurring amino acid

<400> 437

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Xaa Tyr Arg Leu Lys
20 25 30

His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Arg Ile Leu Glu Gln Leu
50 55 60

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Arg Lys Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Arg Ala Gln Gln Xaa Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Xaa Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Met Thr Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Xaa Ser Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Xaa Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220


Pro Gly Gln Xaa Arg Glu Pro Arg Gly Ser Xaa Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln Xaa
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Xaa Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Xaa Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Ser Val Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Xaa Pro Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Xaa Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Xaa Ile Asp
465 470 475 480

Lys Asp Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 438
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 438

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Ile Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys

100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Ala Gly Thr Ser Gln Val Ser
115 120 125

Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln
130 135 140

Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145 150 155 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu
165 170 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
180 185 190

His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
195 200 205

Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro
210 215 220

Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225 230 235 240

Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro
245 250 255

Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
260 265 270

Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro
275 280 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg

```
    290                 295                 300

Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Thr Thr Asn Ala Ala Ala Ala Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Gly Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Ala Pro Pro Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Ser Asp
```

485 490 495

Pro Ser Ser Gln
500

<210> 439
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<400> 439

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Ser Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gly Lys
115 120 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val
130 135 140

```
His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335
```

```
Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Ser His Lys Ala Lys Ile Met Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Asn Ser Thr Ala Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser Ser Arg Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Ser Ala Pro Pro Ala
    450                 455                 460

Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln
465                 470                 475                 480

Glu Pro Thr Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu
                485                 490                 495

Phe Gly Asn Asp Pro Ser Ser Gln
            500
```

<210> 440
<211> 500

<212> PRT
<213> Human immunodeficiency virus

<400> 440

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Met Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Ala Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Arg Ser Lys
            100                 105                 110

Lys Thr Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Gln Ala
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175
```

```
Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Val Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365
```

```
Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Arg Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 441
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 441

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15
```

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asn Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Thr Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Ser Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Val Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205
```

```
Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Asn
    210                 215                 220

Pro Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Ile Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Asn Ser Thr Thr Val Met Met Gln Lys Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400
```

His Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
405 410 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
420 425 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
435 440 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
450 455 460

Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Pro Glu Pro Ile
465 470 475 480

Asp Lys Glu Val Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 442
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 442

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Pro Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu

```
    50                  55                  60

His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Arg Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Arg Val
        115                 120                 125

Ser His Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
```

245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
355 360 365

Gln Ala Thr Asn Ser Ala Ala Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Ser Gln Gly Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Ile Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Asp Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe

435 440 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Thr Thr Pro Pro Gln Lys Gln Glu
465 470 475 480

Pro Ile Asp Lys Glu Leu Tyr Pro Ser Ala Ser Leu Lys Ser Leu Phe
485 490 495

Gly Ser Asp Pro Ser Ser Ile
500

<210> 443
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<400> 443

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Ile Ala Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Lys Val Lys Asp
85 90 95

```
Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Val Gln Gln Ala Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn
        115                 120                 125

Ser Ser His Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly
    130                 135                 140

Gln Met Val His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala
    210                 215                 220

Gly Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn
                245                 250                 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp
        275                 280                 285
```

```
Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Gln Gly Ala Thr Leu Glu Glu Met Met Ser
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala
        355                 360                 365

Glu Ala Met Ser Gln Val Thr Asn Pro Ala Asn Ile Leu Met Gln Arg
    370                 375                 380

Gly Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly
                405                 410                 415

Cys Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu
            420                 425                 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Pro Tyr Lys Gly Arg
        435                 440                 445

Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Ser Ala
    450                 455                 460

Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Pro Ser Gln
465                 470                 475                 480
```

Lys Gln Glu Gln Ile Asp Lys Glu Leu Tyr Pro Ser Ala Ser Leu Arg
485 490 495

Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
500 505

<210> 444
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 444

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Ser Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
100 105 110

Gln Lys Val Gln Gln Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser Asn
115 120 125

```
Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Ser Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Val Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320
```

```
Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Ser Thr Ala Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Arg Gly Pro Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Arg Asp Cys Asn Asn Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Glu Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Ala Gln Lys Pro Glu
465                 470                 475                 480

Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Ser Ser Gln
            500
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<210> 445
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 445

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Arg Ala Pro Gln Thr Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser
        115                 120                 125


Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140


Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160
```

```
Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Asn Pro Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Val Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350
```

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
355 360 365

Met Ser Gln Ala Thr Asn Ser Val Asn Ile Met Met Gln Arg Gly Asn
370 375 380

Leu Arg Asn Gln Arg Lys Met Ala Lys Cys Phe Asn Cys Gly Lys Glu
385 390 395 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
405 410 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Pro Glu Thr
465 470 475 480

Ile Asp Lys Glu Val Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 446
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<400> 446

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Thr Trp

```
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Asn Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Pro Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Gln Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gly Asn
        115                 120                 125

Asn Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ala Gln Gly
    130                 135                 140

Gln Met Val His Gln Ala Ile Thr Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
```

195 200 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala
210 215 220

Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225 230 235 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His
245 250 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
260 265 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp
275 280 285

Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
290 295 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp
305 310 315 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
325 330 335

Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
340 345 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
355 360 365

Glu Ala Met Ser Gln Val Thr Asn Ser Ser Asn Ile Met Met Gln Arg
370 375 380

Gly Asn Phe Arg Asn Gln Arg Arg Val Val Lys Cys Phe Asn Cys Gly

385 390 395 400

Lys Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly
405 410 415

Cys Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu
420 425 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
435 440 445

Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Leu Glu Pro
450 455 460

Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Gly Thr Ala Thr
465 470 475 480

Pro Ser Gln Glu Gln Glu Lys Leu Tyr Pro Leu Thr Ser Leu Lys Ser
485 490 495

Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 447
<211> 510
<212> PRT
<213> Human immunodeficiency virus

<400> 447

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Asp Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Thr Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Cys Leu Leu Glu Thr Ser Thr Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Asp Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Asp Thr Gly Cys Ser Ser Gln
        115                 120                 125

Ala Ser Ser Ser Gln Ala Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu
    130                 135                 140

Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala
145                 150                 155                 160

Trp Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro
                165                 170                 175

Met Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr
            180                 185                 190

Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys
        195                 200                 205

Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val
    210                 215                 220

His Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser
225                 230                 235                 240
```

```
Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met
                245                 250                 255

Thr Asn Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile
            260                 265                 270

Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile
        275                 280                 285

Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp
    290                 295                 300

Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys
305                 310                 315                 320

Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys
                325                 330                 335

Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met
            340                 345                 350

Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val
        355                 360                 365

Leu Ala Glu Ala Met Ser Gln Ala Thr Asn Ala Ala Ala Val Met Met
    370                 375                 380

Gln Lys Gly Asn Phe Arg Gly Gln Arg Lys Thr Val Lys Cys Phe Asn
385                 390                 395                 400

Cys Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys
                405                 410                 415

Arg Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys
            420                 425                 430
```

```
Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys
        435                 440                 445


Gly Arg Pro Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Val Pro
    450                 455                 460


Thr Ala Pro Pro Ala Glu Ser Phe Arg Phe Gly Glu Glu Thr Ala Thr
465                 470                 475                 480


Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Pro Leu
                485                 490                 495


Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505                 510


<210>  448
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus


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<400> 448

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Gln Leu Lys
            20   25   30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ser Ser Gly Cys Arg Gln Ile Leu Arg Gln Leu
    50   55   60

Gln Pro Ala Leu Glu Thr Gly Ser Glu Glu Xaa Lys Ser Leu Tyr Asn
65   70   75   80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85   90   95

```
Thr Lys Glu Ala Leu Xaa Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Glu Lys Xaa Gln Gln Ala Ala Ala Ala Thr Gly Xaa Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Xaa Asn Xaa Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Xaa Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Xaa His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Xaa Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Ile Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Xaa Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Xaa Leu Lys Xaa
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Xaa Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Xaa Thr Asn Ser Xaa Asn Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Pro Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Xaa Arg Pro Gly Asn Xaa
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Xaa Arg
    450                 455                 460

Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Gly Thr Ile Asp
465                 470                 475                 480
```

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 449
<211> 502
<212> PRT
<213> Human immunodeficiency virus

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Glu Lys Ile Gln Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Glu Gln Leu
    50                  55                  60
```

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Ile Tyr Cys Val His Lys Arg Ile Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Xaa Ala Gln Gln Ala Ala Ala Ala Ala Ala Gly Pro Gly Asn Ser
        115                 120                 125

Gln Val Ser Xaa Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Xaa Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Xaa Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Asn Trp Met Thr Asn Asn Pro
                245                 250                 255
```

```
Pro Ile Pro Val Gly Glu Xaa Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Xaa Lys Ile Val Arg Met Tyr Xaa Pro Ala Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Xaa Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Xaa Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Xaa Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Xaa His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Xaa Arg Pro Gly
        435                 440                 445
```

```
Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
    450                 455                 460


Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Gly Pro
465                 470                 475                 480


Met Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495


Xaa Asp Pro Ser Ser Gln
            500


<210>  450
<211>  508
<212>  PRT
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Pro Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Met Ile Glu Ile Arg Asp
```

85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Xaa Gln Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Thr Ala Asp Ala Gly Lys Thr Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
130 135 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Gly Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Xaa Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile
245 250 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly

```
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Xaa Asn Pro Asp Xaa Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Tyr Xaa
    370                 375                 380

Asn Gln Gly Lys Met Val Lys Cys Phe Asn Cys Gly Lys Xaa Gly His
385                 390                 395                 400

Ile Ala Arg Asn Xaa Arg Ala Pro Xaa Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Xaa Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Ala Ala Pro Gln Asn Arg Thr Glu Pro
    450                 455                 460

Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Xaa Ile Thr
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465 470 475 480

Pro Ser Gln Lys Gln Glu Pro Ile Asp Arg Glu Tyr Pro Leu Ala Ser
485 490 495

Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 451
<211> 507
<212> PRT
<213> Human immunodeficiency virus

<400> 451

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Trp
1 5 10 15

Glu Lys Ile Tyr Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Arg Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ile Lys
100 105 110

Lys Lys Thr Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

```
Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Ala Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Val
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320
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```
Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

His Val Thr Asn Ser Asn Ala Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Pro Thr Ala
    450                 455                 460

Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Gly Ala Thr Ala Pro Pro
465                 470                 475                 480

Gln Lys Gln Glu Pro Ile Asp Lys Glu Met Tyr Pro Leu Val Ser Leu
                485                 490                 495

Arg Ser Leu Phe Gly Ser Asp Pro Ser Ser Gln
            500                 505
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<210> 452
<211> 497
<212> PRT
<213> Human immunodeficiency virus

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Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp

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Glu Lys Ile Arg Xaa Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
35 40 45

Gly Leu Leu Xaa Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg His Leu
50 55 60

His Ser Ser Leu Gln Ala Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Xaa Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Xaa Val Xaa Asn Xaa Gln Gly Gln Met Xaa Tyr
130 135 140

Gln Xaa Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gly Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu

195 200 205

Ala Ala Glu Trp Asp Arg Leu Xaa Pro Val Gln Ala Gly Pro Ile Ala
210 215 220

Pro Gly Xaa Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Xaa Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Xaa Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Ala Ile Leu Arg Ala
325 330 335

Leu Gly Pro Ala Ala Xaa Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Gln Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His

385 390 395 400

Ile Xaa Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Xaa Pro Gly Asn Phe
435 440 445

Pro Gln Ser Xaa Thr Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Val Pro Ser Gln Lys Gln Glu Leu Ile Xaa
465 470 475 480

Lys Asn Leu Tyr Pro Ser Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro

<210> 453
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 453

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Arg Leu Asp Gln Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Lys Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Gly Thr Gln Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Ala Gly Asn Asn Ser
        115                 120                 125

Pro Val Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ala Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240
```

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Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Pro Thr Asn Ile Leu Met Gln Arg Gly Asn
    370                 375                 380

Phe Lys Asn Gln Arg Arg Ser Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430
```

```
Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445


Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
    450                 455                 460


Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Lys
465                 470                 475                 480


Ile Asp Lys Glu Met Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly
                485                 490                 495


Asn Asp Pro Ser Ser Gln
            500


<210>  454
<211>  503
<212>  PRT
<213>  Human immunodeficiency virus


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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Xaa Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Lys Glu Leu Glu His Phe Ala Leu Asn Pro
        35   40   45

Xaa Leu Leu Glu Thr Thr Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50   55   60

Gln Pro Ala Leu Arg Thr Gly Thr Gln Glu Leu Lys Ser Leu Tyr Asn
65   70   75   80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Ile Lys Asp
                85   90   95

Thr Xaa Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100   105   110

Xaa Lys Xaa Gln Gln Ala Ala Ala Asp Thr Gly Lys Asp Asn Pro Val

```
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Xaa Ala Gln Gly Gln Met Xaa His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Xaa Glu Val Ile Pro Met Phe Ala Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Xaa Asn Thr Met Xaa Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Ile Gly Leu His Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Xaa Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
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305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Ser Ala Asn Xaa Met Met Gln Lys Gly Asn
370 375 380

Phe Arg Xaa Gln Arg Xaa Ile Xaa Lys Cys Phe Asn Cys Gly Lys Glu
385 390 395 400

Gly His Ile Ala Arg Asn Cys Lys Ala Pro Arg Arg Lys Gly Cys Trp
405 410 415

Lys Cys Gly Xaa Glu Gly His Gln Leu Lys Asp Cys Thr Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Xaa Phe Pro Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Ser
465 470 475 480

Arg Asp Lys Glu Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
485 490 495

Gly Asn Asp Pro Ser Ser Gln

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<213> Human immunodeficiency virus

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Glu Lys Ile Gln Leu Arg Pro Gly Gly Lys Lys Arg Tyr Gln Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Lys Ile Leu Val Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Val Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Xaa Ala Gln Ala Ala Ala Ala Asp Thr Gly Asn Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Xaa Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Ile Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205
```

```
Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Val Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Xaa Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Ser Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Xaa Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Xaa Phe Thr Asn Pro Ala Asn Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400
```

```
Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Xaa Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Xaa Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Ser Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 456
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 456

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asp Pro
        35                  40                  45
```

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Lys Thr Gly Ser Glu Glu Phe Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Met Thr Asn Gln Ala Thr Ile Met Val Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Gly Arg Asn Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
```

```
Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480


Lys Asn Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500


<210>  457
<211>  502
<212>  PRT
<213>  Human immunodeficiency virus

<400>  457

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Ser Trp
1               5                   10                  15


Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80
```

```
Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Asp Ala Gly Thr Ser Ser Gln Val Ser
        115                 120                 125

Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His Gln
    130                 135                 140

Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190

His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro
    210                 215                 220

Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240

Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro
                245                 250                 255

Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
            260                 265                 270
```

```
Val Arg Met Tyr Ser Pro Ala Ser Ile Leu Asp Ile Arg Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg
    290                 295                 300

Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg Asn
    370                 375                 380

Gln Arg Lys Ala Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Val
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Pro
        435                 440                 445

Gln Ser Arg Leu Met Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu Ser
    450                 455                 460
```

Phe Arg Phe Gly Glu Glu Ala Thr Thr Pro Ser Gln Arg Gln Glu Pro
465 470 475 480

Ile Asp Lys Glu His Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 458
<211> 507
<212> PRT
<213> Human immunodeficiency virus

<400> 458

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Ser Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Ile Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Glu Gln Asn Lys Ser Lys Glu Lys Ala Gln Gln Ala Ala Ala Gly Thr

115 120 125

Gly Asn Ser Ser Gln Val Ser Ser Gln Asn Tyr Pro Ile Val Gln Asn
130 135 140

Leu Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn
145 150 155 160

Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile
165 170 175

Pro Met Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Ser Asp Leu Asn
180 185 190

Thr Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu
195 200 205

Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro
210 215 220

Val His Ala Gly Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly
225 230 235 240

Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp
245 250 255

Met Thr Ser Asn Pro Pro Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp
260 265 270

Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser
275 280 285

Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val
290 295 300

Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val

```
305                 310                 315                 320

Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp
                325                 330                 335

Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu
            340                 345                 350

Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg
        355                 360                 365

Val Leu Ala Glu Ala Met Ser Gln Val Thr Asn Ser Ala Asn Ile Met
    370                 375                 380

Met Gln Arg Gly Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe
385                 390                 395                 400

Asn Cys Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg
                405                 410                 415

Lys Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp
            420                 425                 430

Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His
        435                 440                 445

Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala
    450                 455                 460

Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser
465                 470                 475                 480

Gln Lys Gln Asp Pro Ile Asp Lys Asp Leu Tyr Pro Leu Ala Ser Leu
                485                 490                 495

Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
```

500 505

<210> 459
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (28)..(28)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (113)..(113)
<223> Xaa can be any naturally occurring amino acid

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<220>
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
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<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<220>
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<222> (325)..(325)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (340)..(340)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (347)..(347)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (480)..(480)
<223> Xaa can be any naturally occurring amino acid

<400> 459

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Gln Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Xaa Tyr Gln Leu Lys

```
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Phe Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Xaa Lys Xaa Gln Gln Ala Ala Ala Asp Thr Gly Asn Thr Gly Asn Ser
        115                 120                 125

Asn Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Ile Xaa Pro Arg Thr Leu Xaa Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
```

210 215 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Xaa Ile Ala
225 230 235 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
245 250 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Xaa Gly
260 265 270

Leu Xaa Lys Ile Val Arg Met Tyr Ser Xaa Thr Ser Ile Leu Asp Ile
275 280 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
290 295 300

Lys Xaa Leu Arg Xaa Glu Gln Ala Ser Xaa Glu Val Lys Asn Trp Met
305 310 315 320

Thr Glu Thr Leu Xaa Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
325 330 335

Leu Lys Ala Xaa Gly Pro Ala Ala Thr Leu Xaa Glu Met Met Thr Ala
340 345 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
355 360 365

Ala Met Ser Gln Val His Pro Val Asn Ile Met Met Gln Arg Gly Asn
370 375 380

Phe Lys Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu
385 390 395 400

Gly His Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp

405 410 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro
450 455 460

Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Xaa
465 470 475 480

Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser
485 490 495

Leu Phe Gly Asn Asp Pro Leu Ser Gln
500 505

<210> 460
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (224)..(224)
<223> Xaa can be any naturally occurring amino acid

<400> 460

Met Gly Ala Arg Ala Ser Ile Leu Arg Gly Glu Lys Leu Asp Lys Trp
1 5 10 15

```
Glu Lys Ile Gln Leu Arg Pro Gly Gly Lys Lys Arg Tyr Gln Leu Lys
            20                  25                  30

His Leu Ile Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Xaa Ser Ala Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Ser Ser Leu Gln Thr Gly Thr Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Gly Lys
            100                 105                 110

Val Lys Thr Gln Gln Ala Ala Ala Asp Thr Gly Ser Ser Ser Lys Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Leu Thr Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205
```

```
Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Xaa
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Ile Ile Leu Lys Ser
                325                 330                 335

Leu Gly Pro Gly Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Asn Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400
```

```
Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Asn Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Pro Pro Ser Gln Lys Gln Glu Gln Thr Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500
```

<210> 461
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (226)..(226)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (444)..(444)
<223> Xaa can be any naturally occurring amino acid

<400> 461

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
```

```
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Gly Arg Glu Leu Glu Arg Tyr Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Met Glu Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser
        115                 120                 125

Lys Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Phe Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
```

195 200 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly Pro
210 215 220

Val Xaa Pro Gly Gln Ile Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly
225 230 235 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Asp Trp Met Thr Arg Asn Pro
245 250 255

Pro Val Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
260 265 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
275 280 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
290 295 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305 310 315 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
325 330 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
340 345 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
355 360 365

Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn
370 375 380

Phe Arg Asn Gln Lys Lys Asn Val Lys Cys Phe Asn Cys Gly Lys Glu

385 390 395 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
405 410 415

Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Xaa Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Gly Thr Thr Thr Pro Pro Gln Lys Gln Glu Thr
465 470 475 480

Ile Asp Lys Asp Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly
485 490 495

Asn Asp Pro Leu Ser Gln
500

<210> 462
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
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<220>
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<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (307)..(307)
<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (474)..(474)
<223> Xaa can be any naturally occurring amino acid

<400> 462

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
    50                  55                  60


Gln Pro Ala Xaa Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asp Lys Ser Lys
            100                 105                 110
```

```
Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Xaa Met Arg Xaa Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ala Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Xaa Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Val Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Xaa Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Ala Thr Pro Pro Xaa Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495
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Pro Ser Ser Pro
500

<210> 463
<211> 504
<212> PRT
<213> Human immunodeficiency virus

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<400> 463

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1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Lys Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu His Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Arg Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Pro Ala Ala Asp Thr Gly Ser His Asn Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Xaa His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Asn Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Val
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Glu Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ala His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Gln Pro Ala Ala Val Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380
```

Asn Gln Lys Arg Ile Val Lys Cys Tyr Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Xaa Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Gly Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Phe Trp Pro Ser His Xaa Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Asn Ser Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu
450 455 460

Ser Phe Arg Phe Gly Glu Xaa Ile Ala Xaa Pro Ser Xaa Lys Gln Glu
465 470 475 480

Xaa Lys Gly Lys Glu Leu Tyr Pro Pro Leu Ala Ser Leu Arg Ser Leu
485 490 495

Phe Gly Asn Asp Pro Ser Ser Gln
500

<210> 464
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 464

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Asp Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro

```
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Thr Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Arg Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ser Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Ile Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
```

225 230 235 240

Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu His Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Thr Thr Ile Met Met Gln Lys Gly Asn Phe Arg
370 375 380

Asn His Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn

420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Asp Leu Ile Asp
465 470 475 480

Lys Glu Leu His Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 465
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<400> 465

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Xaa Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Xaa Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Xaa Ala Val Leu Tyr Cys Xaa His Gln Asn Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Gln Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ser Thr Gly Asn Ser Gly Gln Ile
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Xaa Val Ile Pro Met Phe Thr Ala Xaa Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Xaa Trp Asp Arg Ile His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Arg Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Gln Ala Ser Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Xaa Ala Xaa Arg Arg Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
```

```
Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Xaa Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Gly Glu Thr Thr Xaa Pro Ser Gln Lys Gln Glu Gln Thr Lys
465                 470                 475                 480

Glu Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
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<210> 466
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 466

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Ser Leu Leu Glu Thr Ala Ala Gly Cys Arg Gln Ile Leu Ala Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu His Asn
65                  70                  75                  80
```

```
Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Ser Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Val
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270
```

```
Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Asn Ala Asn Thr Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu Ser Phe
    450                 455                 460
```

```
Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile
465                 470                 475                 480


Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Ser
                485                 490                 495


Asp Pro Leu Ser Gln
            500


<210>  467
<211>  502
<212>  PRT
<213>  Human immunodeficiency virus


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<400>  467

Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Xaa Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45
```

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Gln Thr
        115                 120                 125

Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Asn Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Asp Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Asn Leu Gln Glu Gln Ile Thr Trp Met Thr Gly Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Ile Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ala His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Asn Ser Thr Thr Ile Met Met Gln Arg Gly Asn Phe Arg Gly
    370                 375                 380

Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Arg Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430
```

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
435 440 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Xaa Glu Ser
450 455 460

Phe Arg Xaa Gly Glu Gly Thr Thr Thr Pro Ser Gln Lys Gln Glu Thr
465 470 475 480

Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 468
<211> 508
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<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

<400> 468

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Glu Lys Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Xaa Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95
```

```
Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Xaa Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Thr Gly Asn
        115                 120                 125

Ser Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln
    130                 135                 140

Gly Gln Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp
145                 150                 155                 160

Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met
                165                 170                 175

Phe Thr Xaa Leu Ser Glu Gly Ala Thr Pro Gln Asp Xaa Asn Thr Met
            180                 185                 190

Leu Asn Thr Val Gly Gly His Gln Ala Xaa Met Gln Met Leu Lys Glu
        195                 200                 205

Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His
    210                 215                 220

Ala Gly Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp
225                 230                 235                 240

Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr
                245                 250                 255

Asn Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile
            260                 265                 270

Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu
        275                 280                 285
```

```
Asp Ile Lys Xaa Gly Pro Lys Glu Xaa Phe Arg Asp Tyr Val Asp Arg
    290                 295                 300

Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn
305                 310                 315                 320

Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys
                325                 330                 335

Thr Ile Leu Lys Ala Xaa Gly Pro Ala Ala Thr Leu Glu Glu Met Met
            340                 345                 350

Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu
        355                 360                 365

Ala Glu Ala Met Ser Gln Ala Thr Asn Ser Ala Ala Ala Ile Met Met
    370                 375                 380

Gln Arg Gly Lys Phe Lys Asn Gln Arg Lys Xaa Val Lys Cys Phe Asn
385                 390                 395                 400

Cys Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys
                405                 410                 415

Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys
            420                 425                 430

Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys
        435                 440                 445

Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro
    450                 455                 460

Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Ala
465                 470                 475                 480
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Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys Glu Val Tyr Pro Leu Ala
485 490 495

Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser
500 505

<210> 469
<211> 499
<212> PRT
<213> Human immunodeficiency virus

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<400> 469

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

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His Ile Val Trp Ala Ser Xaa Glu Leu Glu Xaa Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Ala Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Asp Thr Gly Asn Ser Ser Gln Val Ser
        115                 120                 125

Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln
    130                 135                 140

Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Xaa Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190

Xaa Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Glu Trp Asp Arg Leu His Pro Pro Gln Ala Gly Pro Ile Ala Pro
    210                 215                 220
```

```
Gly Gln Ile Arg Glu Pro Xaa Gly Ser Asp Ile Ala Gly Ser Thr Ser
225                 230                 235                 240

Asn Leu Gln Glu Gln Val Arg Trp Met Thr Ser Asn Pro Pro Ile Pro
                245                 250                 255

Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
            260                 265                 270

Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Arg Thr Leu Arg
    290                 295                 300

Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Ala His Lys Ala Arg Val Leu Ala Glu Ala Met Ser His
        355                 360                 365

Val Thr Gly Ala Asn Ala Ile Met Met Gln Lys Gly Asn Phe Lys Ser
    370                 375                 380

Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415
```

```
Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
    450                 455                 460

Gly Glu Glu Ala Ala Ala Pro Pro Gln Lys Gln Glu Pro Ile Asp Lys
465                 470                 475                 480

Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495

Ser Ser Gln
```

<210> 470
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 470

```
Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Lys Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Ser Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Leu Val Ala Val Leu Trp Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Lys Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Asn Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255
```

```
Gln Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Pro Ala Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

```
Pro Gln Ser Lys Ile Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500


<210>  471
<211>  508
<212>  PRT
<213>  Human immunodeficiency virus

<400>  471

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Gly Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Thr Leu Tyr Cys Val His Gln Asn Ile Glu Val Lys Asp
                85                  90                  95
```

```
Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Ala Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly
    210                 215                 220

Pro Val Ala Pro Gly Gln Ile Arg Asp Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Asn Leu Gln Glu Gln Ile Thr Trp Met Thr Ser Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile
        275                 280                 285
```

```
Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Gly Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Ser Ser Ala Thr Ile Met Met Gln Arg Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Leu Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Arg Ile Trp Pro Ser Ser Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu
465                 470                 475                 480
```

Leu Ile Asp Lys Glu Pro Ile Asp Lys Glu Thr Tyr Pro Leu Ala Ser
485 490 495

Leu Arg Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
500 505

<210> 472
<211> 512
<212> PRT
<213> Human immunodeficiency virus

<400> 472

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Ile Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Pro Ala Ala Ala Ala Asp Thr Glu Asn Ser Ser Gln
115 120 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val

```
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
```

325 330 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
340 345 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
355 360 365

Ser Gln Val Thr Ser Pro Ala Asn Ile Met Met Gln Arg Gly Asn Phe
370 375 380

Arg Asn Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly
385 390 395 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
405 410 415

Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala
420 425 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
435 440 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Gln Ser Arg
450 455 460

Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg Phe Gly Glu Glu
465 470 475 480

Thr Ala Thr Pro Ser Gln Lys Gln Glu Thr Val Asp Lys Glu Val Tyr
485 490 495

Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Ser Asp Pro Leu Leu Gln
500 505 510

<210> 473

<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 473

```
Met Gly Ala Arg Ala Ser Val Leu Arg Gly Gly Gln Leu Asp Thr Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Ile Gly Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Val Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Glu Val Arg Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Thr Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175
```

```
Glu Gly Cys Thr Pro Gln Asp Leu Asn Leu Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Met His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Thr Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365
```

```
Gln Val Thr Asn Pro Ala Ala Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

His Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Arg Arg Gly Gly Pro Gly Asn Phe
        435                 440                 445

Pro Gln Gly Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Asp Pro Ile Asp
465                 470                 475                 480

Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 474
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 474

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15
```

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Gln Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Asn Ser Leu Ser Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Val Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Asn Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Val Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Ser Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205
```

```
Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Ser Asn Ala Thr Asn Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Thr Gln Arg Arg Ile Val Arg Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400
```

```
Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Arg Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Ser Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Pro Pro Gln Lys Gln Glu Ala Ile Asp Lys
465                 470                 475                 480


Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Ser Asp Pro
                485                 490                 495


Ser Ser Gln



<210>  475
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus


<220>
<221>  misc_feature
<222>  (23)..(23)
<223>  Xaa can be any naturally occurring amino acid

<220>
<221>  misc_feature
<222>  (26)..(26)
<223>  Xaa can be any naturally occurring amino acid

<220>
<221>  misc_feature
<222>  (40)..(40)
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<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (51)..(51)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (104)..(104)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (489)..(489)
<223> Xaa can be any naturally occurring amino acid

<400> 475

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1   5   10   15

Glu Arg Ile Arg Leu Arg Xaa Gly Gly Xaa Lys Arg Tyr Lys Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Xaa Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

Gly Leu Xaa Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Ile Gln Leu
    50   55   60

Gln Pro Ser Leu Lys Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65   70   75   80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Glu Val Arg Asp
                85   90   95

Thr Lys Glu Ala Leu Asp Lys Xaa Glu Glu Glu Gln Asn Lys Gly Lys
            100   105   110

Lys Lys Ala Gln Gln Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn

```
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln
    130                 135                 140

Met Val His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Ile Glu Asp Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly
    210                 215                 220

Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met
```

```
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Gly Ala Ser Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Ala Thr Asn Gln Asn Thr Ile Met Met Gln Arg Gly
    370                 375                 380

Thr Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415

Trp Lys Cys Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Arg Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu
    450                 455                 460

Ser Phe Gly Phe Gly Glu Glu Gly Thr Thr Pro Pro Gln Lys Gln Glu
465                 470                 475                 480

Gln Lys Asp Lys Glu Leu Tyr Pro Xaa Ala Ser Leu Arg Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro
```

500

<210> 476
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (230)..(230)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (438)..(438)
<223> Xaa can be any naturally occurring amino acid

<400> 476

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp His Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

```
Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Ile Glu Glu Arg Ala Phe Ser Pro Glu Ile Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Ala Ala Pro Gly Xaa Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn
                245                 250                 255

Pro Ala Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300
```

```
Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met
305                 310                 315                 320


Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335


Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350


Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu
        355                 360                 365


Ala Met Ser Gln Val Thr Asn Gln Ser Thr Ile Met Ile Gln Arg Gly
    370                 375                 380


Asn Phe Arg Gly Gln Gly Lys Ile Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400


Val Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys
                405                 410                 415


Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Gly
            420                 425                 430


Gln Ala Asn Phe Leu Xaa Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445


Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Pro
    450                 455                 460


Thr Ala Pro Pro Ala Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr
465                 470                 475                 480


Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Thr
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Ser Leu Arg Ser Leu Phe Gly Asn Asp His
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Xaa Lys Arg Tyr Arg Leu Lys

20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Leu Ile Xaa Asn Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Ile Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Thr Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Xaa Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Val Ala

210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Xaa Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys

405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ile Phe Arg
450 455 460

Phe Gly Lys Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
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Lys Glu Gly Ser Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
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Pro Ser Ser Gln
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Gly Gln Xaa
    50   55   60

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His Pro Ser Leu Gln Thr Gly Ser Glu Xaa Leu Xaa Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Xaa Asn Ile Glu Val Xaa Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Gln Xaa Lys
            100                 105                 110

Lys Lys Xaa Gln Gln Ala Ala Ala Ala Thr Gly Asn Ser Xaa Ser Xaa
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Xaa Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Xaa Ala Gly Pro Val
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255
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Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Ala Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Xaa Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Xaa Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Asn Ser Ala Asn Xaa Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Asn Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Xaa Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Xaa Arg Pro Gly
        435                 440                 445
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Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
    450                 455                 460


Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro
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Arg Asp Lys Glu Xaa Tyr Pro Leu Xaa Ser Leu Xaa Ser Leu Phe Gly
                485                 490                 495


Asn Asp Pro Ser Ser Gln
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80
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Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Val Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Pro Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Xaa Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Xaa Leu Asn Thr Met Xaa Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Pro Ala
    210                 215                 220

Pro Gly Gln Xaa Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270
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Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Xaa Lys Thr Ile Leu Lys Ala
                325                 330                 335

Xaa Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Xaa Ile Xaa Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Ser Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Pro Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Ser Glu Gly His Gln Met Lys Asp Cys Thr Gly Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Pro Thr Ala Pro
    450                 455                 460
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Pro Ala Glu Ser Phe Arg Phe Gly Gly Glu Thr Thr Thr Pro Pro Gln
465 470 475 480

Lys Gln Glu Xaa Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys
485 490 495

Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
20 25 30

His Ile Xaa Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
35 40 45

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Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Lys Thr Gly Ser Glu Glu Leu Arg Ser Xaa Phe Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Asn Ile Glu Xaa Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Xaa
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Xaa Asp Thr Gly Asn Ser Ser Xaa Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Xaa Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Xaa Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240
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```
Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Arg Thr
    290                 295                 300

Leu Arg Ala Xaa Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Xaa Ala Glu Ala Met
        355                 360                 365

Ser Leu Val Asn Pro Thr Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Xaa Asn
            420                 425                 430
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Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Xaa Glu Pro Thr Ala Pro Xaa Glu Pro Thr Ala Pro
    450                 455                 460


Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Ala Pro Ser Gln
465                 470                 475                 480


Lys Gln Glu Pro Ile Asp Lys Glu Lys Tyr Pro Leu Ala Ser Leu Arg
                485                 490                 495


Ser Leu Phe Gly Asn Asp Pro
            500


<210>  481
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<212>  PRT
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Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Val Val Trp Ala Ser Arg Glu Leu Glu Lys Phe Ala Ile Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Ser Ala Leu Lys Thr Gly Ser Glu Glu Phe Lys Ser Leu Tyr Asn
65                  70                  75                  80
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Thr Val Ala Val Leu Tyr Cys Val His Glu Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Arg Asn Pro Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Pro Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Ile Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270
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Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Asn Pro Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Pro Arg
    370                 375                 380

Thr Gln Arg Lys Met Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Ser Arg Gly Arg Pro Gly Asn Phe
        435                 440                 445

Pro Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser Leu Arg
    450                 455                 460
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Lys Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu Thr Arg Asp Glu Leu
465 470 475 480

Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser
485 490 495

Gln

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
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Glu Lys Ile Arg Leu Xaa Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Xaa Leu Glu Arg Phe Ala Val Asn Pro

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        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Xaa Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Arg Arg Ile Asn Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Xaa Glu Ser Lys
            100                 105                 110

Lys Arg Ala Gln Gln Xaa Glu Ala Xaa Thr Lys Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Xaa Ile Xaa Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Xaa Ser Pro Glu Xaa Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Xaa Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
```

225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Xaa Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Xaa Gly Leu Asn Lys
260 265 270

Ile Val Xaa Met Tyr Xaa Pro Xaa Ser Ile Leu Asp Ile Xaa Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Xaa Tyr Val Asp Arg Phe Tyr Lys Thr Xaa
290 295 300

Arg Ala Glu Gln Xaa Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Xaa Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Xaa Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Leu Met Gln Arg Gly Asn Ile Arg
370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Xaa
405 410 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn

420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Glu Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ala Gln Lys Gln Glu Thr Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 483
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (24)..(24)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (230)..(230)
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 483

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Xaa Gly Lys Lys Gln Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Lys Ile Leu Ile Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Arg Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Thr Ala Ala Ala Asp Pro Gly Asn Ser Ser Gln
        115                 120                 125


Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140
```

```
His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Xaa Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Val
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Xaa Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335
```

```
Ala Leu Xaa Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Lys Val Thr Ser Ser Asn Thr Ile Met Ile Gln Gly Gly Asn Phe
    370                 375                 380

Lys Asn Gln Arg Lys Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Xaa Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Thr Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Met
    450                 455                 460

Phe Gly Glu Glu Thr Thr Pro Ser Gln Arg Gln Glu Ser Xaa Asp Lys
465                 470                 475                 480

Glu Met Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495

Ser Ser Gln
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<210> 484
<211> 503
<212> PRT

<213> Human immunodeficiency virus

<220>
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<220>
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<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (450)..(450)
<223> Xaa can be any naturally occurring amino acid

<400> 484

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Xaa Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Xaa Lys Lys Gln Tyr Arg Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Xaa Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Ile Gly Gln Leu

50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Xaa Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Xaa Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Asn Thr Gly Ser Ser
115 120 125

Ser Thr Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Ala
130 135 140

Met Val His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145 150 155 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
165 170 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
180 185 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
195 200 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
210 215 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225 230 235 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn

```
               245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Met Thr Asn Pro Gly Thr Ile Met Met Gln Arg Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415

Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
```

435 440 445

Gly Xaa Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu
450 455 460

Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu
465 470 475 480

Pro Ile Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
485 490 495

Gly Asn Asp Pro Ser Ser Gln
500

<210> 485
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (197)..(197)
<223> Xaa can be any naturally occurring amino acid

<400> 485

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

```
His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Asn Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Val Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser
        115                 120                 125

Ser Asn Gln Val Ser Gln Asn Tyr Pro Ile Val Arg Asn Ile Gln Gly
    130                 135                 140

Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Xaa His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala
    210                 215                 220

Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Asp Trp Met Thr His
                245                 250                 255
```

```
Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp
        275                 280                 285

Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Thr Gln Asp Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser Gln Val Thr Gly Ser Ala Thr Ile Met Met Gln Lys
    370                 375                 380

Gly Asn Phe Lys Asn Gln Arg Arg Ile Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Arg Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly
                405                 410                 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu
            420                 425                 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
        435                 440                 445
```

Pro Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro Pro Glu
450 455 460

Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln
465 470 475 480

Glu Pro Ile Asp Lys Glu Thr Tyr Pro Leu Ala Ser Leu Lys Ser Leu
485 490 495

Phe Gly Asn Asp Leu Leu Ser Gln
500

<210> 486
<211> 508
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (34)..(34)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (147)..(147)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (237)..(237)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (384)..(384)
<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature
<222> (436)..(436)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (460)..(460)
<223> Xaa can be any naturally occurring amino acid

<400> 486

```
Met Gly Ala Arg Ala Ser Ile Leu Thr Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Xaa Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser
        115                 120                 125


Ser Lys Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln
    130                 135                 140


Met Val Xaa Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
```

```
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Xaa Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Val Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
```

340 345 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
355 360 365

Ala Met Ser Gln Val Thr Asn Ala Ser Ala Ala Ile Met Met Gln Xaa
370 375 380

Gly Asn Phe Arg Thr Pro Gly Lys Thr Val Lys Cys Phe Asn Cys Gly
385 390 395 400

Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Xaa Lys Arg Gly
405 410 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu
420 425 430

Arg Gln Ala Xaa Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
435 440 445

Pro Gly Asn Phe His Gln Ser Arg Leu Glu Pro Xaa Ala Pro Pro Glu
450 455 460

Glu Ser Phe Arg Phe Lys Glu Glu Ile Thr Pro Pro Ser Gln Lys Gln
465 470 475 480

Glu Pro Ile Asp Lys Glu Ile Asp Lys Glu Thr Tyr Pro Leu Ala Ser
485 490 495

Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 487
<211> 498
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (451)..(451)
<223> Xaa can be any naturally occurring amino acid

<400> 487

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Gln Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50   55   60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Phe Arg Ser Leu Tyr Asn
65   70   75   80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85   90   95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Thr Ser Lys
            100   105   110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115   120   125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130   135   140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145   150   155   160

```
Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Ser Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
```

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr His Pro Ala Ile Met Met Gln Arg Gly Asn Phe Lys Asn
370 375 380

Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385 390 395 400

Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
405 410 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
420 425 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Pro
435 440 445

Gln Ser Xaa Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
450 455 460

Gly Glu Glu Thr Ala Pro Phe Gln Lys Gln Glu Arg Val Asp Arg Glu
465 470 475 480

Leu Pro Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Ser
485 490 495

Ser Gln

<210> 488
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (14)..(14)
<223> Xaa can be any naturally occurring amino acid

<400> 488

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Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Xaa Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Ile Ala Val Leu Tyr Cys Val His Arg Lys Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Val Lys
            100                 105                 110


Glu Lys Ala Lys Gln Ala Thr Thr Asp Thr Arg Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Ile Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175
```

```
Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Asp Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365
```

```
Gln Val Thr Asn Ser Gly Ala Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Gly Arg Pro Glu Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu
    450                 455                 460

Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln
465                 470                 475                 480

Glu Thr Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu
                485                 490                 495

Phe Gly Asn Asp Pro Ser Ser Gln
            500
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<210> 489
<211> 497
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (109)..(109)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (132)..(132)
<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (376)..(376)
<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (383)..(383)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (402)..(402)
<223> Xaa can be any naturally occurring amino acid

<400> 489

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Xaa Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Asp Thr Gly Asn Ser Lys Gln
        115                 120                 125

Val Ser Gln Xaa Tyr Pro Ile Val Gln Asn Xaa Gln Gly Gln Met Val
    130                 135                 140

His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro
                245                 250                 255
```

```
Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Asn Ser Asn Xaa Ile Met Xaa Gln Arg Gly Xaa Phe
    370                 375                 380

Arg Asn Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Xaa Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Val Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445
```

Phe Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu Ser Phe
450 455 460

Arg Phe Gly Glu Glu Thr Thr Pro Pro Gln Lys Gln Glu Gln Thr Asp
465 470 475 480

Lys Glu Pro Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Ser Asp
485 490 495

Pro

<210> 490
<211> 486
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (122)..(122)
<223> Xaa can be any naturally occurring amino acid

<400> 490

Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Ile Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Thr Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

```
Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Arg Ala Ala Gln Gln Ala Ala Thr Gly Xaa Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ala Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Pro Gln Ala Gly Pro Leu Pro
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Thr Trp Met Thr Gly Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Val Met Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Ala Asn Pro Ala Thr Val Met Met Gln Arg Gly Asn Tyr Lys
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro
        435                 440                 445

Glu Glu Ser Phe Ser Phe Gly Gly Glu Ile Thr Thr Pro Pro Gln Lys
    450                 455                 460
```

```
Gln Glu Leu Thr Asp Lys Glu Leu Tyr Pro Ser Ala Ser Leu Lys Ser
465                 470                 475                 480


Leu Phe Gly Asn Asp His
                485


<210>  491
<211>  501
<212>  PRT
<213>  Human immunodeficiency virus


<220>
<221>  misc_feature
<222>  (349)..(349)
<223>  Xaa can be any naturally occurring amino acid

<220>
<221>  misc_feature
<222>  (417)..(417)
<223>  Xaa can be any naturally occurring amino acid

<220>
<221>  misc_feature
<222>  (486)..(486)
<223>  Xaa can be any naturally occurring amino acid

<400>  491

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Gly Gly Cys Lys Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val Leu Gln Gly Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Ala Gln Gln Ala Ala Ala Asp Ala Gly Asn Ser Ser Gln Val Ser
        115                 120                 125

Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln
    130                 135                 140

Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190

His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala Pro
    210                 215                 220

Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240

Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro
                245                 250                 255
```

```
Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys Ile
            260                 265                 270

Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg
    290                 295                 300

Ala Glu Gln Ala Ser Gln Glu Val Lys Gly Trp Met Thr Glu Thr Leu
305                 310                 315                 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Xaa Gln Gly Val
            340                 345                 350

Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Val Thr Asn Gln Asn Ala Ile Met Met Gln Arg Gly Asn Phe Lys Asn
    370                 375                 380

Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys Gly
                405                 410                 415

Xaa Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445
```

Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Met Glu Ser Phe Arg Glu
450 455 460

Glu Thr Thr Ala Pro Ser Gln Lys Gln Glu Thr Ile Asp Arg Asp Arg
465 470 475 480

Asp Lys Glu Leu Tyr Xaa Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 492
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (30)..(30)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (276)..(276)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (376)..(376)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (403)..(403)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (486)..(486)
<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature
<222> (488)..(488)
<223> Xaa can be any naturally occurring amino acid

<400> 492

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Xaa Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ser Leu Lys Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Asp Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Glu Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gly Gln
        115                 120                 125


Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140


His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile
145                 150                 155                 160


Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175
```

```
Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Xaa Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365
```

Ser His Met Thr Asn Pro Ala Xaa Ile Met Met Gln Arg Gly Asn Phe
370 375 380

Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385 390 395 400

His Ile Xaa Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
405 410 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Ala Glu Arg Gln Ala
420 425 430

Asn Phe Leu Gly Lys Ile Trp Ser Ser His Lys Gly Arg Pro Gly Asn
435 440 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
450 455 460

Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Gly Pro Ile
465 470 475 480

Tyr Lys Glu Leu Tyr Xaa Leu Xaa Ser Leu Arg Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 493
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (303)..(303)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (374)..(374)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (501)..(501)
<223> Xaa can be any naturally occurring amino acid

<400> 493

```
Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Val Asp Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140
```

```
Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Xaa Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Ser Ser Xaa Ile Met Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Lys Arg Ala Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Arg Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Asn Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460

Arg Phe Gly Glu Glu Ala Thr Ala Pro Ser Gln Lys Gln Glu Gln Thr
465                 470                 475                 480

Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
                485                 490                 495

Asp Pro Leu Ser Xaa
            500
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<210> 494
<211> 500
<212> PRT

<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (40)..(40)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (78)..(78)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (82)..(82)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (116)..(116)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (162)..(162)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (175)..(175)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (315)..(315)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (443)..(443)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (462)..(462)
<223> Xaa can be any naturally occurring amino acid

<400> 494

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Xaa Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Ser Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Xaa Phe Asn
65 70 75 80

Thr Xaa Ala Thr Leu Tyr Cys Val His Gln Asn Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Xaa Gln Ala Ala Ala Asp Thr Gly Asn Ser Asn Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Pro Ile Ala Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Xaa Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Xaa Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Ala Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Ile Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Xaa Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

His Val Ser Asn Pro Thr Thr Ile Met Met Gln Lys Gly Asn Phe Lys
    370                 375                 380
```

```
Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser Arg Arg Xaa Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Asn Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Xaa Leu Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Ala Pro Ser Gln Lys Gln Glu Lys Ala Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500


<210>  495
<211>  498
<212>  PRT
<213>  Human immunodeficiency virus


<220>
<221>  misc_feature
<222>  (458)..(458)
<223>  Xaa can be any naturally occurring amino acid

<400>  495

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Gly Leu Asp Arg Trp
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```
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Ser Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Lys Lys
            100                 105                 110

Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Asn Lys Gln Val Ser Gln
        115                 120                 125

Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His Gln Pro
    130                 135                 140

Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys
145                 150                 155                 160

Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly
                165                 170                 175

Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His
            180                 185                 190

Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala
```

```
        195                 200                 205

Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala Pro Gly
    210                 215                 220

Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr
225                 230                 235                 240

Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro Val
                245                 250                 255

Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val
            260                 265                 270

Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys
        275                 280                 285

Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala
    290                 295                 300

Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu
305                 310                 315                 320

Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly
                325                 330                 335

Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly
            340                 345                 350

Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Val
        355                 360                 365

Thr Asn Ser Asn Ala Val Met Met Gln Arg Gly Asn Phe Arg Asn Gln
    370                 375                 380

Arg Lys Val Ile Lys Cys Phe Asn Cys Gly Arg Glu Gly His Ile Ala
```

385 390 395 400

Lys His Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Lys
405 410 415

Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe Leu
420 425 430

Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe Leu Gln
435 440 445

Ser Arg Pro Glu Pro Thr Ala Pro Pro Xaa Glu Ser Phe Ser Phe Arg
450 455 460

Glu Glu Lys Thr Thr Pro Pro Gln Lys Gln Glu Gln Ile Asp Lys Glu
465 470 475 480

Leu Tyr Pro Leu Ser Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser
485 490 495

Ser Gln

<210> 496
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 496

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Lys Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Gly Gly Cys Lys Gln Ile Leu Ala Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Met
            100                 105                 110

Lys Lys Ala Gln Gln Thr Ala Ala Gly Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ser Ala Asn Ile Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Arg Glu Gly
385                 390                 395                 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430
```

```
Asn Phe Leu Gly Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro Gly Asn
        435                 440                 445


Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460


Arg Phe Gly Glu Glu Thr Thr Ala Ser Pro Gln Lys Gln Glu Pro Ile
465                 470                 475                 480


Asn Lys Glu Leu Tyr Pro Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495


Asn Asp Pro Ser Ser Gln
            500


<210>  497
<211>  501
<212>  PRT
<213>  Human immunodeficiency virus


<220>
<221>  misc_feature
<222>  (14)..(14)
<223>  Xaa can be any naturally occurring amino acid

<220>
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<222>  (26)..(26)
<223>  Xaa can be any naturally occurring amino acid

<220>
<221>  misc_feature
<222>  (385)..(385)
<223>  Xaa can be any naturally occurring amino acid

<400>  497

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Xaa Lys Trp
1               5                   10                  15
```

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Xaa Lys Arg Tyr Arg Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Glu Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Gly Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Val Ala Ala Ala Ala Gly Ala Gly Asn Ser Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205
```

```
Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Ala Asn Ser Thr Thr Ile Met Met Gln Lys Gly Asn Phe
    370                 375                 380

Xaa Asn Gln Arg Lys Met Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400
```

```
His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415


Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430


Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445


Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460


Arg Phe Gly Gly Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile
465                 470                 475                 480


Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
                485                 490                 495


Asp Pro Ser Ser Gln
            500
```

<210> 498
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<400> 498

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45
```

```
Gly Leu Leu Glu Thr Ala Gly Gly Cys Arg Gln Ile Ile Ala Gln Leu
    50                  55                  60

His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Glu
        115                 120                 125

Asn Ser Ser Gln Ile Ser Gln Asn Tyr Pro Ile Ile Gln Asn Leu Gln
    130                 135                 140

Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp
145                 150                 155                 160

Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met
                165                 170                 175

Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
            180                 185                 190

Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu
        195                 200                 205

Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His
    210                 215                 220

Ala Gly Pro Ala Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp
225                 230                 235                 240
```

```
Ile Ala Gly Ser Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr
                245                 250                 255

Ser Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile
            260                 265                 270

Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu
        275                 280                 285

Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg
    290                 295                 300

Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn
305                 310                 315                 320

Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys
                325                 330                 335

Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met
            340                 345                 350

Thr Ala Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Lys Val Leu
        355                 360                 365

Ala Glu Ala Met Ser Gln Thr Thr Ser Ser Ala Ala Ile Met Met Gln
    370                 375                 380

Lys Gly Asn Leu Arg Asn Pro Lys Lys Pro Val Lys Cys Phe Asn Cys
385                 390                 395                 400

Gly Lys Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys
                405                 410                 415

Gly Cys Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr
            420                 425                 430
```

Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly
435 440 445

Arg Pro Gly Asn Phe Phe Gln Ser Gly Leu Glu Pro Thr Ala Pro Pro
450 455 460

Glu Glu Ser Phe Arg Phe Gly Glu Ala Thr Ala Thr Pro Pro Gln Lys
465 470 475 480

Gln Glu Pro Ile Asp Lys Glu Pro Leu Tyr Pro Leu Thr Ser Leu Lys
485 490 495

Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 499
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (82)..(82)
<223> Xaa can be any naturally occurring amino acid

<400> 499

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

```
Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Xaa Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Ala Gln Gln Ala Ala Ala Gly Ala Gly Asn Asn Ser
        115                 120                 125

Pro Ala Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met
    130                 135                 140

Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ala Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Gly Asn Pro
                245                 250                 255
```

```
Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Ala Thr Ser Ser Ala Ala Ala Ile Met Met Gln Arg Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Lys Ser Ile Lys Cys Phe Asn Cys Gly Arg
385                 390                 395                 400

Glu Gly His Leu Ala Arg Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445
```

```
Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
    450                 455                 460


Ser Phe Lys Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu
465                 470                 475                 480


Pro Ile Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe
                485                 490                 495


Gly Ser Asp Pro Ser Ser Gln
            500


<210>  500
<211>  502
<212>  PRT
<213>  Human immunodeficiency virus

<400>  500

Met Gly Ala Arg Ala Ser Ile Leu Ser Ser Gly Gln Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Lys Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Leu Lys Ile Asp Ile Lys Asp
                85                  90                  95
```

```
Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Asn
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Asn Met Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg
        275                 280                 285
```

```
Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Ser Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Thr Pro Ser Ala Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser
    450                 455                 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro
465                 470                 475                 480
```

Ile Asp Lys Glu Ile Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 501
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 501

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Ser Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Lys Gln Ile Leu Ala Gln Leu
50 55 60

His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Thr Ala Ile Asp Ala Gly Ser Ser Ser Gln Ala
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His

130 135 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Ile Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala

325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Thr Ser Ala Asn Ile Met Met Gln Arg Gly Asn Phe Lys
370 375 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
405 410 415

Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Val Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asn
465 470 475 480

Lys Glu Gln Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 502

<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 502

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Val Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Ile Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Asn
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Ser His
        115                 120                 125


Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val
    130                 135                 140


His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160


Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175
```

```
Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365
```

```
Ser Gln Val Thr Asn Pro Ala Asn Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Pro Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Pro Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460

Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Gln Ile
465                 470                 475                 480

Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
                485                 490                 495

Asp Pro Ser Ser Gln
            500
```

<210> 503
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<400> 503

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Gln Leu Asp Arg Trp
1               5                   10                  15
```

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Ile Lys Ser Leu Tyr Asn
65                  70                  75                  80

Met Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Ala Gly Glu Asn Ser Lys Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205
```

```
Ala Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Met Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Lys Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400
```

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Asn Arg Pro Glu Pro Val Glu Pro Thr Ala Pro Pro Glu Glu
450 455 460

Ser Phe Arg Phe Gly Glu Glu Ala Thr Thr Pro Pro Pro Gln Lys Gln
465 470 475 480

Asp Thr Lys Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu
485 490 495

Phe Gly Asn Asp Pro Ser Ser Gln
500

<210> 504
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (303)..(303)
<223> Xaa can be any naturally occurring amino acid

<400> 504

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Pro Ala Ala Ala Asp Thr Gly Ser Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Ser Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Xaa Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Val Met Met Gln Arg Gly Asn Tyr Arg
    370                 375                 380

Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

```
Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Pro Ile Pro Ser Gln Lys Gln Glu Pro Thr Asp
465                 470                 475                 480

Lys Glu Thr Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500


<210>  505
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<400>  505

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Xaa Trp
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205
```

```
Ala Ala Glu Trp Asp Arg Thr His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Xaa Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Ser Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400
```

Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Asp Lys Glu Leu Tyr Pro Leu Ala Ser
465 470 475 480

Leu Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
485 490

<210> 506
<211> 503
<212> PRT
<213> Human immunodeficiency virus

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<400> 506

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50   55   60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65   70   75   80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Xaa Glu Val Arg Asp
                85   90   95

Thr Lys Glu Ala Xaa Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100   105   110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Gly Ala Gly Asn Ser Ser
        115   120   125

Gln Ala Ala Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln
    130   135   140

```
Met Xaa His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Xaa Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335
```

```
Leu Lys Ala Leu Gly Pro Xaa Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Thr Ser Asn Thr Ile Met Met Gln Arg Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Lys Ala Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Xaa Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Glu Ala Thr Thr Pro Pro Gln Lys Pro Glu
465                 470                 475                 480

Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Ser Ser Gln
            500
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<210> 507
<211> 499

<212> PRT
<213> Human immunodeficiency virus

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Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Ala Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Ile Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Leu Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Val Thr Ala Ala Asp Thr Gly Asn Ser Ser Lys Val
115 120 125

```
Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Xaa Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320
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```
Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Xaa Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Ile Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Lys Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Ser Lys Glu
465                 470                 475                 480

Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495

Ser Ser Gln
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<210> 508
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<212> PRT
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<400> 508

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
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Xaa Lys Ile Xaa Leu Arg Xaa Gly Gly Lys Lys Lys Tyr Xaa Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Xaa Leu Xaa Glu Thr Ser Glu Gly Xaa Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Gln
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Arg Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Xaa Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175
```

```
Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365
```

```
Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380


Gly Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Xaa Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Arg Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Glu Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Ser Ile Asp
465                 470                 475                 480


Lys Asp Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


His Ser Ser Gln
            500
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<210> 509
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<212> PRT
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<400> 509

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Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Xaa Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Xaa Tyr Arg Leu Lys
            20                  25                  30


His Leu Val Trp Xaa Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Thr Gly Cys Arg Gln Ile Leu Gln Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Val Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Xaa Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Glu Gln Gln Xaa Ala Ala Gly Thr Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Xaa Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175
```

```
Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Xaa Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Xaa Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Xaa Leu Ala Glu Ala Met Ser
        355                 360                 365
```

```
Gln Val Thr Ser Pro Ala Thr Val Met Ile Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ala Val Lys Cys Phe Asn Cys Gly Lys Glu Gly Xaa
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Xaa Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Thr Ile Asp
465                 470                 475                 480

Arg Asp Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
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<210> 510
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<212> PRT
<213> Human immunodeficiency virus

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<400> 510

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Met Gly Ala Arg Ala Ser Val Leu Ser Xaa Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Tyr Ala Leu Asn Xaa
        35                  40                  45


Gly Leu Leu Glu Thr Thr Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
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```
Gln Pro Ser Leu Gln Thr Ala Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Xaa Leu Tyr Cys Val His Gln Arg Ile Glu Ile Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Xaa Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Xaa Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Xaa Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Xaa Lys Xaa Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Xaa His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Xaa
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255
```

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Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Xaa Glu Xaa Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Xaa Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Xaa Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Xaa Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Thr Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ser Val Lys Cys Phe Xaa Cys Gly Lys Glu Gly His
385                 390                 395                 400

Thr Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Xaa Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Gly Arg Pro Gly Asn
        435                 440                 445
```

```
Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460


Arg Phe Gly Glu Glu Thr Thr Ala Pro Leu Gln Lys Gln Glu Lys Gly
465                 470                 475                 480


Asp Gly Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn
                485                 490                 495


Asp Pro Ser Ser Gln
            500


<210>  511
<211>  505
<212>  PRT
<213>  Human immunodeficiency virus


<220>
<221>  misc_feature
<222>  (385)..(385)
<223>  Xaa can be any naturally occurring amino acid

<220>
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<222>  (393)..(393)
<223>  Xaa can be any naturally occurring amino acid

<220>
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<222>  (452)..(452)
<223>  Xaa can be any naturally occurring amino acid

<400>  511

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Arg Ile Arg Leu Arg Pro Gly Gly Ser Lys Lys Tyr Lys Leu Lys
            20                  25                  30
```

```
His Ile Ile Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Ile Gln Ile
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Asp Asn Thr Gly Ser Asn Asn Thr Gly
        115                 120                 125

Ser Asn Asn Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln
    130                 135                 140

Gly Gln Met Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp
145                 150                 155                 160

Val Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met
                165                 170                 175

Phe Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
            180                 185                 190

Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu
        195                 200                 205

Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His
    210                 215                 220
```

```
Ala Gly Pro Pro Val Ala Gly Gln Met Arg Glu Pro Arg Gly Ser Asp
225                 230                 235                 240


Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr
                245                 250                 255


Ser Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile
            260                 265                 270


Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu
        275                 280                 285


Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg
    290                 295                 300


Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn
305                 310                 315                 320


Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys
                325                 330                 335


Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met
            340                 345                 350


Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu
        355                 360                 365


Ala Glu Ala Met Ser Gln Leu Thr Gly Ser Ala Thr Val Met Met Gln
    370                 375                 380


Xaa Gly Asn Phe Arg Asn Gln Arg Xaa Ser Val Lys Cys Phe Asn Cys
385                 390                 395                 400


Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg
                405                 410                 415
```

Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Ile
420 425 430

Glu Gly Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly
435 440 445

Arg Pro Gly Xaa Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro
450 455 460

Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Lys Gln
465 470 475 480

Glu Lys Arg Asp Gln Glu Leu Tyr Pro Pro Leu Thr Ser Leu Arg Ser
485 490 495

Leu Phe Gly Asn Asp Pro Leu Ser Gln
500 505

<210> 512
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (487)..(487)
<223> Xaa can be any naturally occurring amino acid

<400> 512

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Gln Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Asp Thr Gly Asn Ala Asn Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240
```

```
Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Arg Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Ser Pro Ala Ala Val Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430
```

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro
450 455 460

Glu Glu Ser Phe Arg Phe Gly Glu Glu Ile Thr Thr Pro Ser Gln Lys
465 470 475 480

Gln Glu Thr Lys Asp Lys Xaa Met Tyr Pro Leu Thr Ser Leu Arg Ser
485 490 495

Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 513
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (384)..(384)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (483)..(483)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (501)..(501)
<223> Xaa can be any naturally occurring amino acid

<400> 513

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

```
Glu Lys Ile Arg Leu Arg Pro Met Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Thr Gln Gln Ala Ala Ala Asp Ala Gly Lys Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205
```

```
Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Ala Thr Ile Met Met Gln Arg Gly Asn Phe Xaa
    370                 375                 380

Asn Gln Arg Lys Pro Ile Lys Cys Phe Asn Cys Gly Lys Asp Gly His
385                 390                 395                 400
```

Ile Ala Ser Lys Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Gln Glu Gly His Gln Met Arg Asp Cys Pro Gly Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Leu Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Asn Pro Pro Gln Lys Gln
465 470 475 480

Glu Ser Xaa Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu
485 490 495

Phe Gly Asn Asp Xaa Leu Ser Gln
500

<210> 514
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 514

Met Gly Ala Arg Ala Ser Val Leu Arg Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Gly Gln Phe

```
    50                  55                  60

Gln Ser Ser Leu Gln Thr Gly Ser Glu Glu Phe Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Arg Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Asn Gln Val
        115                 120                 125

Ser Gln Asn Ser Asn Gln Ala Ser Gln Asn Tyr Pro Ile Val Gln Asn
    130                 135                 140

Leu Gln Gly Gln Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn
145                 150                 155                 160

Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile
                165                 170                 175

Pro Met Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Thr Asp Leu Asn
            180                 185                 190

Thr Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu
        195                 200                 205

Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro
    210                 215                 220

Val His Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly
225                 230                 235                 240

Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp
```

245 250 255

Met Thr Asn Asn Pro Pro Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp
260 265 270

Ile Ile Met Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser
275 280 285

Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val
290 295 300

Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val
305 310 315 320

Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp
325 330 335

Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu
340 345 350

Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg
355 360 365

Val Leu Ala Glu Ala Met Ser Gln Val Thr Asn Ser Thr Ala Ile Met
370 375 380

Met Gln Arg Gly Asn Leu Arg Asn Gln Arg Lys Thr Ile Lys Cys Phe
385 390 395 400

Asn Cys Gly Lys Glu Gly His Leu Ala Arg Asn Cys Arg Ala Pro Arg
405 410 415

Lys Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp
420 425 430

Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Asn

435 440 445

Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala
450 455 460

Pro Pro Glu Glu Ser Phe Arg Glu Glu Met Ala Thr Pro Ser Gln Lys
465 470 475 480

Gln Glu Thr Arg Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser
485 490 495

Leu Phe Gly Asn Asp Pro
500

<210> 515
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (39)..(39)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (175)..(175)
<223> Xaa can be any naturally occurring amino acid

<400> 515

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys His Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Xaa Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Phe Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Gln Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Asp Thr Gly Lys Ser Ser Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Xaa Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Val
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240
```

```
Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Leu Thr Asn Ser Ala Thr Val Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Gln Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Ile Glu Arg Gln Ala
            420                 425                 430
```

```
Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445


Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu
    450                 455                 460


Glu Ser Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Ser Pro Lys Gln
465                 470                 475                 480


Glu Pro Ile Asp Lys Glu Leu Tyr Pro Ser Ala Ser Leu Arg Ser Leu
                485                 490                 495


Phe Gly Asn Asp Leu
            500


<210>  516
<211>  512
<212>  PRT
<213>  Human immunodeficiency virus

<400>  516

Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Lys Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ser Ile Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80
```

```
Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Ala Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Val Gly Trp Met Thr Ser Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu
            260                 265                 270
```

```
Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Gly Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Ser Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Ala Gln Ser Arg Leu Glu
    450                 455                 460
```

Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr
465 470 475 480

Thr Pro Ser Gln Lys Gln Glu Ser Lys Asp Arg Asp Lys Glu Leu Tyr
485 490 495

Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505 510

<210> 517
<211> 498
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (203)..(203)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (378)..(378)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (396)..(396)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (430)..(430)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (440)..(440)
<223> Xaa can be any naturally occurring amino acid

<400> 517

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Thr Gln Gln Ala Ala Ala Asp Ala Gly Ser Gln Val Ser Gln
        115                 120                 125

Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Pro
    130                 135                 140

Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys
145                 150                 155                 160

Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu Gly
                165                 170                 175

Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His
            180                 185                 190

Gln Ala Ala Met Gln Met Leu Lys Glu Ala Xaa Asn Glu Glu Ala Ala
        195                 200                 205
```

```
Asp Trp Asp Arg Thr His Pro Val His Ala Gly Pro Val Ala Pro Gly
    210                 215                 220

Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr
225                 230                 235                 240

Leu Gln Glu Gln Ile Gln Trp Met Thr Asn Asn Pro Pro Ile Pro Val
                245                 250                 255

Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val
            260                 265                 270

Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys
        275                 280                 285

Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala
    290                 295                 300

Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr Leu Leu
305                 310                 315                 320

Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg Ala Leu Gly
                325                 330                 335

Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly
            340                 345                 350

Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Val
        355                 360                 365

Gln Gly Pro Pro Ala Ile Met Met Gln Xaa Gly Asn Phe Arg Asn Gln
    370                 375                 380

Gly Arg Ile Ile Lys Cys Phe Asn Cys Gly Lys Xaa Gly His Ile Ala
385                 390                 395                 400
```

Lys Asn Cys Arg Ala Pro Arg Arg Arg Gly Cys Trp Lys Cys Gly Lys
405 410 415

Glu Gly His Gln Met Lys Asp Cys Thr Glu Lys Gln Ala Xaa Phe Leu
420 425 430

Gly Lys Ile Trp Pro Ser His Xaa Gly Arg Pro Gly Asn Phe Leu Gln
435 440 445

Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly
450 455 460

Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Glu Lys Asp
465 470 475 480

Leu Tyr Pro Thr Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Leu
485 490 495

Ser Gln

<210> 518
<211> 498
<212> PRT
<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (362)..(362)
<223> Xaa can be any naturally occurring amino acid

<400> 518

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp

1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Asn Lys Lys Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Asp Gly Cys Lys Gln Ile Met Lys Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Glu Ala Gln Gln Ala Ala Ala Asp Pro Gly Asn Ser Ser Gln
115 120 125

Xaa Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val
130 135 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145 150 155 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
165 170 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
180 185 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu

195 200 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
210 215 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225 230 235 240

Thr Ser Thr Leu Gln Glu Gln Ile Asn Trp Met Thr Asn Asn Pro Pro
245 250 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
260 265 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
275 280 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
290 295 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305 310 315 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
325 330 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
340 345 350

Gly Val Gly Gly Pro Gly His Lys Ala Xaa Val Leu Ala Glu Ala Met
355 360 365

Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe
370 375 380

Lys Lys Gln Arg Arg Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly

385 390 395 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
405 410 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
420 425 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
435 440 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
450 455 460

Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Ser Ile
465 470 475 480

Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
485 490 495

Asp Pro

<210> 519
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<220>
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<400> 519

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Ile Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Leu Pro Thr Gly Ser Glu Xaa Cys Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110
```

```
Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Lys Ser Asn Pro Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Xaa Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Xaa Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335


Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350


Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365


Gln Val Thr Asn Ser Ala Thr Val Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380


Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Lys Asn Cys Arg Ala Pro Xaa Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Thr Ala Xaa Pro Glu Glu
    450                 455                 460


Ser Phe Arg Phe Gly Glu Glu Thr Ile Pro Ser Gln Lys Gln Glu Val
465                 470                 475                 480


Ile Asp Lys Glu Leu Tyr Pro Ser Ala Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495
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Asn Asp Pro Leu Xaa Gln
500

<210> 520
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 520

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Arg Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Ile Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Val Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

```
Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220


Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Met Thr Asn Ser Ala Asn Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Lys Thr Ile Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Asp Glu Arg Tyr Pro Leu Thr Ala Leu Lys Ser Leu Phe Gly Asn
                485                 490                 495

Asp Pro Leu Ser Gln
            500
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<210> 521
<211> 510
<212> PRT
<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (477)..(477)
<223> Xaa can be any naturally occurring amino acid

<400> 521

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Gly Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Asp Arg Phe Ala Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Ser Ser Leu Pro Thr Gly Ser Glu Glu Ile Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Gly Asn Ser Ser Asn Ala
        115                 120                 125


Gly Asn Ser Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn
    130                 135                 140
```

```
Leu Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn
145                 150                 155                 160

Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile
                165                 170                 175

Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn
            180                 185                 190

Thr Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu
        195                 200                 205

Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Val His Pro
    210                 215                 220

Val Gln Ala Gly Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly
225                 230                 235                 240

Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp
                245                 250                 255

Met Thr Ser Asn Pro Ala Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp
            260                 265                 270

Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser
        275                 280                 285

Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val
    290                 295                 300

Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val
305                 310                 315                 320

Lys Ala Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp
                325                 330                 335
```

```
Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala Pro Thr Leu Glu Glu
            340                 345                 350

Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg
        355                 360                 365

Val Leu Ala Glu Ala Met Ser Gln Val Thr Asn Pro Ala Ala Ile Met
    370                 375                 380

Met Gln Lys Ser Asn Phe Arg Asn His Arg Lys Pro Val Lys Cys Phe
385                 390                 395                 400

Asn Cys Gly Lys Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg
                405                 410                 415

Lys Arg Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp
            420                 425                 430

Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Xaa Pro Ser His
        435                 440                 445

Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala
    450                 455                 460

Pro Ser Ala Pro Pro Ala Glu Ser Phe Arg Phe Gly Xaa Glu Thr Ala
465                 470                 475                 480

Thr Pro Ser Gln Lys Gln Glu Pro Met Glu Lys Glu Leu Tyr Pro Ser
                485                 490                 495

Ala Ala Leu Lys Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
            500                 505                 510
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<210> 522
<211> 500

<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

<400> 522

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Xaa Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Xaa Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Val Val Gln Asn Leu Gln Gly Gln Met Xaa Tyr
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Xaa Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Xaa Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Pro Gln Glu Gln Val Ala Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Xaa Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Xaa Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Xaa Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Ser Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Xaa Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Xaa Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Xaa Arg
450 455 460

Xaa Gly Glu Glu Met Xaa Thr Pro Ala Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Xaa Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Xaa Ser Ser Gln
500

<210> 523
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 523

Met Gly Ala Arg Ala Ser Val Leu Ser Ser Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
85 90 95

```
Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Glu Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Pro Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Val
                245                 250                 255

Gln Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Asn Ser Thr Thr Ile Met Met Gln Arg Gly Asn Phe Lys Asn
    370                 375                 380

Gln Arg Lys Gly Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Arg His Cys Lys Ala Pro Arg Arg Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Ile Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg Phe
    450                 455                 460

Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Thr Val Asp Lys
465                 470                 475                 480
```

Glu Leu Tyr Pro Val Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
485 490 495

Leu Ser Gln

<210> 524
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<400> 524

Met Gly Ala Arg Ala Ser Xaa Leu Ser Gly Gly Gln Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Lys Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn

65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Glu Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Thr Gly Asn Ser Ser
115 120 125

Gln Asn Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu
130 135 140

Gln Gly Gln Met Val His Gln Ala Met Thr Pro Arg Thr Leu Asn Ala
145 150 155 160

Trp Val Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro
165 170 175

Met Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Xaa Leu Asn Thr
180 185 190

Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Ile Leu Lys
195 200 205

Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val
210 215 220

His Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser
225 230 235 240

Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met
245 250 255

Thr Asn Asn Pro Pro Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile

260 265 270

Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile
275 280 285

Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp
290 295 300

Arg Phe Tyr Lys Val Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys
305 310 315 320

Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys
325 330 335

Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met
340 345 350

Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val
355 360 365

Leu Ala Glu Ala Met Ser Gln Met Thr Asn Ser Ala Ala Ile Met Met
370 375 380

Gln Xaa Gly Asn Phe Arg Gly Gln Arg Lys Thr Val Lys Cys Phe Asn
385 390 395 400

Cys Gly Arg Glu Gly His Ile Ala Arg Asn Cys Lys Ala Pro Arg Lys
405 410 415

Lys Gly Cys Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys
420 425 430

Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Ser Ser His Lys
435 440 445

Gly Arg Pro Gly Asn Phe Val Gln Asn Arg Pro Glu Pro Thr Ala Pro

450 455 460

Pro Ala Glu Ser Phe Gly Phe Gly Glu Glu Met Thr Thr Pro Ser Gln
465 470 475 480

Thr Gln Glu Pro Lys Asp Lys Glu Leu Tyr Pro Leu Ser Ser Leu Lys
485 490 495

Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 525
<211> 508
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

<400> 525

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Met Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Ala
        35                  40                  45


Asn Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Met Glu Gln Leu
    50                  55                  60


Gln Pro Ala Leu Asn Thr Gly Thr Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Lys Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Pro Gln Ala Ala Ala Ala Ala Ala Thr Gly Asn Ser Ser
        115                 120                 125


Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140


Ile His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160
```

```
Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Val Ala
                165                 170                 175

Leu Ser Glu Gly Ser Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Xaa Asp Arg Thr His Pro Val His Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro
                245                 250                 255

Pro Val Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Val Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Ile Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350
```

```
Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Ser Thr Xaa Ile Met Met Gln Asn Gly Asn
    370                 375                 380

Phe Arg Gly Gln Arg Lys Ile Val Xaa Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Xaa Asn Cys Lys Ala Pro Xaa Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Xaa Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Gln Ser Arg Leu Glu Pro
    450                 455                 460

Thr Ala Pro Pro Xaa Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Pro
465                 470                 475                 480

Pro Gln Lys Gln Glu Lys Thr Asp Lys Glu Leu Tyr Pro Leu Thr Ser
                485                 490                 495

Leu Arg Ser Leu Phe Gly Ser Asp Pro Ser Ser Gln
            500                 505
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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Xaa Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Val Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Xaa Tyr Cys Val His Gln Arg Ile Asp Xaa Lys Asp
                85                  90                  95

Thr Lys Asp Ala Leu Asp Lys Ile Xaa Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Xaa Gln Ala Ala Ala Asp Thr Gly Asn Arg Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Arg Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Thr Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Ser Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Asp Trp Asp Arg Met His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Xaa Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Asp Trp Met Thr Gly Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Tyr Arg
    370                 375                 380

Asp Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
```

```
Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Xaa Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Ser Pro Gln Lys Gln Glu Pro Arg Asp
465                 470                 475                 480


Glu Glu Leu Tyr Pro Ser Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500
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<210> 527
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<400> 527

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Lys Trp
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Lys Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ala Leu Arg Thr Gly Ser Glu Glu Leu Lys Ser Val Tyr Asn
65                  70                  75                  80
```

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Gln Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Thr His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Ala Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Gln His Ser Thr Ala Ile Met Met Gln Asn Gly Asn Phe Arg
    370                 375                 380

Gly Gln Lys Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Val Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Ser Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Leu Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Gly
    450                 455                 460
```

```
Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480


Arg Asp Met Asn Lys Asp Leu Tyr Pro Pro Leu Ala Ser Leu Arg Ser
                485                 490                 495


Leu Phe Gly Asn Asp His Ser Ser Gln
            500                 505


<210>  528
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<400>  528

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                   10                  15
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Glu Xaa Ile Arg Leu Arg Pro Gly Gly Xaa Lys Arg Tyr Lys Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Arg Thr Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val Ser
        115                 120                 125

Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Ile Tyr Gln
    130                 135                 140

Ser Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Xaa Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190

His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205
```

```
Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala Pro
    210                 215                 220

Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240

Thr Pro Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile Pro
                245                 250                 255

Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
            260                 265                 270

Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg
    290                 295                 300

Ala Glu Gln Ala Thr Ala Glu Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Gly Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Gly His Lys Ala Arg Xaa Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Met Thr Asn Ser Asn Thr Ile Met Met Gln Gly Gly Asn Phe Arg Asn
    370                 375                 380

Gln Arg Lys Lys Ile Lys Cys Phe Asn Cys Gly Arg Glu Gly His Val
385                 390                 395                 400
```

Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
405 410 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
420 425 430

Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe Pro
435 440 445

Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser Leu Ser Phe
450 455 460

Arg Glu Glu Lys Thr Thr Pro Ser Gln Lys Gln Xaa Pro Ile Asp Lys
465 470 475 480

Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
485 490 495

Ser Ser Thr

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Glu Arg Ile Arg Leu Arg Pro Xaa Gly Lys Lys Xaa Tyr Xaa Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Ala Gly Cys Xaa Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Xaa Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Gly
        115                 120                 125

Ser Gly Ser Gln Val Ser Gln Asn Tyr Xaa Ile Val Gln Asn Leu Gln
    130                 135                 140

Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp
145                 150                 155                 160

Val Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met
                165                 170                 175

Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
            180                 185                 190
```

```
Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu
        195                 200                 205

Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His
    210                 215                 220

Ala Gly Pro Val Ala Pro Gly Xaa Met Arg Glu Pro Arg Gly Ser Asp
225                 230                 235                 240

Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr
                245                 250                 255

Asn Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile
            260                 265                 270

Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu
        275                 280                 285

Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg
    290                 295                 300

Phe Tyr Arg Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn
305                 310                 315                 320

Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys
                325                 330                 335

Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met
            340                 345                 350

Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu
        355                 360                 365

Ala Glu Ala Met Ser Gln Val Thr Asn Ser Ala Ala Ile Met Met Gln
    370                 375                 380
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```
Lys Gly Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys
385                 390                 395                 400


Gly Lys Glu Gly His Ile Ala Lys Asn Cys Xaa Ala Pro Arg Lys Xaa
                405                 410                 415


Gly Cys Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr
            420                 425                 430


Glu Arg Gln Ala Asn Phe Leu Xaa Lys Ile Trp Pro Ser Tyr Lys Gly
        435                 440                 445


Xaa Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Thr
    450                 455                 460


Ala Pro Pro Xaa Glu Ser Phe Arg Phe Gly Glu Glu Met Thr Thr Pro
465                 470                 475                 480


Pro Gln Lys Gln Glu Leu Ile Asp Lys Glu Leu Tyr Pro Ser Ala Ser
                485                 490                 495


Leu Lys Ser Leu Phe Gly Asn Asp Pro
            500                 505


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Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Xaa Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

```
Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Val Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Xaa His Gln Lys Ile Asp Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Xaa Ile Glu Xaa Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Xaa Thr Gly Asn Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Xaa Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ser Ala Asn Ile Met Met Gln Xaa Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Val Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450   455   460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Ser Gln Lys Gln
465   470   475   480

Glu Pro Ile Asp Lys Xaa Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu
                485   490   495

Phe Gly Asn Asp Pro Ser Ser Gln
            500

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Asn Trp
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Glu Arg Ile Arg Leu Arg Pro Gly Gly Ser Lys Arg Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Met Glu Thr Ala Glu Gly Cys Gln Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Arg Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Thr Ala Asp Ala Gly Thr Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140
```

```
Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Met His Pro Val Gln Xaa Gly Pro Val Ala
    210                 215                 220


Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Glu Val Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Xaa Ala Cys Xaa Gly
            340                 345                 350

Xaa Gly Gly Pro Gly Xaa Lys Ala Xaa Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Xaa Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Ile Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Lys Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Ser Lys Glu
465                 470                 475                 480

Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495

Ser Ser Gln
```

<210> 532
<211> 506
<212> PRT
<213> Human immunodeficiency virus

<400> 532

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Met Gly Asn Ser Ser Gln Ala
115 120 125

Ser Val Ser Gln Ala Ser Val Ser Gln Asn Tyr Pro Ile Val Gln Asn
130 135 140

Leu Gln Gly Gln Met Val His Gln Pro Leu Thr Pro Arg Thr Leu Asn
145 150 155 160

Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile
165 170 175

Pro Met Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn

180 185 190

Thr Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu
195 200 205

Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro
210 215 220

Val His Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly
225 230 235 240

Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp
245 250 255

Met Thr Asn Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp
260 265 270

Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Ile Ser
275 280 285

Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val
290 295 300

Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val
305 310 315 320

Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp
325 330 335

Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu
340 345 350

Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg
355 360 365

Val Leu Ala Glu Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met

370 375 380

Met Gln Lys Gly Asn Phe Arg Ser Gln Arg Lys Ile Val Lys Cys Phe
385 390 395 400

Asn Cys Gly Lys Glu Gly His Ile Ala Arg Ser Cys Arg Ala Pro Arg
405 410 415

Lys Arg Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp
420 425 430

Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His
435 440 445

Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala
450 455 460

Pro Pro Glu Glu Ser Phe Gly Phe Gly Glu Glu Ala Thr Pro Ser Gln
465 470 475 480

Lys Gln Glu Pro Arg Asp Lys Glu Thr Tyr Pro Leu Ala Ser Leu Arg
485 490 495

Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 533
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<400> 533

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Lys Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Thr
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Cys Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415
```

```
Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Pro Thr Pro Ser Gln Lys Gln Glu Pro Leu Ile
465                 470                 475                 480

Asp Leu Asp Lys Glu Leu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu
                485                 490                 495

Phe Gly Asn Asp Pro Ser Ser Lys
            500
```

<210> 534
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<400> 534

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ile Thr Thr Pro Pro Asn Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Val Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

```
Pro Gln Ser Arg Thr Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu
    450                 455                 460


Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu
465                 470                 475                 480


Pro Pro Ile Asp Arg Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu
                485                 490                 495


Phe Gly Asn Asp Pro Ser Ser Gln
            500
```

<210> 535
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 535

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95
```

```
Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Val Gly Trp Met Thr Ser Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285
```

```
Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Thr Thr Ser Ala Ala Ala Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
    450                 455                 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro
465                 470                 475                 480
```

Arg Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 536
<211> 498
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (359)..(359)
<223> Xaa can be any naturally occurring amino acid

<400> 536

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Ile Ala Val Leu Phe Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Ile Gln Asn Lys Ser Lys
100 105 110

```
Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Lys Asn Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Ser Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ala His Xaa Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Thr Ala Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Ile Thr Thr Gln Lys Gln Glu Pro Ile Asp Lys Glu
465                 470                 475                 480

Gln Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser
                485                 490                 495
```

Ser Gln

<210> 537
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (440)..(440)
<223> Xaa can be any naturally occurring amino acid

<400> 537

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Glu Lys Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Pro Gly Lys Ser Ser
115 120 125

```
Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Gly Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320
```

```
Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Ser Gly Ala Ile Met Met Gln Lys Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Arg Glu
385                 390                 395                 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Xaa Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser
    450                 455                 460

Phe Arg Phe Gly Glu Glu Thr Ala Thr Ser Ser Gln Lys Gln Glu Pro
465                 470                 475                 480

Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly
                485                 490                 495

Asn Asp Pro Ser Ser Gln
            500
```

<210> 538
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (275)..(275)
<223> Xaa can be any naturally occurring amino acid

<400> 538

Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Gly Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Ala Gln Leu
50 55 60

Tyr Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Gln Lys Ala Gln Pro Ala Ala Ala Asp Thr Gly Asn Asn Ser Lys Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His

130 135 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Xaa Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala

325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Val Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Asn Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Arg Ile Trp Pro Ser Pro Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 539

<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 539

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Leu Val Ala Thr Leu Tyr Cys Val His Gln Ser Ile Asp Val Arg Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Lys Lys Glu Gln
            100                 105                 110


Gln Ala Ala Ala Asp Thr Gly Asn Lys Ser Gln Val Ser Gln Asn Tyr
        115                 120                 125


Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala Leu Ser
    130                 135                 140


Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe
145                 150                 155                 160


Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly Ala Thr
                165                 170                 175
```

```
Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln Ala
            180                 185                 190

Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp
        195                 200                 205

Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala Pro Gly Gln Met
    210                 215                 220

Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln
225                 230                 235                 240

Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile Pro Val Gly Glu
                245                 250                 255

Ile Tyr Lys Arg Trp Ile Ile Ile Gly Leu Asn Lys Ile Val Arg Met
            260                 265                 270

Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro
        275                 280                 285

Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln
    290                 295                 300

Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln
305                 310                 315                 320

Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Gly
                325                 330                 335

Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
            340                 345                 350

Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Val Thr Asn
        355                 360                 365
```

```
Ser Ala Ser Ala Ser Ile Met Ala Gln Arg Gly Asn Tyr Gly Asn Gln
    370                 375                 380

Arg Lys Ala Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala
385                 390                 395                 400

Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Lys
                405                 410                 415

Glu Gly His Gln Met Lys Asp Cys Ala Glu Arg Gln Ala Asn Phe Leu
            420                 425                 430

Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu Gln
        435                 440                 445

Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460

Arg Phe Gly Glu Glu Lys Pro Thr Pro Ser Gln Lys Gln Glu Gln Thr
465                 470                 475                 480

Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
                485                 490                 495

Asp Pro Ser Ser Gln
            500
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<210> 540
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<400> 540

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Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Arg Trp
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Met Glu Thr Ser Glu Gly Cys Arg Lys Ile Leu Gly Xaa Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80
```

```
Thr Ile Ala Xaa Leu Tyr Cys Val His Gln Lys Ile Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Thr Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Asn Gln Val Ser Gln
        115                 120                 125

Asn Tyr Pro Ile Val Gln Asn Val Gln Gly Gln Met Val His Gln Pro
    130                 135                 140

Ile Ser Xaa Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys
145                 150                 155                 160

Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu Gly
                165                 170                 175

Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His
            180                 185                 190

Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala
        195                 200                 205

Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro Gly
    210                 215                 220

Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr
225                 230                 235                 240

Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile Pro Val
                245                 250                 255

Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val
            260                 265                 270
```

```
Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys
        275                 280                 285

Glu Pro Phe Arg Xaa Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala
    290                 295                 300

Glu Gln Ala Ser Gln Xaa Val Lys Asn Trp Met Thr Glu Thr Leu Leu
305                 310                 315                 320

Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg Ala Leu Gly
                325                 330                 335

Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Xaa Gly
            340                 345                 350

Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Val
        355                 360                 365

Thr Asn Ser Thr Ala Ile Met Met Gln Lys Gly Asn Phe Arg Gly Gln
    370                 375                 380

Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala
385                 390                 395                 400

Lys Asn Cys Arg Ala Pro Arg Arg Lys Gly Cys Trp Lys Cys Gly Lys
                405                 410                 415

Glu Gly His Gln Ile Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe Leu
            420                 425                 430

Gly Lys Ile Trp Pro Ser Ser Lys Gly Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Ser Phe
    450                 455                 460
```

Gly Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Thr Asn
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 541
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<212> PRT
<213> Human immunodeficiency virus

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<400> 541

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Ala Gln Leu
50 55 60

Gln Pro Ser Ile Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
85 90 95

```
Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Val Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Gly Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Ala Ile Met Met Gln Arg Gly Asn His Arg
    370                 375                 380

Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Gln Glu Gly His Gln Met Lys Glu Cys Pro Gly Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Val Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Leu Ser Gln Lys Gln Xaa Pro Thr Asp
465                 470                 475                 480
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Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 542
<211> 502
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

<400> 542

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Xaa Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr His Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Ile Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Asn Ile Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gly Ser
        115                 120                 125

Lys Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Xaa Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240
```

```
Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Ser Xaa Pro Thr Ile Met Met Gln Lys Gly Asn
    370                 375                 380

Phe Arg Asn Pro Lys Xaa Thr Val Lys Cys Phe Asn Cys Gly Arg Glu
385                 390                 395                 400

Gly His Ile Ala Lys His Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430
```

```
Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445


Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
    450                 455                 460


Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Thr
465                 470                 475                 480


Ile Asn Lys Asp Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495


Asn Asp Pro Ser Ser Gln
            500


<210>  543
<211>  502
<212>  PRT
<213>  Human immunodeficiency virus


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<223> Xaa can be any naturally occurring amino acid

<400> 543

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Xaa Trp
1 5 10 15

Glu Lys Ile Xaa Leu Arg Pro Gly Xaa Lys Lys Gln Tyr Xaa Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Xaa Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Thr Glu Xaa Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Xaa Asp
                85                  90                  95

Thr Lys Glu Ala Leu Xaa Lys Ile Glu Glu Glu Gln Thr Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Xaa Asn Ser Ser Gln Ile
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Asp Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Ile His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Val
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Asn Ala Val Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Arg Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
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Phe Leu Gly Arg Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu Ser Phe Met
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Ser Lys Asp
465 470 475 480

Arg Asp Lys Glu Thr Tyr Pro Leu Ala Ser Leu Xaa Ser Leu Phe Gly
485 490 495

Asn Asp Pro Xaa Ser Gln
500

<210> 544
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 544

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Ile Ala Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp

85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Asn Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Ser Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Val
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly

```
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Ala Ala Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Asp Gly His
385                 390                 395                 400

Ile Ser Arg Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Gln Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Thr Val Pro Thr Ala Pro Pro Glu Glu Ser Leu Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Pro Ser Gln Lys Gln Glu Pro Val Asp Lys
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465 470 475 480

Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
485 490 495

Ser Ser Gln

<210> 545
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 545

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Asp Arg Phe Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ala Leu Lys Thr Gly Thr Glu Glu Ile Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Ala Gly Asn Asn Ser
        115                 120                 125

Gln Val Ser Arg Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met
    130                 135                 140

Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ala Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190
```

```
Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Xaa Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Xaa Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Xaa Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Xaa Lys
    290                 295                 300

Xaa Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Xaa Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Ser Ala Thr Val Met Met Gln Lys Ser Asn
    370                 375                 380
```

```
Phe Arg Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400


Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
                405                 410                 415


Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430


Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445


Asn Phe Leu Gln Arg Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro
    450                 455                 460


Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys
465                 470                 475                 480


Gln Glu Gln Val Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser
                485                 490                 495


Leu Phe Gly Asn Asp Pro Ser Ser Pro
            500                 505


<210>  546
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<212>  PRT
<213>  Human immunodeficiency virus


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<400> 546

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Ile Gly Cys Lys Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Ser Ala Leu Xaa Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Leu Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Val Gln Gln Ala Ala Ala Asp Thr Gly Asn Gln Val Ser Gln
        115                 120                 125


Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140


His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160


Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu
                165                 170                 175


Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
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180 185 190

Gly Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile Asn Glu
195 200 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
210 215 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225 230 235 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro
245 250 255

Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
260 265 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
275 280 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
290 295 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305 310 315 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Leu Leu Lys
325 330 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
340 345 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
355 360 365

Ser Gln Ile Asn Ser Ala Ala Thr Thr Val Met Met Gln Arg Gly Asn

370 375 380

Phe Lys Asn Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu
385 390 395 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
405 410 415

Lys Cys Gly Lys Glu Gly His Gln Leu Lys Asp Cys Thr Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Lys Thr Thr Pro Ser Gln Lys Gln Glu Pro
465 470 475 480

Met Asp Lys Glu Leu Tyr Pro Leu Xaa Ser Leu Arg Ser Leu Phe Gly
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Asn Asp Pro Ser Ser Gln
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
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His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Lys Gln Ile Leu Ala Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Ser Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val
    130                 135                 140

His Gln Pro Leu Thr Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile
145                 150                 155                 160

Glu Glu Lys Asn Phe Ser Pro Glu Ile Ile Pro Met Phe Thr Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190
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Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Ser His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Val Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Ala His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Asn Ser Asn Thr Ile Met Met Gln Lys Gly Asn Phe
    370                 375                 380
```

```
Arg Gly Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400


His Ile Ala Lys Asn Cys Arg Ala Pro Arg Arg Arg Gly Cys Trp Lys
                405                 410                 415


Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430


Asn Phe Leu Gly Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro Gly Asn
        435                 440                 445


Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460


Arg Phe Gly Xaa Glu Ala Ala Thr Pro Ser Gln Lys Gln Glu Gln Leu
465                 470                 475                 480


Ile Asp Leu Asp Arg Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg
                485                 490                 495


Ser Leu Phe Gly Ser Asp Pro Ser Ser Lys
            500                 505


<210>  548
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<212>  PRT
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<400> 548

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Xaa Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ser Glu Gly Xaa Arg Gln Ile Leu Xaa Gln Leu
    50   55   60

Gln Xaa Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65   70   75   80

Thr Ile Ala Xaa Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85   90   95

```
Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Ser Xaa
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Xaa Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Xaa Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Xaa Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Xaa
305                 310                 315                 320

Leu Leu Val Gln Asn Xaa Asn Pro Asp Cys Xaa Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Asn Ser Ser Thr Met Met Met Gln Arg Gly Asn Phe Arg Asn
    370                 375                 380

Gln Arg Lys Xaa Val Lys Xaa Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Lys Asn Cys Arg Ala Pro Xaa Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly Xaa Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Asn Arg Pro Glu Gln Asn Arg Pro Glu Pro Ser Arg Pro Glu Pro
    450                 455                 460

Ser Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Ala Thr
465                 470                 475                 480
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Pro Pro Gln Lys Gln Glu Thr Ile Asp Lys Glu Leu Tyr Pro Leu Thr
485 490 495

Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50   55   60

Gln Pro Ser Ile Arg Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65   70   75   80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85   90   95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Glu Ser Lys
            100   105   110

Lys Lys Ala Gln Gln Ala Ala Thr Ala Ala Asp Xaa Gly Asn Ser Asn
        115   120   125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130   135   140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145   150   155   160

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Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Xaa Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350
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Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
355 360 365

Met Ser Gln Val Thr Asn Ser Ala Ser Met Met Met Gln Arg Ser Asn
370 375 380

Phe Lys Asn Gln Xaa Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu
385 390 395 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
405 410 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
420 425 430

Ala Ile Phe Leu Gly Lys Ile Trp Pro Ser His Xaa Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser
450 455 460

Phe Met Phe Gly Glu Glu Thr Thr Thr Pro Xaa Gln Lys Gln Glu Pro
465 470 475 480

Xaa Asp Gln Gly Leu Tyr Pro Leu Ala Ser Leu Lys Ser Xaa Phe Gly
485 490 495

Asn Asp Pro Ser Ser Xaa
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<210> 550
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<213> Human immunodeficiency virus

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Xaa Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Xaa Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Lys Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Trp Cys Xaa His Arg Gly Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Xaa Lys
            100                 105                 110

Lys Lys Ala Gln Gln Glu Thr Xaa Ser Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Xaa Tyr Pro Ile Val Arg Asn Xaa Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Xaa Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Glu Glu Gln Ile Ala Trp Ile Thr Asn Asn Pro Pro Val
                245                 250                 255

Pro Xaa Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Xaa Met Tyr Ser Pro Thr Ser Ile Leu Xaa Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Xaa Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Xaa Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Xaa Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Xaa Asn Ser Thr Ala Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
```

```
Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Xaa Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Xaa Gln Ile Asn
465                 470                 475                 480


Lys Asp Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500
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<210> 551
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<400> 551

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Glu Arg Ile Arg Leu Arg Pro Gly Gly Arg Lys Arg Tyr Gln Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60
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```
Gln Pro Ser Leu Pro Val Gly Ser Glu Glu Ile Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Pro Thr Ala Ala Gly Ala Gly Ser Ser Ser Gln Ala
        115                 120                 125

Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255
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Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Asn Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Arg Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

```
Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Xaa Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Thr Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
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<210> 552
<211> 509
<212> PRT
<213> Human immunodeficiency virus

<400> 552

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Thr Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Val Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Lys Gln Ile Leu Glu His Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Ala Val Ala Val Leu Cys Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95
```

```
Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Lys Ala Gln Gln Glu Ala Ala Asp Thr
        115                 120                 125

Gly Asn Ser Asn Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu
    130                 135                 140

Gln Gly Gln Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala
145                 150                 155                 160

Trp Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro
                165                 170                 175

Met Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Ala Asp Leu Asn Thr
            180                 185                 190

Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys
        195                 200                 205

Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val
    210                 215                 220

His Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser
225                 230                 235                 240

Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met
                245                 250                 255

Thr His Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile
            260                 265                 270

Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile
        275                 280                 285
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```
Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp
    290                 295                 300

Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys
305                 310                 315                 320

Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys
                325                 330                 335

Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met
            340                 345                 350

Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val
        355                 360                 365

Leu Ala Glu Ala Met Ser Gln Val Thr Asn Ser Asn Thr Ile Met Met
    370                 375                 380

Gln Arg Gly Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn
385                 390                 395                 400

Cys Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys
                405                 410                 415

Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys
            420                 425                 430

Val Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys
        435                 440                 445

Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro
    450                 455                 460

Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu
465                 470                 475                 480
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Arg Ala Thr Pro Ser Gln Lys Pro Glu Pro Ile Asp Lys Asp Arg Tyr
485 490 495

Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
500 505

<210> 553
<211> 507
<212> PRT
<213> Human immunodeficiency virus

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<400> 553

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Gln Leu Asp Arg Trp
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp

85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Asn
115 120 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln
130 135 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145 150 155 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
165 170 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
180 185 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
195 200 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
210 215 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225 230 235 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn
245 250 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly
260 265 270

Leu Asn Lys Ile Val Lys Met Tyr Ser Pro Val Ser Ile Leu Asp Ile

```
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Xaa Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Ala Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly
    370                 375                 380

Asn Phe Lys Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Arg Lys Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Glu Gly Xaa Gln Leu Lys Asp Cys Ala Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
    450                 455                 460

Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Asp
```

465 470 475 480

Pro Lys Gln Asp Pro Ile Asp Lys Glu Met Tyr Pro Leu Thr Ser Leu
485 490 495

Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 554
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<400> 554

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Thr Gly
115 120 125

```
Asn Ser Ser Glu Val Ser Arg Asn Phe Pro Ile Val Gln Asn Leu Gln
    130                 135                 140

Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp
145                 150                 155                 160

Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met
                165                 170                 175

Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
            180                 185                 190

Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu
        195                 200                 205

Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Gln Gln
    210                 215                 220

Ala Gly Pro Ile Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp
225                 230                 235                 240

Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr
                245                 250                 255

Asn Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile
            260                 265                 270

Leu Gly Leu His Lys Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu
        275                 280                 285

Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg
    290                 295                 300

Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn
305                 310                 315                 320
```

```
Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys
                325                 330                 335

Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met
            340                 345                 350

Thr Ala Cys Gln Gly Val Gly Gly Pro Ala His Lys Ala Arg Val Leu
        355                 360                 365

Ala Glu Ala Met Ser His Val Thr Asn Ser Ala Thr Ile Met Met Gln
    370                 375                 380

Lys Gly Asn Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys
385                 390                 395                 400

Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys
                405                 410                 415

Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr
            420                 425                 430

Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly
        435                 440                 445

Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro
    450                 455                 460

Glu Glu Ser Phe Arg Phe Gly Glu Gly Thr Ala Ile Pro Ser Gln Lys
465                 470                 475                 480

Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser
                485                 490                 495

Leu Phe Gly Asn Asp His Ser Ser Gln
            500                 505
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<210> 555
<211> 499
<212> PRT
<213> Human immunodeficiency virus

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<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 555

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Xaa Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Xaa Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Xaa Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Val Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Ala Ala Ala Asp Thr Lys Xaa Ser Ser Xaa Val Ser
        115                 120                 125
```

```
Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln
    130                 135                 140

Pro Xaa Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190

His Gln Ala Ala Met Gln Met Leu Lys Xaa Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro
    210                 215                 220

Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240

Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro
                245                 250                 255

Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
            260                 265                 270

Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Xaa Leu Arg
    290                 295                 300

Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320
```

```
Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Ala His Lys Ala Arg Val Leu Ala Xaa Ala Met Ser Gln
        355                 360                 365

Val Thr Asn Pro Thr Thr Ile Met Met Gln Arg Gly Asn Leu Arg Asn
    370                 375                 380

Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Lys Gly His Gln Leu Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Xaa Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
    450                 455                 460

Gly Glu Glu Thr Thr Thr Xaa Pro Gln Lys Gln Glu Pro Ile Asp Lys
465                 470                 475                 480

Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495

Ser Ser Gln
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<210> 556
<211> 489
<212> PRT
<213> Human immunodeficiency virus

<220>
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<400> 556

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Gln Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Lys Gln Ile Leu Gln Gln Leu
50 55 60

Gln Pro Ser Leu Arg Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Ala Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Glu Ser Lys
100 105 110

Lys Gln Thr Gln Gln Ala Ala Ala Gly Thr Gly Asn Asn Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

```
Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Asn Ala
    210                 215                 220

Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Val Met Met Gln Lys Gly Asn Leu Gly
    370                 375                 380

Asn Gln Arg Lys Phe Val Lys Cys Phe Asn Cys Gly Lys Ala Gly His
385                 390                 395                 400

Ile Ser Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Asn Phe Pro Gln Ser Arg Thr Glu Pro Thr Xaa Pro Pro
        435                 440                 445

Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Pro Ser Gln Lys Gln
    450                 455                 460

Glu Lys Thr Asp Lys Glu Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser
465                 470                 475                 480

Leu Phe Gly Asn Asp Pro Ser Ser Gln
                485
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<210> 557
<211> 512
<212> PRT
<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 557

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Xaa Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Ile Gln Leu
    50   55   60

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Xaa Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Xaa Lys Ile Xaa Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Xaa Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Xaa Asn Ser Xaa Asn
        115                 120                 125

Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly
    130                 135                 140

Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Val Glu Glu Lys Ala Xaa Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Ser Ala Xaa Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Xaa Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala
    210                 215                 220

Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His
                245                 250                 255
```

```
Asn Pro Pro Ile Pro Val Gly Xaa Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270

Xaa Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Xaa Ser Ile Leu Asp
        275                 280                 285

Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser Gln Ala Thr Asn Ser Ala Ala Ile Met Met Gln Arg
    370                 375                 380

Gly Asn Phe Arg Asn Gln Arg Xaa Thr Ile Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Glu Gly His Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly
                405                 410                 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu
            420                 425                 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
        435                 440                 445
```

```
Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Arg
    450                 455                 460

Pro Xaa Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu
465                 470                 475                 480

Thr Ala Thr Pro Ala Gln Lys Gln Glu Xaa Lys Asp Lys Glu Leu Tyr
                485                 490                 495

Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Ser Asp Pro Ser Leu Gln
            500                 505                 510
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<210> 558
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 558

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Xaa Lys Leu Asp Ala Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Gln Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gln Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Gln Ala Gln Gln Ala Ala Ala Asn Thr Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140
```

```
Gln Ser Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160


Glu Lys Ala Xaa Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Xaa Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Xaa Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220


Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Ala Ile
                245                 250                 255


Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Asn Ser Thr Ala Val Met Met Gln Arg Gly Asn Phe Arg Asn
    370                 375                 380

Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Arg Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Phe Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Xaa Glu Ser Phe Arg Phe
    450                 455                 460

Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Xaa Glu Leu Ile Asp Leu
465                 470                 475                 480

Asp Lys Glu Leu Tyr Pro Ser Ala Ser Leu Lys Ser Xaa Phe Gly Asn
                485                 490                 495

Asp Pro Ser Ser Lys
            500
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<210> 559
<211> 504
<212> PRT

<213> Human immunodeficiency virus

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<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (477)..(477)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (489)..(489)
<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 559

Met Gly Ala Arg Ala Ser Val Ile Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly His Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Gly Ala Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Val Gln Gln Ala Ala Ala Ala Thr Ala Ala Asp Thr Gly Ser
        115                 120                 125

Asn Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly
    130                 135                 140

Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205
```

```
Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala
    210                 215                 220

Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Xaa Gln Xaa Gln Ile Gly Trp Met Thr Asn
                245                 250                 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Xaa Asp
        275                 280                 285

Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Ile Leu Ala
        355                 360                 365

Glu Ala Met Ser Gln Val Thr Asn Pro Ala Thr Ile Met Met Gln Arg
    370                 375                 380

Gly Asn Phe Arg Gly Gln Gly Arg Pro Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400
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Lys Glu Gly His Ile Ala Xaa Asn Cys Lys Ala Pro Arg Lys Lys Gly
405 410 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Glu
420 425 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg
435 440 445

Pro Gly Asn Phe Leu Gln Ser Xaa Pro Glu Pro Thr Ala Pro Pro Met
450 455 460

Glu Ser Phe Lys Phe Gly Glu Glu Thr Thr Thr Pro Xaa Gln Lys Gln
465 470 475 480

Glu Pro Thr Asp Lys Glu Met Tyr Xaa Leu Ala Ser Leu Lys Ser Leu
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Phe Gly Asn Asp Xaa Ser Ser Gln
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Xaa Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Xaa Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Ala Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Ile Xaa Glu Glu Glu Gln Asn Lys Gly Lys
100 105 110

```
Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Gly Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Xaa Gln Gly Gln Met Xaa His
    130                 135                 140

Gln Ala Ile Ala Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Xaa Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Xaa
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Xaa Gly Glu Ile Tyr Lys Arg Trp Ile Val Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Xaa Ser Pro Thr Ser Ile Leu Asp Xaa Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Xaa Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Xaa Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Asn Pro Asn Ala Ile Met Met Gln Arg Gly Asn Phe Arg Asn
    370                 375                 380

Gln Arg Xaa Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Xaa Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Pro
        435                 440                 445

Gln Ser Arg Thr Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Xaa Phe
    450                 455                 460

Gly Glu Glu Thr Thr Pro Pro Gln Lys Xaa Gly Gln Lys Asp Lys Glu
465                 470                 475                 480

Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser
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Ser Gln

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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Thr Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Leu Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Xaa Ala Gln Gln Ala Gln Gln Thr Glu Ala Ala Thr Gly Asn Asn
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Xaa Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240
```

```
Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Thr Gln Asp Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Xaa Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Met Gly Pro Gly Val Thr Leu Glu Glu Met Met Xaa Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Asn Ser Thr Asn Ile Met Met Gln Arg Gly
    370                 375                 380

Asn Phe Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Gln Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
```

```
Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Val Pro Thr Ala Pro Pro Ala Glu
    450                 455                 460


Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu
465                 470                 475                 480


Gln Ile Asp Lys Asp Pro Ser Pro Leu Ala Ser Leu Arg Ser Leu Phe
                485                 490                 495


Gly Asn Asp Pro Ser Ser Xaa
            500


<210>  562
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Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Tyr Pro Ala Leu Asn Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Lys Glu Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Thr Asn Lys
100 105 110

Lys Lys Glu Gln Gln Ala Ala Ala Asp Thr Gly Asn Arg Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

```
Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175


Xaa Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Leu His Pro Val Pro Ala Gly Pro Val Ala
    210                 215                 220


Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg Ala
                325                 330                 335
```

```
Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Ile Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Val Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asp Pro Arg Lys Xaa Val Lys Xaa Phe Asn Xaa Gly Lys Thr Gly His
385                 390                 395                 400

Ile Ala Lys Asn Xaa Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Xaa
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Arg Val Trp Pro Phe His Lys Glu Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Ala Pro Thr Ala Pro Thr Glu Pro Thr Ala Pro
    450                 455                 460

Pro Glu Glu Ser Phe Arg Phe Gly Glu Gly Thr Ala Thr Pro Pro Gln
465                 470                 475                 480

Lys Gln Glu Pro Ile Asp Lys Asp Leu Tyr Pro Leu Ala Ser Leu Lys
                485                 490                 495

Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
            500                 505
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<400> 563

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1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Xaa Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Xaa Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80
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Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Pro Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Gln
        115                 120                 125

Val Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly
    130                 135                 140

Gln Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Xaa Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala
    210                 215                 220

Gly Pro Val Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His
                245                 250                 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270
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Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp
        275                 280                 285

Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser Gln Val Thr Asn Ala Gly Asn Ile Met Met Gln Arg
    370                 375                 380

Gly Asn Phe Lys Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Glu Gly His Leu Ala Arg Asn Cys Xaa Ala Pro Arg Lys Lys Gly
                405                 410                 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu
            420                 425                 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
        435                 440                 445

Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu
    450                 455                 460
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```
Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln
465                 470                 475                 480


Glu Xaa Ile Asp Lys Glu Val Tyr Pro Leu Thr Ser Leu Lys Ser Leu
                485                 490                 495


Phe Gly Asn Asp Pro Ser Ser Gln
            500


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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Asp Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Gln Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45
```

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Lys Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ala Leu Arg Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Asn Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Arg Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Xaa Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Xaa Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Ser Phe Arg
    370                 375                 380

Asn Gln Arg Arg Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
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Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Xaa Glu Ser Phe Arg
450 455 460

Phe Gly Lys Glu Thr Thr Pro Pro Gln Lys Gln Glu Ser Ile Asp Lys
465 470 475 480

Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
485 490 495

Ser Ser Gln

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys

```
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Pro Thr Gly Ser Glu Glu Ile Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Xaa Asp Ala Glu Lys Ser Asn Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Pro Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly Pro Val Ala
```

210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Val Met Met Gln Arg Gly Asn Phe Xaa
370 375 380

Asn Gln Lys Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Leu Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys

405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Arg Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Xaa Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Ala Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Asp Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
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<210> 566
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<400> 566

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Xaa Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Xaa Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

```
Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val Xaa Gln Gly Ile Glu Val Lys Asp
                85                  90                  95


Thr Xaa Glu Ala Leu Xaa Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Cys Ser Gln Xaa
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175


Glu Xaa Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly Pro Val Ala
    210                 215                 220


Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ser Ala Thr Met Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Pro Gly Lys Asn Ile Lys Cys Phe Asn Cys Gly Lys Gln Gly His
385                 390                 395                 400

Thr Ala Lys Asn Cys Arg Ala Pro Arg Xaa Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ala His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

Leu Gln Ser Arg Pro Asp Pro Thr Ala Pro Ser Arg Thr Glu Pro Thr
450 455 460

Ala Pro Pro Glu Glu Ser Phe Lys Cys Arg Glu Glu Ile Thr Thr Pro
465 470 475 480

Pro Gln Xaa Gln Glu Pro Ile Asp Gln Gly Gln Tyr Pro Leu Thr Ser
485 490 495

Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 567
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 567

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Ser Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys

100 105 110

Lys Lys Ala Gln Pro Ala Ala Ala Ala Thr Gly Asn Ser Ser Gln Asp
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Pro Ile Ser Ala Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Val Leu

```
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Val Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Leu Trp Pro Ser Gln Gln Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Gly Pro Ile Asp
465                 470                 475                 480

Glu Gly Lys Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
```

485 490 495

Pro Ser Ser Gln
500

<210> 568
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (16)..(16)
<223> Xaa can be any naturally occurring amino acid

<400> 568

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Xaa
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Pro Glu Gly Cys Arg Gln Ile Leu Gly Gln Ile
50 55 60

Gln Pro Ser Leu Asn Thr Gly Thr Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asn Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

```
Gln Lys Thr Gln Gln Ala Ala Ala Asp Thr Gly Ser Ser Ser Ser Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Met Gln Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Ile Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro
                245                 250                 255

Pro Val Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300
```

```
Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320


Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335


Lys Ala Leu Gly Pro Ala Ala Ser Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350


Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365


Met Ser Gln Val Thr Thr Pro Pro Thr Ile Met Met Gln Arg Gly Asn
    370                 375                 380


Phe Arg Asn Gln Arg Arg Thr Ile Lys Cys Phe Asn Cys Gly Arg Glu
385                 390                 395                 400


Gly His Val Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415


Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430


Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445


Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser
    450                 455                 460


Phe Arg Ser Gly Glu Glu Thr Ala Ile Pro Ser Gln Lys Gln Asp Gln
465                 470                 475                 480


Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495
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Asn Asp Pro Ser Ser Gln
500

<210> 569
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (12)..(12)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (82)..(82)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (91)..(91)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (97)..(97)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (382)..(382)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (482)..(483)
<223> Xaa can be any naturally occurring amino acid

<400> 569

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Xaa Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Met Glu Thr Ala Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Xaa Ala Val Leu Tyr Cys Val His Gln Xaa Ile Asp Val Lys Asp
                85                  90                  95

Xaa Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Thr Lys Ser Lys
            100                 105                 110

Lys Lys Val Gln Gln Val Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Gln Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Xaa Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Lys Ala Pro Arg Arg Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

```
Gly Lys Glu Gly His Gln Met Arg Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Gly
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Thr Asp
465                 470                 475                 480

Lys Xaa Xaa Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Leu Ser Gln
            500
```

<210> 570
<211> 498
<212> PRT
<213> Human immunodeficiency virus

<400> 570

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Ala Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Ser Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ser Leu Arg Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Ala Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Glu Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val Ser Gln
        115                 120                 125

Asn Leu Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala
    130                 135                 140

Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys
145                 150                 155                 160

Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly
                165                 170                 175

Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His
            180                 185                 190

Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala
        195                 200                 205

Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro Gly
    210                 215                 220

Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr
225                 230                 235                 240

Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Ala Ile Pro Val
                245                 250                 255
```

```
Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val
            260                 265                 270

Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys
        275                 280                 285

Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala
    290                 295                 300

Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu
305                 310                 315                 320

Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly
                325                 330                 335

Pro Gly Ala Thr Leu Glu Asp Met Met Thr Ala Cys Gln Gly Val Gly
            340                 345                 350

Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Val
        355                 360                 365

Thr Asn Ser Ser Ala Ile Met Met Gln Arg Gly Asn Phe Arg Asn Gln
    370                 375                 380

Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala
385                 390                 395                 400

Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Lys
                405                 410                 415

Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe Leu
            420                 425                 430

Gly Arg Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu Gln
        435                 440                 445
```

Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly
450 455 460

Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys Glu
465 470 475 480

Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Leu
485 490 495

Ser Gln

<210> 571
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (437)..(437)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (446)..(446)
<223> Xaa can be any naturally occurring amino acid

<400> 571

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu

```
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Ile Asn Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
```

245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Ala Asn Thr Ala Ser Met Met Met Gln Arg Ser Asn Phe Lys Asn
370 375 380

Gln Gly Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Val Gly His Ile
385 390 395 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys Gly
405 410 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
420 425 430

Leu Gly Lys Ile Xaa Pro Ser His Lys Gly Arg Pro Gly Xaa Phe Leu

435 440 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
450 455 460

Gly Glu Glu Ala Thr Ala Pro His Gln Lys Gln Glu Pro Ile Asp Lys
465 470 475 480

Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
485 490 495

Ser Ser Gln

<210> 572
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (79)..(79)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (97)..(97)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (103)..(103)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (114)..(114)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (166)..(166)

<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (397)..(397)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (467)..(467)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (477)..(477)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (504)..(504)
<223> Xaa can be any naturally occurring amino acid

<400> 572

Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Lys Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
            20   25   30

His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50   55   60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Xaa Asn
65   70   75   80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85   90   95

```
Xaa Lys Glu Ala Leu Asp Xaa Val Glu Glu Glu Gln Asn Gln Ser Lys
            100                 105                 110

Lys Xaa Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Asn Gln Ala
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Xaa Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Thr Thr Ala Met Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Xaa Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Asn Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Pro Gln Ser Arg Thr Glu Pro Gln Ser Arg Leu Glu Pro Thr Ala
    450                 455                 460

Pro Pro Xaa Glu Ser Phe Arg Phe Gly Glu Glu Ala Xaa Ala Pro Ser
465                 470                 475                 480
```

Gln Lys Gln Glu Pro Ile Asp Lys Asp Leu Tyr Pro Leu Ala Ser Leu
485 490 495

Lys Ser Leu Phe Gly Asn Asp Xaa
500

<210> 573
<211> 498
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (3)..(3)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (15)..(15)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (81)..(81)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (114)..(114)
<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (334)..(334)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (485)..(485)
<223> Xaa can be any naturally occurring amino acid

<400> 573

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Met Gly Xaa Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Xaa Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Xaa Val Ala Val Leu Phe Cys Val His Arg Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Xaa Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140
```

```
Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Xaa His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Xaa Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Val Xaa
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Xaa Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Met Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Glu Glu Thr Thr Thr Pro Ser Gln Lys Pro Glu Leu Ile Glu Lys Glu
465                 470                 475                 480

Lys Tyr Pro Leu Xaa Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser
                485                 490                 495

Ser Gln
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<210> 574
<211> 513
<212> PRT

<213> Human immunodeficiency virus

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<400> 574

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Xaa Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Xaa Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Xaa Ile Glu Glu Glu Arg Asn Lys Ser Lys
            100                 105                 110

Lys Gln Ala Gln Gln Gln Gln Thr Gln Gln Ala Ala Ala Asp Thr Gly
        115                 120                 125

Asn Ser Ser Lys Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln
    130                 135                 140

Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp
145                 150                 155                 160

Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Xaa Val Ile Pro Met
                165                 170                 175

Phe Ala Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
            180                 185                 190

Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu
        195                 200                 205

Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Pro
    210                 215                 220
```

```
Ala Gly Pro Val Ala Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp
225                 230                 235                 240


Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr
                245                 250                 255


Ser Asn Pro Pro Ile Gln Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile
            260                 265                 270


Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu
        275                 280                 285


Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg
    290                 295                 300


Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn
305                 310                 315                 320


Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys
                325                 330                 335


Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met
            340                 345                 350


Thr Ala Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu
        355                 360                 365


Ala Glu Ala Met Ser Gln Ala Xaa Ser Ala Ala Xaa Met Met Gln Arg
    370                 375                 380


Gly Asn Phe Arg Asn Gln Arg Xaa Ile Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400


Lys Glu Gly His Ile Ala Arg Asn Cys Lys Ala Pro Arg Lys Lys Gly
                405                 410                 415
```

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Asn
420 425 430

Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly
435 440 445

Arg Pro Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Ser
450 455 460

Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu
465 470 475 480

Glu Ile Ala Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys Gly Leu
485 490 495

Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Leu Ser
500 505 510

Gln

<210> 575
<211> 500
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<213> Human immunodeficiency virus

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<400> 575

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Xaa Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Ile
    50                  55                  60

Gln Pro Ser Xaa Gln Thr Gly Ser Glu Glu Ile Lys Xaa Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Glu Ile Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Ser Lys Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val Gln Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Xaa His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Xaa Thr Asn Pro Xaa Asn Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Ala Val Lys Xaa Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Xaa Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly Xaa Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
```

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Ala Thr Xaa Pro Ser Gln Lys Gln Glu Ser Ile Asp
465 470 475 480

Lys Asp Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 576
<211> 504
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<213> Human immunodeficiency virus

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<400> 576

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Lys Leu Asp Ala Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Xaa Lys Xaa Tyr Gln Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Xaa Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Xaa Glu Gly Cys Arg Gln Ile Leu Gly Xaa Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Xaa Ala Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser
115 120 125

Ser Gln Val Ser Gln Asn Phe Pro Ile Xaa Gln Asn Met Gln Gly Gln
130 135 140

Met Val His Gln Pro Leu Thr Pro Arg Thr Leu Asn Ala Trp Val Lys
145 150 155 160

```
Val Val Glu Xaa Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Xaa Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Xaa Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350
```

```
Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Xaa Glu
        355                 360                 365


Ala Met Ser Gln Ala Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly
    370                 375                 380


Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400


Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415


Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Xaa Glu Arg
            420                 425                 430


Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445


Gly Asn Phe Xaa Gln Xaa Arg Xaa Glu Pro Ser Ala Pro Pro Glu Glu
    450                 455                 460


Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu
465                 470                 475                 480


Pro Thr Asp Lys Gly Met Tyr Pro Pro Leu Ala Ser Leu Arg Ser Leu
                485                 490                 495


Phe Gly Asn Asp Pro Ser Ser Gln
            500
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<210> 577
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<400> 577

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Xaa Tyr Lys Leu Lys
20 25 30

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His Leu Val Trp Ala Ser Arg Glu Val Glu Arg Phe Leu Ile Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

His Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Ser Gly Ser Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Xaa
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Xaa Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Gly Ser Ala Thr Val Met Met Gln Xaa Gly Arg Phe Arg
    370                 375                 380

Asp Gln Xaa Arg Xaa Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

```
Gly Xaa Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Leu Lys Asp
465                 470                 475                 480

Gln Glu Met Tyr Pro Leu Thr Ser Leu Xaa Ser Leu Phe Gly Ser Asp
                485                 490                 495

Pro Leu Ser Gln
            500
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<210> 578
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<400> 578

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Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Ala Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Asn Tyr Gln Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Ser Leu Leu Glu Thr Gly Ala Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Ala Glu Lys Asn Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220


Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Val
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Gly Thr Pro Asp Val Lys Gln Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Ser Ile Leu Lys Ala
                325                 330                 335

Met Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Asn Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Ser Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

Leu Gln Asn Arg Thr Glu Ser Thr Ala Ser Val Glu Pro Thr Ala Pro
450 455 460

Pro Ala Glu Ser Phe Met Phe Gly Glu Glu Thr Thr Pro Pro Gln Lys
465 470 475 480

Gln Glu Pro Arg Asp Lys Glu Leu Tyr Pro Ser Thr Ala Leu Arg Ser
485 490 495

Leu Phe Gly Asn Asp Pro Leu Ser Gln
500 505

<210> 579
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<400> 579

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Asn Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Xaa Ala Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Pro Ala Ala Ala Asp Thr Gly Asn Asn Xaa Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Xaa Gln Gly Gln Met Val His
    130                 135                 140

Gln Ser Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Xaa
145                 150                 155                 160

Glu Xaa Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Xaa Pro Val Ser Ile Xaa Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Xaa Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Ser Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Xaa Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Xaa Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
```

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Gly Thr Thr Asp
465 470 475 480

Gln Glu Xaa Tyr Pro Leu Val Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Xaa
500

<210> 580
<211> 508
<212> PRT
<213> Human immunodeficiency virus

<220>
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<220>
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<400> 580

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Ala Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Gln Phe Lys
20 25 30

His Ile Ile Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Thr Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Ile Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser
        115                 120                 125

Ser Thr Gly Asn Asn Ser Lys Val Ser Gln Asn Tyr Pro Ile Val Gln
    130                 135                 140

Asn Leu Gln Gly Gln Met Val His Gln Pro Ile Ser Pro Arg Thr Leu
145                 150                 155                 160

Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val
                165                 170                 175

Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu
            180                 185                 190

Asn Thr Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met
        195                 200                 205

Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His
    210                 215                 220

Pro Val Gln Ala Gly Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg
225                 230                 235                 240
```

```
Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly
                245                 250                 255

Trp Met Thr Ser Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg
            260                 265                 270

Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr
        275                 280                 285

Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr
    290                 295                 300

Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu
305                 310                 315                 320

Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro
                325                 330                 335

Asp Cys Arg Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu
            340                 345                 350

Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala
        355                 360                 365

Arg Val Leu Ala Glu Ala Met Ser Gln Val Thr Asn Ser Asn Thr Val
    370                 375                 380

Met Met Gln Xaa Gly Asn Phe Lys Asn Gln Arg Lys Thr Val Lys Cys
385                 390                 395                 400

Phe Asn Cys Gly Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro
                405                 410                 415

Arg Lys Arg Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys
            420                 425                 430
```

Asp Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser
435 440 445

His Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser Xaa Pro Glu Pro Ser
450 455 460

Ala Pro Pro Ala Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro
465 470 475 480

Pro Gln Lys Gln Glu Pro Met Asp Lys Glu Leu Tyr Pro Leu Ala Ser
485 490 495

Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 581
<211> 505
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

<400> 581

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Arg Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Val Ala Asp Thr Gly Asn Ser Arg Gln Gly
        115                 120                 125


Asn Asn Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln
    130                 135                 140
```

```
Gly Gln Met Val His Gln Pro Xaa Thr Pro Arg Thr Leu Asn Ala Trp
145                 150                 155                 160


Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met
                165                 170                 175


Phe Xaa Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
            180                 185                 190


Xaa Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu
        195                 200                 205


Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Xaa His
    210                 215                 220


Ala Gly Pro Xaa Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp
225                 230                 235                 240


Ile Ala Gly Thr Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr
                245                 250                 255


Ser Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile
            260                 265                 270


Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu
        275                 280                 285


Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg
    290                 295                 300


Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn
305                 310                 315                 320


Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys
                325                 330                 335
```

Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met
340 345 350

Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu
355 360 365

Ala Xaa Ala Met Ser Gln Met Thr Asn Ser Ala Thr Val Met Met Gln
370 375 380

Arg Gly Asn Phe Arg Asn Gln Arg Arg Thr Ile Lys Cys Phe Asn Cys
385 390 395 400

Gly Lys Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys
405 410 415

Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr
420 425 430

Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly
435 440 445

Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro
450 455 460

Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Ala Gln Lys
465 470 475 480

Gln Glu Pro Ile Asn Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser
485 490 495

Leu Phe Gly Asn Asp His Ser Ser Gln
500 505

<210> 582
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 582

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

```
His Xaa Val Trp Ala Ser Arg Glu Leu Glu Arg Xaa Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Thr Xaa Gly Cys Arg Arg Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Xaa Ala Thr Leu Tyr Cys Val His Ala Lys Ile Glu Val Xaa Asp
                85                  90                  95

Thr Lys Glu Ala Leu Xaa Lys Xaa Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Arg Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser
        115                 120                 125

Lys Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Xaa Lys Ala Phe Asn Pro Glu Val Ile Pro Met Phe Ala Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Xaa Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220
```

```
Xaa Ala Pro Gly Gln Met Arg Xaa Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Xaa Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Xaa Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Xaa Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Xaa Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Xaa Pro Thr Thr Ile Met Met Gln Lys Gly Asn
    370                 375                 380

Phe Arg Ser Gln Lys Lys Thr Val Lys Cys Phe Asn Cys Gly Arg Glu
385                 390                 395                 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
                405                 410                 415
```

```
Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430


Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Gln Asn Lys Gly Arg Pro
        435                 440                 445


Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu
    450                 455                 460


Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu
465                 470                 475                 480


Pro Ile Asp Lys Glu Met Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe
                485                 490                 495


Gly Asn Asp Xaa Ser Ser Gln
            500


<210>  583
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus


<220>
<221>  misc_feature
<222>  (132)..(132)
<223>  Xaa can be any naturally occurring amino acid

<400>  583

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45
```

```
Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Arg Val Gln Gln Ala Ala Ala Asp Thr Gly Gln Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Xaa Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Ala Ala Asn Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Lys Lys Ser Val Arg Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Leu Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
```

```
Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Lys Thr Thr Ala Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 584
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 584

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80
```

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Cys Ser Gln Ala
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Thr
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu
    450                 455                 460
```

```
Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Arg Gln Glu
465                 470                 475                 480


Met Thr Asp Lys Glu Lys Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
                485                 490                 495


Gly Asn Asp Pro
            500


<210>  585
<211>  499
<212>  PRT
<213>  Human immunodeficiency virus

<400>  585

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Ala Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110
```

```
Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Gly Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val Gln Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Val Asn Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Ala Thr Ser Gln Lys Gln Asp Pro Ile Asp Lys
465                 470                 475                 480

Glu Met Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495
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Ser Ser Gln

<210> 586
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 586

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Asp Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser
115 120 125

Gln Val Ser Arg Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met
130 135 140

Val His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val

```
145                 150                 155                 160

Val Glu Glu Lys Asn Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Ile Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Asn Leu Gln Glu Gln Ile Thr Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
```

340 345 350

Gln Gly Val Gly Gly Pro Ala His Lys Ala Arg Val Leu Ala Glu Ala
355 360 365

Met Ser Gln Val Thr Asn Ser Thr Ala Ile Met Met Gln Lys Gly Asn
370 375 380

Phe Arg Asn Gln Arg Arg Ser Val Lys Cys Phe Asn Cys Gly Lys Glu
385 390 395 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
405 410 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Asp Pro
465 470 475 480

Lys Asp Lys Asp Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 587
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (445)..(445)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (454)..(454)
<223> Xaa can be any naturally occurring amino acid

<400> 587

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Gly Leu Thr Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Ser Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Pro Thr Val Ala Asp Ala Gly Asn Asn Ser Asn Gln
        115                 120                 125


Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140
```

```
His Gln Pro Met Thr Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ala Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335
```

```
Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe
    370                 375                 380

Gly Asn Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Val Gly
385                 390                 395                 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Xaa Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Xaa Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460

Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile
465                 470                 475                 480

Asp Arg Glu Gly Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn
                485                 490                 495

Asp Pro Leu Ser Gln
            500
```

<210> 588
<211> 502
<212> PRT

<213> Human immunodeficiency virus

<400> 588

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Asn Lys Arg Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Gly Asp Gly Cys Lys Gln Ile Ile Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Gln Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Lys Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met
    130                 135                 140

Val His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
                165                 170                 175
```

```
Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190


Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205


Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220


Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240


Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro
                245                 250                 255


Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270


Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
        275                 280                 285


Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300


Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320


Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335


Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Asp Met Met Thr Ala Cys
            340                 345                 350


Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365
```

Met Ser Gln Leu Thr Asn Ser Thr Ala Ile Met Met Gln Arg Gly Asn
370 375 380

Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu
385 390 395 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
405 410 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Thr Thr Ala Pro Pro Gln Lys Gln Asp Gln
465 470 475 480

Ile Asp Lys Glu Leu Tyr Pro Ser Ala Ser Leu Lys Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 589
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (357)..(357)
<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature
<222> (467)..(467)
<223> Xaa can be any naturally occurring amino acid

<400> 589

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175
```

```
Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Xaa His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365
```

```
Gln Val Thr Asn Ser Ala Thr Val Met Met Gln Lys Gly Asn Phe Lys
    370                 375                 380

Gly Gln Arg Arg Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
    450                 455                 460

Phe Gly Xaa Glu Thr Thr Pro Ser Gln Lys Pro Glu Gly Ile Asp Lys
465                 470                 475                 480

Glu Met Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495

Ser Ser Gln
```

<210> 590
<211> 496
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (459)..(459)
<223> Xaa can be any naturally occurring amino acid

<400> 590

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Arg Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Gly Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly

180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Asn Ser Thr Thr Val Met Met Gln Arg Gly Asn Phe Lys Asn

370 375 380

Gln Arg Arg Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385 390 395 400

Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
405 410 415

Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
420 425 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
435 440 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Xaa Glu Ser Phe Arg Phe
450 455 460

Gly Glu Gly Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Arg Asp Lys
465 470 475 480

Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Ser Asp Pro
485 490 495

<210> 591
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (26)..(26)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (197)..(197)
<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature
<222> (282)..(282)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (409)..(409)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (467)..(467)
<223> Xaa can be any naturally occurring amino acid

<400> 591

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Xaa Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Ile Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Gln Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125
```

```
Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Xaa Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Thr Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Xaa Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320
```

```
Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ala His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Gly Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Gly
    370                 375                 380

Asn Gln Lys Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Ile Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Xaa Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Ile Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Gly
    450                 455                 460

Phe Gly Xaa Glu Ile Thr Thr His Ser Gln Lys Gln Glu Ser Ile Asp
465                 470                 475                 480

Lys Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly
                485                 490                 495

Asn Asp Pro Ser Ser Gln
            500
```

<210> 592
<211> 497
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (469)..(469)
<223> Xaa can be any naturally occurring amino acid

<400> 592

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Leu Glu Gly Cys Arg Gln Ile Leu Gly Gln Ile
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Asp Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Gln Ala Ala Ala Gly Pro Gly Asn Asn Ser Gln Val Ser Gln Asn
115 120 125

Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His Gln Ala Ile
130 135 140

```
Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala
145                 150                 155                 160

Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser Glu Gly Ala
                165                 170                 175

Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln
            180                 185                 190

Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu
        195                 200                 205

Trp Asp Arg Leu His Pro Val His Ala Gly Pro Thr Ala Pro Gly Gln
    210                 215                 220

Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu
225                 230                 235                 240

Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile Gln Val Gly
                245                 250                 255

Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg
            260                 265                 270

Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu
        275                 280                 285

Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu
    290                 295                 300

Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val
305                 310                 315                 320

Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro
                325                 330                 335
```

```
Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly
            340                 345                 350

Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Val Thr
        355                 360                 365

Gly Thr Asn Thr Ile Met Met Gln Arg Gly Asn Phe Arg Asn Gln Arg
    370                 375                 380

Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala Lys
385                 390                 395                 400

Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Lys Glu
                405                 410                 415

Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly
            420                 425                 430

Lys Phe Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser
        435                 440                 445

Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu
    450                 455                 460

Glu Thr Pro Thr Xaa Ser Gln Lys Gln Asp Gln Ile Asp Lys Glu Leu
465                 470                 475                 480

Tyr Pro Ser Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Leu Leu
                485                 490                 495

Gln
```

<210> 593
<211> 502
<212> PRT

<213> Human immunodeficiency virus

<400> 593

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Ala Leu Met Glu Ser Ala Glu Gly Cys Lys Gln Ile Leu Ala Gln Leu
    50                  55                  60


Gln Pro Ser Ile Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Ala Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Gln Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Ala Gly Asn Ser Ser
        115                 120                 125


Gln Ala Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140


Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160


Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175
```

```
Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Ser
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Asp Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365
```

```
Met Ser Gln Ile Thr Asn Asn Thr Ala Asn Ile Met Met Gln Lys Gly
    370                 375                 380

Asn Phe Arg Ser Gln Arg Lys Ile Lys Cys Phe Asn Cys Gly Arg Glu
385                 390                 395                 400

Gly His Ile Ala Lys His Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
    450                 455                 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Gln
465                 470                 475                 480

Ile Asn Lys Glu Leu Tyr Pro Ser Val Ser Leu Lys Ser Leu Phe Gly
                485                 490                 495

Asn Asp Pro Ser Ser Gln
            500
```

<210> 594
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (97)..(97)
<223> Xaa can be any naturally occurring amino acid

<220>

<221> misc_feature
<222> (468)..(468)
<223> Xaa can be any naturally occurring amino acid

<400> 594

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Thr Leu Tyr Cys Val His Arg Lys Ile Glu Val Lys Asp
                85                  90                  95


Xaa Lys Glu Ala Leu Asp Met Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser
        115                 120                 125


Ser Lys Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140


Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160


Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175
```

```
Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365
```

```
Ala Met Ser Gln Val Thr His Pro Ala Thr Ile Met Met Gln Arg Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Gly Arg
        435                 440                 445

Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala
    450                 455                 460

Glu Ser Phe Xaa Phe Gly Glu Glu Thr Ala Thr Pro Pro Pro Lys Gln
465                 470                 475                 480

Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu
                485                 490                 495

Phe Gly Asn Asp Pro Leu Ser Gln
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<210> 595
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<213> Human immunodeficiency virus

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<400> 595

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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Ser Ser Leu Glu Thr Gly Ser Glu Glu Ile Lys Ser Leu Phe Asn
65                  70                  75                  80
```

```
Thr Ile Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Xaa Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Gln Ala Gln Lys Ala Ala Ala Asp Thr Gly Ser Lys Asn Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Xaa Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Xaa Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Asn Val Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Arg Xaa Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Xaa Arg Pro Glu Xaa Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460
```

Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Pro Arg Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Ser Asp
485 490 495

Pro Ser Leu Gln
500

<210> 596
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<213> Human immunodeficiency virus

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<400> 596

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gln Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Asp Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Thr Ile Tyr Cys Val His Xaa Lys Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Glu Gln Gln Ala Ala Ala Gly Thr Gly Asn Ile Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140
```

```
Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Xaa Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Xaa Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Xaa Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Xaa Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Xaa His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Asn Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Gln Arg Lys Ala Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Xaa Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Val Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Asp Glu Thr Ala Thr Pro Xaa Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
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<210> 597
<211> 499
<212> PRT
<213> Human immunodeficiency virus

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<400> 597

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Gly Asp Gly Cys Arg Lys Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Arg Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Thr Ala Asp Thr Gly Asn Ser Asn Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Xaa Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Xaa Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Thr Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Xaa Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Ala Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ser Val Lys Xaa Phe Asn Xaa Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Xaa
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

```
Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Gly
    450                 455                 460

Phe Gly Glu Glu Ile Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Val Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

His Ser Ser
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<210> 598
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<213> Human immunodeficiency virus

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<400> 598

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Xaa Asn Pro
35 40 45

Gly Leu Leu Glu Thr Thr Glu Gly Cys Arg Gln Ile Leu Gly Gln Xaa
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Xaa Leu Xaa Asn
65 70 75 80

Thr Ile Ala Val Leu Tyr Cys Xaa His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Xaa Lys Xaa Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Xaa Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His

130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Xaa Val Ile Glu
145 150 155 160

Glu Xaa Ala Phe Ser Pro Glu Xaa Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Pro Gln Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Ile Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Asn Leu Gln Glu Gln Ile Thr Trp Met Thr Ser Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Xaa Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Thr Gln Xaa Val Lys Xaa Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala

325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

His Met Thr Asn Ala Asn Ala Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Xaa Ala Pro Arg Lys Xaa Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Ala Pro Pro Ser Gln Lys Gln Glu Xaa Ile Lys
465 470 475 480

Glu Glu Met Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 599

<211> 502
<212> PRT
<213> Human immunodeficiency virus

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<400> 599

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp

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1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Xaa Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Ile Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Xaa Ala Ala Ala Asp Thr Gly Asn Ser Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met
    130                 135                 140

Val His Gln Pro Xaa Thr Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Xaa Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
```

195 200 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Xaa Ala Gly Pro
210 215 220

Xaa Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225 230 235 240

Thr Thr Ser Asn Xaa Gln Glu Gln Val Thr Trp Met Thr Ser Asn Pro
245 250 255

Xaa Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
260 265 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
275 280 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
290 295 300

Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr
305 310 315 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
325 330 335

Arg Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Ser Ala Cys
340 345 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
355 360 365

Met Ser Gln Met Thr Ala Gln Thr Asn Ile Met Met Gln Arg Gly Asn
370 375 380

Phe Gly Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Thr

385 390 395 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Arg Lys Gly Cys Trp
405 410 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Thr
465 470 475 480

Ile Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 600
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 600

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Gly Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Asn Ser
        115                 120                 125

Pro Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240
```

```
Thr Thr Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Asn Pro Val Ile Met Met Gln Arg Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln
            420                 425                 430
```

```
Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445


Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser
    450                 455                 460


Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu Pro
465                 470                 475                 480


Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly
                485                 490                 495


Asn Asp Pro Ser Ser Gln
            500


<210>  601
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<212>  PRT
<213>  Human immunodeficiency virus


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<223> Xaa can be any naturally occurring amino acid

<400> 601

Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Xaa Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Xaa Asn Pro
35 40 45

Gly Leu Xaa Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Ser Lys Ile Glu Val Lys Asp

85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Arg Ser Lys
100 105 110

Lys Gln Thr Gln Gln Val Ala Ala Gly Thr Gly Asn Ser Ser Gln Ala
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Xaa Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Xaa Met Gln Met Leu Lys Xaa Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Ala Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly

```
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Cys Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Pro Ala Asn Ile Met Met Gln Arg Gly Asn Phe Xaa
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Ala Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Xaa Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Ser
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Arg Gln Glu Pro Ile Xaa
```

465 470 475 480

Lys Glu Met Tyr Pro Leu Thr Ala Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 602
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 602

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gln Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Thr Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Arg Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

```
Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Pro Ala
    210                 215                 220

Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320
```

```
Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Ser Tyr Lys
    370                 375                 380

Asn Gln Arg Lys Ala Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Arg Gln Glu Gln Lys Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
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<210> 603
<211> 495
<212> PRT
<213> Human immunodeficiency virus

<400> 603

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Lys Lys Ala Gln Gln
            100                 105                 110


Ala Ala Ala Ala Thr Gly Thr Ser Ser Gln Val Ser Gln Asn Tyr Pro
        115                 120                 125


Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala Ile Ser Pro
    130                 135                 140


Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala Phe Ser
145                 150                 155                 160
```

```
Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro
                165                 170                 175

Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln Ala Ala
            180                 185                 190

Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp
        195                 200                 205

Arg Leu His Pro Val His Ala Gly Pro Val Ala Pro Gly Gln Met Arg
    210                 215                 220

Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu
225                 230                 235                 240

Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile Pro Val Gly Glu Ile
                245                 250                 255

Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr
            260                 265                 270

Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe
        275                 280                 285

Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala
    290                 295                 300

Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn
305                 310                 315                 320

Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Gly Ala
                325                 330                 335

Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro Gly
            340                 345                 350
```

```
His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Met Thr Asn Ser
        355                 360                 365


Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg Asn Gln Arg Lys Pro
    370                 375                 380


Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala Lys Asn Cys
385                 390                 395                 400


Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His
                405                 410                 415


Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile
            420                 425                 430


Trp Pro Ser Gln Lys Gly Arg Pro Gly Asn Phe Pro Gln Ser Arg Thr
        435                 440                 445


Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg Phe Gly Glu Glu Thr
    450                 455                 460


Thr Ala Pro Leu Gln Lys Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro
465                 470                 475                 480


Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
                485                 490                 495


<210>  604
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus


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<400> 604

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Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Lys Leu
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Pro Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
```

165 170 175

Glu Xaa Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
245 250 255

Pro Xaa Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser

355 360 365

Gln Met Thr Asn Pro Ala Ala Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Gln Glu Gly His Gln Met Lys Asp Cys Ile Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Ala Pro Pro Gln Lys Gln Glu Gln Ile Asp
465 470 475 480

Lys Asp Leu Tyr Pro Met Ala Ser Leu Lys Ser Leu Phe Gly Ser Asp
485 490 495

Pro Ser Ser Gln
500

<210> 605
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 605

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Lys Gln Leu
    50                  55                  60

Gln Pro Ser Ile Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Asn
        115                 120                 125

Gln Ser Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Thr Asp Leu Asn Ile Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205
```

```
Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400
```

```
Gly His Val Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser
    450                 455                 460

Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Arg Gln Glu Pro
465                 470                 475                 480

Ile Asp Lys Glu Lys Glu Met Tyr Pro Leu Ala Ser Leu Lys Ser Leu
                485                 490                 495

Phe Gly Asn Asp Pro
            500
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<210> 606
<211> 503
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<400> 606

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Arg Trp
1               5                   10                  15


Xaa Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Xaa Leu Met Glu Thr Ser Glu Gly Cys Xaa Gln Ile Leu Gly Gln Leu
    50                  55                  60


His Pro Ser Ile Gln Thr Gly Ser Glu Glu Ile Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Xaa Thr Leu Tyr Cys Val His Gln Xaa Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110


Lys Gln Val Gln Gln Ala Ala Ala Ala Thr Gly Ser Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Xaa Gly Gln Met Val Xaa
    130                 135                 140
```

```
Gln Ser Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Xaa Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220


Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Xaa Ile Tyr Lys Arg Trp Ile Ile Met Xaa Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Gly Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Xaa Pro Asp Cys Lys Ile Ile Leu Lys Gly
                325                 330                 335
```

```
Xaa Gly Ala Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Ala Thr Ile Met Met Gln Arg Gly Xaa Phe Arg
    370                 375                 380

Pro Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Xaa Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Ala Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Arg Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Pro Thr Ala Pro
    450                 455                 460

Pro Glu Glu Ser Phe Arg Phe Gly Glu Lys Thr Thr Thr Pro Ser Gln
465                 470                 475                 480

Lys Gln Glu Gln Ile Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Lys
                485                 490                 495

Ser Leu Phe Gly Ser Asp Pro
            500
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<210> 607
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<400> 607

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Met Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Lys Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Ile Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160
```

```
Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Ile His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Asn Trp Met Xaa Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350
```

```
Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365


Gln Val Thr Gly Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380


Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His His Ile Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Arg Ile Trp Pro Ser Thr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500
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<210> 608
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<220>

<221> misc_feature
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 608

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Asn Ser
        115                 120                 125


Gln Val Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ala Gln
    130                 135                 140


Gly His Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp
```

```
145                 150                 155                 160

Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met
                165                 170                 175

Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
            180                 185                 190

Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu
        195                 200                 205

Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His
    210                 215                 220

Ala Gly Pro Val Ala Pro Gly Xaa Met Arg Glu Pro Arg Gly Ser Asp
225                 230                 235                 240

Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr
                245                 250                 255

Asn Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile
            260                 265                 270

Met Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu
        275                 280                 285

Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg
    290                 295                 300

Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn
305                 310                 315                 320

Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys
                325                 330                 335

Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met
```

340 345 350

Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu
355 360 365

Ala Glu Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln
370 375 380

Arg Gly Asn Phe Arg Asn Gln Arg Lys Met Val Lys Cys Phe Asn Cys
385 390 395 400

Gly Lys Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys
405 410 415

Gly Cys Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr
420 425 430

Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly
435 440 445

Arg Pro Gly Asn Phe Leu Gln Ser Arg Xaa Glu Pro Thr Ala Pro Pro
450 455 460

Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Ala Pro Ser Gln Lys
465 470 475 480

Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser
485 490 495

Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 609
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<220>
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<220>
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<220>
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<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (293)..(293)
<223> Xaa can be any naturally occurring amino acid

<400> 609

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gly Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Xaa Pro Gly Gly Lys Lys Lys Tyr Xaa Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Xaa Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gln Xaa Leu
    50                  55                  60


Gln Pro Ser Leu Lys Thr Gly Ser Glu Glu Leu Thr Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Thr Gln Ala Gln Gln Ala Ala Ala Ala Asn Thr Gly Asn Ser Ser Gln
        115                 120                 125


Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val
    130                 135                 140


His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Xaa
145                 150                 155                 160


Glu Glu Lys Ala Xaa Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175
```

```
Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Xaa Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Asp Trp Asp Arg Leu Xaa Pro Xaa His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Ser
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Xaa Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Cys Thr Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365
```

```
Ser Gln Val Thr Ser Ser Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380


Ser Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Leu Pro Pro Glu Glu
    450                 455                 460


Ser Phe Arg Glu Glu Ala Thr Ala Pro Pro Gln Lys Gln Asp Pro Ile
465                 470                 475                 480


Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Ser
                485                 490                 495


Asp Pro Ser Ser Gln
            500


<210>  610
<211>  503
<212>  PRT
<213>  Human immunodeficiency virus


<220>
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<223>  Xaa can be any naturally occurring amino acid
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<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 610

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Glu Gln Gln Ala Val Ala Asp Thr Gly Ser Lys Ser Gln Val
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240
```

```
Gly Val Thr Ser Thr Leu Gln Glu Gln Xaa Gly Trp Met Thr Ser Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Xaa Val Tyr Lys Lys Trp Ile Ile Ile Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile
                325                 330                 335

Leu Lys Ala Xaa Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly Xaa Lys Ala Xaa Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Ala Thr Asn Ser Ala Ala Ile Met Val Gln Arg Gly
    370                 375                 380

Asn Tyr Lys Gly Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ser Xaa Asn Cys Arg Ala Pro Xaa Lys Lys Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg
            420                 425                 430
```

```
Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445


Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Xaa Ala Pro Pro Glu Glu
    450                 455                 460


Ser Phe Arg Phe Gly Glu Glu Pro Ala Thr Pro Pro Gln Lys Gln Glu
465                 470                 475                 480


Pro Met Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
                485                 490                 495


Gly Asn Asp Pro Ser Ser Gln
            500


<210>  611
<211>  504
<212>  PRT
<213>  Human immunodeficiency virus


<220>
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<222>  (114)..(114)
<223>  Xaa can be any naturally occurring amino acid

<220>
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<223>  Xaa can be any naturally occurring amino acid

<220>
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<223>  Xaa can be any naturally occurring amino acid

<220>
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<222>  (488)..(488)
<223>  Xaa can be any naturally occurring amino acid

<400>  611
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```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Ala Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Gln Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Xaa Ala Gln Gln Thr Ala Ala Asp Ala Ala Ala Ala Ser Ser Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190
```

```
Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Val
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Xaa His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Ser Ser Ala Ala Ile Met Met Gln Lys Gly Asn Phe
    370                 375                 380
```

```
Arg Ser Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400


His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415


Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Asp Glu Arg Gln Ala
            420                 425                 430


Asn Phe Leu Xaa Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445


Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ser Arg Thr Glu
    450                 455                 460


Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr
465                 470                 475                 480


Thr Pro Ser Gln Lys Gln Glu Xaa Glu Arg Tyr Pro Leu Ala Ser Leu
                485                 490                 495


Arg Ser Leu Phe Gly Asn Asp Pro
            500


<210>  612
<211>  509
<212>  PRT
<213>  Human immunodeficiency virus

<400>  612

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Ser Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Lys Leu Lys
            20                  25                  30
```

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Lys Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ser Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255


Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270


Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285


Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300


Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg Ala
                325                 330                 335


Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350


Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365


Gln Val Thr Asn Ser Asn Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380


Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Lys Asn Cys Arg Ala Pro Arg Arg Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Gln Ser Arg Pro Glu Pro
450 455 460

Thr Ala Pro Pro Ala Glu Ser Phe Arg Phe Gly Glu Glu Thr Ile Thr
465 470 475 480

Pro Ser Pro Lys Gln Glu Pro Ile Asp Lys Gly Leu Tyr Pro Ser Asp
485 490 495

Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
500 505

<210> 613
<211> 497
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (143)..(143)
<223> Xaa can be any naturally occurring amino acid

<400> 613

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

His Ser Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Asp Ile Gly Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Arg Val Glu Glu Glu Gln Asn Lys Ile Lys
            100                 105                 110

Lys Ser Ala Gln Gln Ala Ala Asp Thr Gly Asn Ser Ser Lys Val Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Xaa His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Val
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Val Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ser Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Asn Val Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
```

```
Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Pro Gln Ser Arg Thr Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Pro
    450                 455                 460


Glu Thr Ala Thr Pro Phe Gln Arg Gln Glu Pro Ile Asp Lys Glu Leu
465                 470                 475                 480


Ser Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser
                485                 490                 495


Gln
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<210> 614
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<400> 614

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Ala Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80
```

```
Ala Ile Ala Val Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Lys Lys Ser Lys
            100                 105                 110

Lys Thr Thr Gln Gln Ala Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn
        115                 120                 125

Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly
    130                 135                 140

Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala
    210                 215                 220

Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Ser
                245                 250                 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270
```

```
Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp
        275                 280                 285

Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser Gln Val Thr Asn Pro Ala Thr Ile Met Met Gln Lys
    370                 375                 380

Gly Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly
                405                 410                 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu
            420                 425                 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg
        435                 440                 445

Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu
    450                 455                 460
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Glu Ser Leu Arg Leu Gly Gly Glu Thr Thr Thr Pro Ser Gln Arg Gln
465 470 475 480

Glu Pro Ile Asp Arg Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu
485 490 495

Phe Gly Asn Asp Pro Ser Ser Gln
500

<210> 615
<211> 512
<212> PRT
<213> Human immunodeficiency virus

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<400> 615

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ser Ile Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu

```
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Ala Val Ala Val Leu Tyr Cys Val His Gln Asn Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser
        115                 120                 125

Ser Gln Ser Ser Gln Asn Tyr Pro Ile Val Gln Asn Val Gln Gly Gln
    130                 135                 140

Met Val Tyr Gln Ser Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Ser Asp Leu Asn Leu Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Thr His Pro Val His Ala Gly
    210                 215                 220

Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Gly Asn
```

245 250 255

Pro Val Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly
260 265 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
275 280 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
290 295 300

Lys Val Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met
305 310 315 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
325 330 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
340 345 350

Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu
355 360 365

Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly
370 375 380

Asn Pro Arg Asn Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys
385 390 395 400

Glu Gly His Ile Ala Arg Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys
405 410 415

Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg
420 425 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Xaa Pro

435 440 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu
450 455 460

Ser Leu Pro Thr Ala Pro Pro Val Glu Ser Phe Arg Phe Xaa Glu Glu
465 470 475 480

Thr Thr Thr Xaa Ser Gln Lys Gln Gly Pro Ile Asp Lys Glu Leu Tyr
485 490 495

Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505 510

<210> 616
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 616

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Thr Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Thr Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu His Asn
65 70 75 80

Ala Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Arg Asp
85 90 95

```
Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Arg Asn Cys Lys Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Gln Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Ile Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480
```

Lys Asp Arg His Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 617
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 617

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Gln Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Gly Glu Gly Cys Arg Gln Leu Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu His Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Glu Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Pro Gly Asn Ser Ser Gln Val
115 120 125

```
Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ser Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Thr Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320
```

```
Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Asn Thr Val Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Pro Ser Gln Lys Gln Glu Gln Ile Asp Lys
465                 470                 475                 480

Glu Met Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495

Ser Ser Gln
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<210> 618
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
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<400> 618

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Xaa Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Xaa Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Xaa Gln Thr Gly Thr Glu Glu Ile Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Val Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Asn Glu Ala Leu Glu Lys Ile Lys Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Glu Thr Gln Gln Ala Ala Ala Asp Thr Gly Lys Ser Asn Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Val Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140


Gln Pro Val Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Xaa Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala
                165                 170                 175
```

```
Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Xaa Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Xaa Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365
```

```
Gln Ala Thr Ser Ala Ser Ala Met Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Xaa Gln Arg Xaa Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Leu Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Xaa Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ser Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
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<210> 619
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

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<400> 619

Met Gly Ala Arg Ala Ser Val Xaa Ser Gly Gly Lys Leu Asp Xaa Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Xaa Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Ser Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Asp Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Gly Lys
100 105 110

Lys Asn Ala Gln Gln Ala Ala Ala Asn Thr Gly Asn Asn Ile Pro Xaa
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Xaa Gln Gly Gln Met Val His

130 135 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Xaa Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Xaa Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Xaa Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Xaa Lys Ala

325 330 335

Leu Gly Pro Gly Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Pro Ala Thr Ile Met Leu Gln Lys Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Pro Glu Xaa Lys Asp
465 470 475 480

Lys Glu Met Tyr Pro Leu Ala Ser Leu Xaa Ser Leu Phe Gly Xaa Asp
485 490 495

Pro Ser Xaa Gln
500

<210> 620

<211> 498
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 620

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ala Glu Gly Cys Lys Gln Ile Leu Gly Gln Xaa
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Xaa Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Xaa Gln Ile Asp Val Xaa Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Xaa Ala Ala Asp Thr Arg Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Ser Ile Met Met Gln Gly Gly Ser Met Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Val Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Arg Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Ser Glu Lys Gln Ala Asn
            420                 425                 430
```

```
Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Ala Gln Asn Arg Leu Glu Pro Thr Ala Pro Pro Xaa Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Gln Ile Asp Lys
465                 470                 475                 480


Asp Asn Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser
                485                 490                 495


Ser Gln



<210>  621
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus


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<220>
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<400> 621

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Xaa Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Xaa Arg Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Gln Xaa Ile Xaa Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Thr Ala Ala Gly Thr Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
```

```
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Arg Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
```

340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Ser Asn Phe Arg
370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Xaa Glu Xaa Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 622
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 622

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Thr Ala Ala Asp Thr Gly Ser Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Gly Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Val Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380
```

```
Ser Gln Arg Arg Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Leu Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480


Lys Glu Met Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Leu Ser Gln
            500


<210>  623
<211>  499
<212>  PRT
<213>  Human immunodeficiency virus

<400>  623

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30
```

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Gly Ser Leu Tyr Asn
65                  70                  75                  80

Thr Met Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Lys Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Ser Thr Ile Met Ile Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415
```

```
Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Arg Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Pro Gln Ser Arg Thr Glu Pro Thr Ala Pro Pro Glu Glu Asn Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp Lys
465                 470                 475                 480


Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495


Leu Ser Gln
```

<210> 624
<211> 509
<212> PRT
<213> Human immunodeficiency virus

<400> 624

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Arg Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Pro Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Ala
        115                 120                 125

Thr Pro Gly Gly Pro Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu
    130                 135                 140

Gln Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala
145                 150                 155                 160

Trp Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro
                165                 170                 175

Met Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr
            180                 185                 190

Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys
        195                 200                 205

Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val
    210                 215                 220

His Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser
225                 230                 235                 240

Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met
                245                 250                 255
```

```
Thr Asn Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile
            260                 265                 270

Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile
        275                 280                 285

Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp
    290                 295                 300

Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys
305                 310                 315                 320

Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys
                325                 330                 335

Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met
            340                 345                 350

Met Thr Ala Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val
        355                 360                 365

Leu Ala Glu Ala Met Ser Gln Val Asn Gln Ala Thr Ile Met Met Gln
    370                 375                 380

Lys Gly Asn Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys
385                 390                 395                 400

Gly Lys Glu Gly His Ile Ala Arg Asn Cys Lys Ala Pro Arg Lys Arg
                405                 410                 415

Gly Cys Trp Lys Cys Gly Lys Asp Gly His Gln Met Lys Asp Cys Thr
            420                 425                 430

Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly
        435                 440                 445
```

Arg Pro Gly Asn Phe Leu Gln Asn Arg Pro Glu Ser Arg Pro Glu Pro
450 455 460

Ser Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Ala Phe
465 470 475 480

Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Val
485 490 495

Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 625
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<400> 625

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Ser Leu Val Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Asn Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Glu

100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Asn Asn Asn Ser Pro Val
115 120 125

Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Ala Val
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
260 265 270

Val Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu

```
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Lys Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Gly Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Val Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Ser Arg Leu Glu Pro Thr Ala Pro Pro Ala
    450                 455                 460

Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln
465                 470                 475                 480

Glu Gln Thr Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu
```

485 490 495

Phe Gly Asn Asp Pro Ser Ser Gln
500

<210> 626
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 626

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Ser Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Ile His
130 135 140

```
Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro His Asp Leu Asn Thr Met Leu Asn Ala Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Val Tyr Lys Lys Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Ser Pro Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Pro Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Leu Glu Pro Thr Ala Pro Leu Glu Glu Ser Phe Arg
    450                 455                 460

Phe Arg Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Gln Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 627
<211> 500

<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (12)..(12)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (67)..(67)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (223)..(223)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (292)..(292)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (326)..(326)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (442)..(442)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (447)..(447)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (452)..(452)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (467)..(467)
<223> Xaa can be any naturally occurring amino acid

<400> 627

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Xaa Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Lys Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Xaa Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Val Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
```

180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Xaa Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Xaa Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Xaa Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

His Ile Gln Asn Ser Asn Thr Ile Met Met Gln Arg Gly Asn Phe Arg

370 375 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Xaa Gly Arg Pro Gly Xaa Phe
435 440 445

Leu Gln Ser Xaa Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Ser Gly Xaa Gly Thr Thr Thr Leu Pro Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Gln Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Leu Ser Gln
500

<210> 628
<211> 510
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (226)..(226)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature

<222> (466)..(466)
<223> Xaa can be any naturally occurring amino acid

<400> 628

```
Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Gly Gln Ile
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Lys Glu Gln Asn Asn Ser Gln
            100                 105                 110


Lys Lys Val Gln Gln Val Ala Ala Gly Thr Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Pro Leu Thr Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175
```

```
Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Asp Trp Asp Arg Val His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Xaa Gln Ile Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365
```

```
Gln Val Thr Ser Thr Ser Ala Ile Met Met Gln Lys Gly Asn Tyr Arg
    370                 375                 380

Ile Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro Ala Glu Pro Ser Ala Pro
    450                 455                 460

Pro Xaa Glu Ser Phe Arg Phe Gly Glu Gly Thr Thr Thr Pro Ser Arg
465                 470                 475                 480

Gly Gln Glu Pro Thr Asp Lys Ser Gln Glu Pro Thr Asp Lys Gly Leu
                485                 490                 495

Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Ser Asp Pro
            500                 505                 510


<210>  629
<211>  503
<212>  PRT
<213>  Human immunodeficiency virus


<220>
<221>  misc_feature
<222>  (371)..(371)
<223>  Xaa can be any naturally occurring amino acid
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<400> 629

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Ile Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Ala Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Asn Thr Gly Asn Ser Ser Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140

His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190
```

```
Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Xaa Thr Asn Ser Ala Ser Ala Ala Ile Met Met Gln Arg Gly
    370                 375                 380
```

```
Asn Phe Lys Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400


Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415


Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430


Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro
        435                 440                 445


Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
    450                 455                 460


Ser Phe Arg Phe Gly Glu Glu Thr Thr Ala Pro Ser Gln Lys Gln Glu
465                 470                 475                 480


Thr Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe
                485                 490                 495


Gly Asn Asp Pro Ser Ser Gln
            500


<210>  630
<211>  499
<212>  PRT
<213>  Human immunodeficiency virus


<220>
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<222>  (4)..(4)
<223>  Xaa can be any naturally occurring amino acid

<220>
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<222>  (26)..(26)
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (476)..(476)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (485)..(485)
<223> Xaa can be any naturally occurring amino acid

<400> 630

Met Gly Ala Xaa Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Xaa Lys Thr Tyr Xaa Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Ala Gly Cys Arg Gln Ile Leu Gly Gln Xaa
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Arg Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Lys Glu Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Xaa Gln Gly Gln Met Val His
130 135 140

Gln Ala Xaa Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

```
Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Ser Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Xaa Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Thr Ile Met Met Gln Arg Gly Asn Tyr Arg Ser
    370                 375                 380

Thr Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400
```

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
405 410 415

Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn Phe
420 425 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
435 440 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Xaa Val
450 455 460

Arg Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Xaa Thr Ile Asp Lys
465 470 475 480

Glu Leu Tyr Pro Xaa Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
485 490 495

Ser Ser Gln

<210> 631
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (463)..(463)
<223> Xaa can be any naturally occurring amino acid

<400> 631

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Asn Lys Lys Tyr Lys Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Asp Thr Gly Asn Asn Ser Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Ile
    210                 215                 220
```

```
Ala Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Asn Asn Thr Asn Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Pro Arg Lys Ile Ala Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415
```

```
Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430


Asn Phe Leu Gly Arg Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445


Phe Leu Gln Asn Arg Thr Glu Pro Thr Ala Pro Pro Ala Glu Xaa Phe
    450                 455                 460


Arg Phe Gly Glu Glu Thr Thr Pro Ser Gln Lys Gln Glu Gln Thr Asp
465                 470                 475                 480


Lys Asp Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Leu Leu
            500
```

<210> 632
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 632

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile His Leu Arg Pro Gly Gly Lys Lys Arg Tyr Gln Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
        35                  40                  45


Ser Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Ile Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val Ser
        115                 120                 125

Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His Gln
    130                 135                 140

Pro Leu Thr Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190

His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro
    210                 215                 220

Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240

Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro
                245                 250                 255
```

```
Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
            260                 265                 270

Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg
    290                 295                 300

Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Lys Asn
    370                 375                 380

Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445
```

Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Ala Glu Ser Phe Gly Phe
450 455 460

Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp Arg
465 470 475 480

Glu Met Tyr Pro Leu Ser Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
485 490 495

Ser Ser Gln

<210> 633
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 633

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Ala Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Ile Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Asn Ile Glu Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys

100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Pro Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Gly Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu

```
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Ala Thr Asn Pro Asn Ile Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Asp Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Ser Glu Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro
    450                 455                 460

Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Ala Thr Pro Pro Gln
465                 470                 475                 480

Lys Gln Glu Pro Ile Asp Lys Glu Arg Tyr Pro Leu Thr Ser Leu Arg
```

485 490 495

Ser Leu Phe Gly Asn Asp Pro
500

<210> 634
<211> 499
<212> PRT
<213> Human immunodeficiency virus

<400> 634

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Asn Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Pro Ala Asp Asp Thr Gly Asn Ser Ser Gln Val Ser
115 120 125

Gln Asn Tyr Pro Val Val Gln Asn Leu Gln Gly Gln Met Val His Gln
130 135 140

```
Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu
                165                 170                 175

Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190

His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala
        195                 200                 205

Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro
    210                 215                 220

Asp Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Ile Thr Ser
225                 230                 235                 240

Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro
                245                 250                 255

Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile
            260                 265                 270

Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg
    290                 295                 300

Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr Leu
305                 310                 315                 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu
                325                 330                 335
```

```
Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg Asn
    370                 375                 380

Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Thr Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser Lys Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg Phe
    450                 455                 460

Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Thr Asp Lys
465                 470                 475                 480

Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495

Ser Ser Gln
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<210> 635
<211> 504

<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (327)..(327)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (392)..(392)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (405)..(405)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (413)..(413)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (416)..(416)
<223> Xaa can be any naturally occurring amino acid

<400> 635

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Lys Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Ser Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn

65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Gly Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Ala Gly Glu Asn Lys Leu Val
115 120 125

Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys

260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Xaa Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Ala Val Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Ala Val Lys Xaa Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Xaa Arg Ala Pro Arg Lys Lys Gly Xaa Trp Lys Xaa
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu

450 455 460

Glu Ser Phe Ser Phe Gly Glu Glu Thr Gly Ile Pro Ser Gln Lys Gln
465 470 475 480

Gly Thr Ile Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu
485 490 495

Phe Gly Asn Asp Pro Ser Ser Gln
500

<210> 636
<211> 498
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (45)..(45)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (103)..(103)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (115)..(115)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (306)..(306)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (389)..(389)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature

<222> (397)..(397)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (404)..(404)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (407)..(407)
<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (487)..(487)
<223> Xaa can be any naturally occurring amino acid

<400> 636

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Gln Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Xaa Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60


Glu Pro Ala Leu Lys Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Arg Asp
                85                  90                  95
```

```
Thr Lys Glu Ala Leu Asp Xaa Ile Glu Glu Glu Arg Asn Lys Ser Lys
            100                 105                 110

Lys Lys Xaa Gln Gln Ala Ala Ala Asp Ala Gly Asn Asn Ser Ser Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Val
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285
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```
Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300


Leu Xaa Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320


Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335


Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350


Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365


Ser Gln Val Thr Asn Ala Thr Thr Ile Met Met Gln Lys Gly Asn Tyr
    370                 375                 380


Arg Asn Gln Arg Xaa Thr Val Lys Cys Phe Asn Cys Xaa Lys Glu Gly
385                 390                 395                 400


His Ile Ala Xaa Asn Cys Xaa Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415


Cys Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Gly Arg Gln Ala
            420                 425                 430


Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445


Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460


Arg Phe Xaa Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Arg
465                 470                 475                 480
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Asp Arg Glu Leu Tyr Pro Xaa Ala Ser Leu Arg Ser Leu Phe Gly Asn
485 490 495

Asp Pro

<210> 637
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<400> 637

Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Arg Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Xaa Lys Lys Tyr Arg Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ser Glu Gly Xaa Arg Gln Ile Leu Gly Gln Leu
    50   55   60

Gln Pro Xaa Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65   70   75   80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85   90   95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100   105   110

Lys Lys Ala Gln Gln Ala Val Ala Asp Thr Gly Asn Ser Asn Gln Xaa
        115   120   125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Xaa Gln Met Val His
    130   135   140

```
Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Xaa Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Xaa Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Asp Thr
305                 310                 315                 320

Leu Leu Ile Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335
```

```
Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr His Pro Pro Thr Ile Met Val Gln Asn Gly Lys Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Xaa Lys Asp Cys Xaa Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Arg Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Val Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Thr Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Cys Gln
            500
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<210> 638
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<212> PRT
<213> Human immunodeficiency virus

<400> 638

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30

His Ile Ile Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Ser Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Val Ala Ala Ala Gly Thr Gly Asn Ser Ser
        115                 120                 125

Gln Val Ser Gln Asn Phe Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
                165                 170                 175
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Leu Ser Glu Gly Val Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190


Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205


Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220


Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240


Thr Thr Ser Asn Leu Gln Glu Gln Val Ala Trp Met Thr Ser Asn Pro
                245                 250                 255


Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270


Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
        275                 280                 285


Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300


Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320


Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335


Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Asp Met Met Thr Ala Cys
            340                 345                 350


Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365
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```
Met Ser Gln Ala Asn Ser Ala Ser Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Val
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe
    450                 455                 460

Arg Phe Gly Glu Glu Thr Lys Thr Pro Pro Gln Lys Gln Glu Pro Thr
465                 470                 475                 480

Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
                485                 490                 495

Asp Pro Ser Ser Gln
            500
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<210> 639
<211> 498
<212> PRT
<213> Human immunodeficiency virus

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<400> 639

Met Gly Ala Arg Ala Ser Val Leu Ser Pro Gly Glu Leu Asp Lys Trp
1   5   10   15

Glu Gly Ile Arg Xaa Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Xaa Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ala Gly Gly Cys Lys Gln Ile Xaa Glu Xaa Leu
    50   55   60

Leu Pro Xaa Leu Gln Thr Gly Ser Glu Gly Phe Arg Ser Leu Tyr Xaa
65   70   75   80

```
Thr Val Ala Xaa Leu Tyr Cys Val His Lys Xaa Ile Glu Ile Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Asn Ser Lys
            100                 105                 110

Lys Arg Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Xaa Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Xaa Ser Pro Glu Val Ile Xaa Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Ile Arg Asp Pro Arg Gly Ser Asp Ile Ala Xaa Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Ala Asn Pro Ala Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
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```
Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Asn Thr Thr Ile Met Met Gln Lys Gly Asn
    370                 375                 380

Phe Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His Leu
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Xaa
        435                 440                 445

Phe Leu Xaa Ser Arg Pro Glu Pro Thr Ala Pro Pro Xaa Glu Ser Phe
    450                 455                 460
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Xaa Phe Gln Glu Glu Thr Thr Thr Pro Pro Arg Lys Gln Glu Pro Ile
465 470 475 480

Asp Lys Asp Gln Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
485 490 495

Asp Pro

<210> 640
<211> 498
<212> PRT
<213> Human immunodeficiency virus

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Asp Phe Arg Ser Leu Tyr Asn

65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Xaa His Gln Asn Ile Asp Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Arg Ala Gln Gln Ala Ala Ala Asp Ala Gly Asn Lys Ser Gln Ile
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys

260 265 270

Ile Val Arg Met Tyr Ser Pro Ala Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Thr Xaa Thr Val Met Met Gln Lys Gly Asn Phe Lys
370 375 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ile Phe Arg

450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Ile Asp Lys Glu
465 470 475 480

Gln Cys Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Leu
485 490 495

Ser Gln

<210> 641
<211> 505
<212> PRT
<213> Human immunodeficiency virus

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<400> 641

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gly Leu Asp Arg Trp
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Lys Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Ser Lys Ser Lys
            100                 105                 110

Lys Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser
        115                 120                 125

Ser Gln Val Ser Xaa Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Xaa Thr
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Xaa Met Leu Asn
            180                 185                 190
```

```
Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Xaa Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile
        275                 280                 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Xaa Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly
    370                 375                 380
```

```
Asn Phe Arg Ser His Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400


Glu Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys
                405                 410                 415


Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430


Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445


Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
    450                 455                 460


Ser Phe Arg Ser Gly Glu Gly Thr Ala Thr Pro Ala Gln Lys Gln Glu
465                 470                 475                 480


Leu Ile Asp Leu Asp Lys Glu Met Tyr Pro Leu Thr Ser Leu Arg Ser
                485                 490                 495


Leu Phe Gly Asn Asp Pro Ser Ser Lys
            500                 505


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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Xaa Tyr Lys Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Ala Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Arg Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Asn Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Thr His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205
```

```
Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ala Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Ser Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Gly Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Ala Asn Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Arg Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400
```

```
Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Gly Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Met
    450                 455                 460


Phe Gly Glu Glu Thr Ala Ala Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480


Lys Glu Lys Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Leu Ser Gln
            500
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<210> 643
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<212> PRT
<213> Human immunodeficiency virus

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<220>
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<222> (274)..(274)
<223> Xaa can be any naturally occurring amino acid

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<222> (290)..(290)
<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<400> 643

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Gln Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Xaa Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Ala Val Ala Val Leu Tyr Cys Val His Gln Asn Ile Glu Ile Arg Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Xaa Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110
```

```
Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Xaa Ser Ser Asn Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Xaa Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Xaa Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Xaa Val Xaa Glu Ile Tyr Xaa Arg Trp Ile Ile Xaa Gly Leu Asn Lys
            260                 265                 270

Ile Xaa Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Xaa Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Xaa Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Xaa Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335


Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350


Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365


Gln Val Thr Asn Ser Thr Asn Ile Met Met Gln Arg Xaa Ser Xaa Arg
    370                 375                 380


Ser Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Arg Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Pro Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Xaa Thr Pro Ser Gln Lys Gln Glu Pro Lys Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495
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Pro Ser Ser Gln
500

<210> 644
<211> 501
<212> PRT
<213> Human immunodeficiency virus

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<400> 644

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Ala Ser Glu Glu Val Lys Ser Leu Asn Asn
65 70 75 80

```
Ala Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Arg Ala Gln Gln Ala Ala Ala Ala Thr Gly Asn Asn Ser Gln Ser
        115                 120                 125

Ser Gln Gly Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly
    210                 215                 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270
```

```
Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Xaa Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Gly His Lys Xaa Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Xaa His Val Thr Asn Ser Thr Asn Ile Met Met Gln Arg Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Lys Ala Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Arg Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys
                405                 410                 415

Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu
    450                 455                 460
```

Ser Phe Arg Glu Glu Ala Thr Thr Pro Pro Gln Arg Ser Glu Pro Ile
465 470 475 480

Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 645
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
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<400> 645

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Asp Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Xaa Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
85 90 95

```
Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Gln Thr
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Asn
        355                 360                 365

Gln Val Thr Thr Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Ala Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480
```

Lys Glu Gln Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 646
<211> 498
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<400> 646

Met Gly Ala Arg Ala Ser Ile Xaa Ser Gly Gly Glu Leu Asp Arg Trp
1   5   10   15

Glu Lys Ile Arg Xaa Arg Pro Gly Gly Asn Lys Lys Tyr Lys Leu Lys
            20   25   30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro

```
        35                  40                  45

Gly Leu Leu Glu Thr Ser Xaa Gly Cys Arg Gln Ile Leu Val Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Arg Glu Ala Leu Xaa Lys Val Glu Glu Glu Gln Asn Xaa Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Asn Ser Xaa Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Ala Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Xaa Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Xaa Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
```

225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Xaa Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Xaa Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Gln Gln Gly Asn Tyr Xaa Asn
370 375 380

Gln Arg Lys Pro Val Lys Cys Xaa Asn Cys Gly Lys Ala Gly His Ile
385 390 395 400

Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
405 410 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe

420 425 430

Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe Leu
435 440 445

Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg Phe
450 455 460

Gly Glu Glu Thr Thr Pro Xaa Gln Lys Gln Glu Gln Ile Asp Lys Glu
465 470 475 480

Xaa His Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Ser Asp Pro Ser
485 490 495

Ser Gln

<210> 647
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

<400> 647

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Ala Trp
1 5 10 15

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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Xaa Ser Lys
            100                 105                 110

Lys Lys Ala Gln His Ala Ala Ala Asp Thr Gly Asn Asn Asn Ser Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Xaa Asn Ala Gln Gly Gln Leu Val
    130                 135                 140

His Gln Ala Met Ser Pro Xaa Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205
```

```
Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val
    210                 215                 220

Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Pro Thr Thr Val Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Ser Gln Arg Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Asp Gly His
385                 390                 395                 400
```

```
Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Thr Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Leu Ser Gln
            500
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<210> 648
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<400> 648

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Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Asp Leu Asp Arg Trp
1               5                   10                  15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45
```

```
Gly Leu Leu Glu Thr Pro Glu Gly Cys Arg Gln Ile Leu Ser Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Gly Phe Arg Ser Leu Tyr Asn
65                  70                  75                  80

Ala Ile Ser Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Val Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Gly Pro Arg Lys Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
```

```
Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu
    450                 455                 460


Ser Phe Arg Phe Gly Gly Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu
465                 470                 475                 480


Gln Ile Asp Lys Asp Leu Tyr Pro Leu Asp Ser Leu Arg Ser Leu Phe
                485                 490                 495


Gly Asn Asp Pro Ser Ser Gln
            500


<210>  649
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus


<220>
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<223>  Xaa can be any naturally occurring amino acid

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<400>  649

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15
```

```
Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Lys Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ala Asn Asn Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205
```

```
Ala Ala Glu Trp Asp Arg Xaa His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Xaa Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Gly Pro Ala Asn Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Gly Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400
```

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Asn Arg Xaa Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Arg Gln Glu Pro Ile Asn
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 650
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<212> PRT
<213> Human immunodeficiency virus

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<400> 650

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Ala Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Phe Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Ile Arg Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Thr Ala Ala Asp Thr Gly Asn Ser Asn Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
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180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Ala Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Xaa Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Xaa Pro Ala Thr Ile Met Met Gln Lys Gly Lys Phe Arg

370 375 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Xaa Gln
500

<210> 651
<211> 503
<212> PRT
<213> Human immunodeficiency virus

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<400> 651

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Xaa Leu Asp Thr Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Ser Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Xaa Val Trp Ala Ser Arg Glu Leu Xaa Arg Phe Ala Val Asn Pro
35 40 45

```
Xaa Leu Xaa Glu Thr Ser Glu Gly Cys Arg Gln Ile Met Arg Gln Leu
    50                  55                  60

Xaa Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Lys Ser Lys Lys Lys
            100                 105                 110

Ala Xaa Gln Gln Ala Ala Ala Asp Thr Glu Ser Ser Lys Gln Val Ser
        115                 120                 125

Gln Asn Xaa Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln
    130                 135                 140

Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu
145                 150                 155                 160

Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala Xaa
                165                 170                 175

Gly Ala Thr Pro Gly Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly
            180                 185                 190

His Xaa Ala Ala Met Xaa Met Leu Lys Glu Xaa Ile Asn Glu Glu Ala
        195                 200                 205

Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala Pro
    210                 215                 220

Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser
225                 230                 235                 240
```

```
Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile Pro
                245                 250                 255

Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Ile Gly Leu Asn Lys Ile
            260                 265                 270

Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly Pro
        275                 280                 285

Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Xaa Leu Arg
    290                 295                 300

Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Xaa
305                 310                 315                 320

Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Ser Ile Leu Lys Ala Leu
                325                 330                 335

Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val
            340                 345                 350

Gly Gly Pro Ser His Lys Xaa Arg Val Leu Ala Glu Ala Met Ser Gln
        355                 360                 365

Ala Asn Ser Ala Ala Ile Met Met Gln Lys Gly Asn Phe Arg Asn Gln
    370                 375                 380

Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Leu Ala
385                 390                 395                 400

Arg Asn Cys Arg Ala Pro Arg Lys Xaa Gly Cys Trp Lys Cys Gly Gln
                405                 410                 415

Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe Leu
            420                 425                 430
```

Gly Lys Phe Trp Pro Ser His Lys Xaa Arg Pro Gly Asn Phe Leu Xaa
435 440 445

Ser Arg Pro Glu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu
450 455 460

Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu
465 470 475 480

Pro Arg Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe
485 490 495

Gly Asn Asp Pro Ser Ser Gln
500

<210> 652
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<400> 652

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Xaa Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Ile Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
85 90 95

```
Thr Lys Glu Ala Leu Asp Xaa Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Xaa Gln Gln Ala Ala Ala Asp Thr Gly Asp Arg Gly Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Xaa Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Val Ala Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Ile Gly Leu Asn Lys
            260                 265                 270

Val Val Lys Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Xaa Val Lys Asn Trp Met Thr Glu Xaa
305                 310                 315                 320

Leu Leu Val Gln Asn Xaa Asn Pro Asp Cys Lys Xaa Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Ser Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Ala Gln Pro Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Ser Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Pro Gln Ser Arg Thr Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Lys Glu Thr Xaa Asp
465                 470                 475                 480
```

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 653
<211> 502
<212> PRT
<213> Human immunodeficiency virus

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<400> 653

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Glu Glu Arg Phe Ala Ile Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Ala Gly Cys Lys Gln Ile Leu Ile Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Asn Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Xaa His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Val Ala Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Asn Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380
```

```
Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Xaa Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Val Trp Pro Ser His Lys Gly Xaa Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Xaa Glu Ser Phe Lys
    450                 455                 460


Phe Val Lys Glu Thr Thr Thr Pro Pro Gln Glu Gln Asn Leu Ile Asp
465                 470                 475                 480


Leu Asp Lys Glu Val Tyr Pro Leu Xaa Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495


Asn Asp Pro Ser Xaa Lys
            500


<210>  654
<211>  495
<212>  PRT
<213>  Human immunodeficiency virus


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<400>  654

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Asn Gln Ala
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205
```

```
Ala Ala Glu Trp Asp Arg Leu His Pro Pro Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Asn Ser Gly Ala Ala Met Met Gln Arg Gly Asn Phe Arg Asn
    370                 375                 380

Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400
```

Ala Arg Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
405 410 415

Arg Glu Gly His Gln Met Lys Asp Cys Xaa Glu Arg Gln Ala Asn Phe
420 425 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
435 440 445

Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg Phe
450 455 460

Val Glu Glu Thr Thr Thr Pro Ser Gln Lys Pro Glu Glu Leu Tyr Pro
465 470 475 480

Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
485 490 495

<210> 655
<211> 501
<212> PRT
<213> Human immunodeficiency virus

<400> 655

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
35 40 45

Gly Leu Leu Glu Ser Ser Gly Gly Cys Lys Gln Ile Leu Ala Gln Leu
50 55 60

```
Gln Pro Ala Leu Lys Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Gln
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Thr Asp Thr Gly Asn Ser Ser Ser Asn
        115                 120                 125


Gln Val Ser Arg Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140


Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160


Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala
                165                 170                 175


Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190


Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205


Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly Pro
    210                 215                 220


Ile Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240


Thr Thr Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Asn Asn Pro
                245                 250                 255
```

```
Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Asn Pro Asn Asn Val Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Arg Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Ala Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445
```

Phe Pro Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Cys Phe
450 455 460

Gly Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Thr
465 470 475 480

Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 656
<211> 502
<212> PRT
<213> Human immunodeficiency virus

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<400> 656

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Gly Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Thr Ala Asp Thr Gly Asn Asn Asn Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Ser Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Asn Ser Ala Thr Val Met Met Gln Arg Gly Asn Phe Arg Asn
    370                 375                 380

Pro Arg Lys Thr Val Lys Cys Phe Asn Xaa Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Arg Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Xaa Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445
```

```
Gln Asn Arg Pro Glu Pro Thr Ala Pro Ser Ala Pro Pro Glu Glu Ser
    450                 455                 460

Phe Arg Phe Gly Glu Gly Thr Thr Ala Pro Ser Gln Lys Gln Glu Pro
465                 470                 475                 480

Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495

Ser Asp Pro Ser Ser Gln
            500
```

<210> 657
<211> 508
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (399)..(399)
<223> Xaa can be any naturally occurring amino acid

<400> 657

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Ala Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Ile Tyr Asn
```

65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Thr Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys

260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Ser Ala Ala Ile Met Met Gln Lys Gly Asn
370 375 380

Phe Gly Asn Gln Arg Lys Thr Val Lys Cys Cys Asn Cys Gly Xaa Val
385 390 395 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
405 410 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Pro Thr

```
    450                 455                 460

Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Ala Ala Ala Thr Pro
465                 470                 475                 480

Ser Gln Lys Gln Glu Pro Ile Asp Lys Asp Leu Tyr Pro Leu Ala Ser
                485                 490                 495

Leu Arg Ser Leu Phe Gly Asn Asp Gln Leu Ser Gln
            500                 505
```

<210> 658
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (411)..(411)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (465)..(465)
<223> Xaa can be any naturally occurring amino acid

<400> 658

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Ala Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Thr Ser Ser Ser Ser
        115                 120                 125


Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
    130                 135                 140


Met Val His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160


Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser
                165                 170                 175


Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
            180                 185                 190


Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
        195                 200                 205


Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
    210                 215                 220


Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240


Gly Thr Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn
                245                 250                 255
```

```
Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
        275                 280                 285

Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met
305                 310                 315                 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Ala Thr Asn Ser Ala Asn Ile Met Met Gln Arg Gly
    370                 375                 380

Asn Phe Gly Lys Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Lys Asn Cys Arg Ala Xaa Arg Lys Arg Gly Cys
                405                 410                 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro
        435                 440                 445
```

```
Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
    450                 455                 460


Xaa Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu
465                 470                 475                 480


Thr Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
                485                 490                 495


Gly Asn Asp Pro Ser Ser Gln
            500


<210>  659
<211>  505
<212>  PRT
<213>  Human immunodeficiency virus


<220>
<221>  misc_feature
<222>  (404)..(404)
<223>  Xaa can be any naturally occurring amino acid

<400>  659

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80
```

```
Thr Ile Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Arg Asn Thr Ala Asp Thr
        115                 120                 125

Lys Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln
    130                 135                 140

Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp
145                 150                 155                 160

Val Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met
                165                 170                 175

Phe Ser Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
            180                 185                 190

Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu
        195                 200                 205

Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Val His Pro Val Gln
    210                 215                 220

Ala Gly Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp
225                 230                 235                 240

Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr
                245                 250                 255

Ser Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile
            260                 265                 270
```

```
Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu
        275                 280                 285

Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg
    290                 295                 300

Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn
305                 310                 315                 320

Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys
                325                 330                 335

Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met
            340                 345                 350

Thr Ala Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu
        355                 360                 365

Ala Glu Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln
    370                 375                 380

Arg Gly Asn Phe Arg Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys
385                 390                 395                 400

Gly Lys Arg Xaa His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys
                405                 410                 415

Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr
            420                 425                 430

Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly
        435                 440                 445

Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro
    450                 455                 460
```

```
Ala Glu Cys Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys
465                 470                 475                 480


Gln Glu Pro Ile Glu Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser
                485                 490                 495


Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505


<210>  660
<211>  500
<212>  PRT
<213>  Human immunodeficiency virus

<400>  660

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Arg Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110
```

```
Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Ser
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Val Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Asn Val Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asp Gln Arg Lys Lys Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Ser Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495
```

Pro Leu Leu Gln
500

<210> 661
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (188)..(188)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (201)..(201)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (215)..(215)
<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (498)..(498)
<223> Xaa can be any naturally occurring amino acid

<400> 661

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

```
Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Arg Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Xaa Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Xaa Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Xaa His Pro Ala Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240
```

```
Ser Thr Leu Gln Glu Gln Ile Asp Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Xaa Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Met Thr Asn Ala Thr Asn Ile Met Met Gln Gly Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Phe Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430
```

```
Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Gly Cys Arg
    450                 455                 460

Tyr Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Gln Glu Lys Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Ser Asp
                485                 490                 495

Pro Xaa Ser Gln
            500
```

<210> 662
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 662

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Ala Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Val Tyr Asn
65                  70                  75                  80
```

```
Thr Val Ala Thr Ile Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Thr Gln Gln Ala Ala Ala Gly Ala Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Ser Pro Thr Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Asn Pro Arg Arg Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Arg Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Val Glu Gly Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460
```

Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu Pro Thr Asp
465 470 475 480

Arg Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 663
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (7)..(7)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (24)..(24)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (34)..(34)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (48)..(48)
<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

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<222> (167)..(167)
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<220>
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (500)..(500)
<223> Xaa can be any naturally occurring amino acid

<400> 663

Met Gly Ala Arg Ala Ser Xaa Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Xaa Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Xaa Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Xaa
35 40 45

Gly Leu Xaa Glu Thr Xaa Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu

50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Xaa Lys Ser Leu Tyr Asn
65 70 75 80

Xaa Ile Ala Val Leu Tyr Cys Val His Gln Xaa Ile Asp Val Lys Asp
85 90 95

Thr Xaa Glu Xaa Leu Asp Xaa Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Val His Xaa Asp Thr Gly Asn Ser
115 120 125

Xaa Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln
130 135 140

Met Val His Gln Pro Xaa Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145 150 155 160

Val Val Glu Glu Lys Ala Xaa Ser Xaa Glu Val Ile Pro Met Phe Ser
165 170 175

Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn
180 185 190

Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile
195 200 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly
210 215 220

Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225 230 235 240

Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn

245 250 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly
260 265 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
275 280 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
290 295 300

Lys Val Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met
305 310 315 320

Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile
325 330 335

Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala
340 345 350

Cys Gln Gly Val Xaa Gly Pro Gly His Lys Ala Arg Val Leu Xaa Glu
355 360 365

Ala Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly
370 375 380

Asn Phe Arg Gly Pro Arg Lys Asn Val Lys Cys Phe Asn Cys Gly Arg
385 390 395 400

Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys
405 410 415

Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg
420 425 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro

435 440 445

Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu
450 455 460

Ser Phe Arg Phe Gly Glu Glu Thr Xaa Pro Ser Gln Lys Pro Glu Pro
465 470 475 480

Ile Asp Lys Asp Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly
485 490 495

Xaa Asp Pro Xaa Ser Gln
500

<210> 664
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (92)..(92)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (314)..(314)
<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 664

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Lys Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Xaa Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Thr Gly Asn
        115                 120                 125

Ser Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly
    130                 135                 140

Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160

Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175

Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190

Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr
        195                 200                 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala
    210                 215                 220

Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240

Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser
                245                 250                 255
```

```
Asn Pro Ala Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp
        275                 280                 285

Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300

Tyr Lys Thr Leu Arg Ala Glu Gln Ala Xaa Gln Asp Val Lys Asn Trp
305                 310                 315                 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335

Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser Gln Val Thr Asn Ser Ala Ser Ile Met Met Gln Arg
    370                 375                 380

Gly Asn Phe Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Glu Gly His Ile Ala Arg Asn Cys Xaa Ala Pro Arg Lys Lys Gly
                405                 410                 415

Cys Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu
            420                 425                 430

Arg Gln Ala Xaa Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
        435                 440                 445
```

```
Pro Gly Asn Phe Xaa Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala
    450                 455                 460

Pro Pro Xaa Glu Xaa Phe Xaa Phe Gly Glu Glu Thr Thr Xaa Pro Ser
465                 470                 475                 480

Xaa Lys Gln Glu Xaa Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu
                485                 490                 495

Lys Ser Leu Phe Gly Asn Asp His
            500
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<210> 665
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 665

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Val Gly Cys Lys Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Ile Ala Thr Leu Tyr Cys Val His Leu Arg Ile Asp Val Lys Asp
                85                  90                  95
```

```
Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Thr Pro Pro Val Ile Met Met Gln Lys Asp Asn Phe Arg
    370                 375                 380

Asn Gln Lys Arg Thr Val Lys Cys Phe Asn Cys Gly Arg Asp Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480
```

Lys Glu Met Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 666
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (467)..(467)
<223> Xaa can be any naturally occurring amino acid

<400> 666

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Ser Leu Leu Glu Thr Pro Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

```
Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Thr Ala Val Met Met Gln Lys Gly Thr Phe Arg
    370                 375                 380

Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Arg Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Xaa Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Leu Ile Asp
465                 470                 475                 480

Leu Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly
                485                 490                 495
```

Asn Asp Pro Ser Ser Lys
500

<210> 667
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

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<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (478)..(478)
<223> Xaa can be any naturally occurring amino acid

<400> 667

```
Met Gly Ala Arg Xaa Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Xaa
1               5                   10                  15

Lys Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Lys Gln Ile Leu Gln Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Xaa Glu Leu Lys Ser Xaa Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Asn Lys Ile Glu Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Arg Ala Gln Gln Ala Ala Xaa Asp Thr Gly Asn Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190
```

```
Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Xaa Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Gly Ser Ala Thr Ile Met Met Gln Gly Gly Asn Tyr Lys
    370                 375                 380
```

```
Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Lys Ser Glu Thr Thr Arg Ile Glu Pro Thr Ala Pro Pro
    450                 455                 460


Ala Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Xaa Gln Lys
465                 470                 475                 480


Pro Glu Leu Ile Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser
                485                 490                 495


Leu Phe Gly Asn Asp Pro Ser Ser Gln
            500                 505


<210>  668
<211>  502
<212>  PRT
<213>  Human immunodeficiency virus


<220>
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<222>  (297)..(297)
<223>  Xaa can be any naturally occurring amino acid

<220>
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<223>  Xaa can be any naturally occurring amino acid
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<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (448)..(448)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (451)..(451)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (482)..(482)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (488)..(488)
<223> Xaa can be any naturally occurring amino acid

<400> 668

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Arg Trp
1               5                   10                  15


Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80
```

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Gly Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Gln Thr Ala Ala Ala Asp Thr Gly
        115                 120                 125

Ser Asn Asn Gln Val Ser His Asn Tyr Pro Ile Val Gln Asn Ile Gln
    130                 135                 140

Gly Gln Met Val His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp
145                 150                 155                 160

Val Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met
                165                 170                 175

Phe Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met
            180                 185                 190

Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu
        195                 200                 205

Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His
    210                 215                 220

Ala Gly Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp
225                 230                 235                 240

Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr
                245                 250                 255

Asn Asn Pro Pro Val Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile
            260                 265                 270
```

```
Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu
        275                 280                 285

Asp Ile Lys Gln Gly Pro Lys Glu Xaa Phe Arg Asp Tyr Val Asp Arg
    290                 295                 300

Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn
305                 310                 315                 320

Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys
                325                 330                 335

Thr Ile Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Asp Met Met
            340                 345                 350

Thr Ala Cys Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu
        355                 360                 365

Ala Glu Ala Met Ser Gln Met Asn Ser Thr Thr Val Met Met Gln Arg
    370                 375                 380

Gly Asn Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly
                405                 410                 415

Cys Trp Lys Cys Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu
            420                 425                 430

Arg Gln Ala Asn Phe Leu Gly Lys Ile Xaa Pro Ser His Xaa Gly Xaa
        435                 440                 445

Pro Gly Xaa Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu
    450                 455                 460
```

Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln
465 470 475 480

Glu Xaa Lys Glu Leu Tyr Pro Xaa Thr Ser Leu Arg Ser Leu Phe Gly
485 490 495

Asn Asp Pro Leu Ser Gln
500

<210> 669
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<400> 669

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Ile Trp Ala Ser Arg Glu Leu Glu Arg Phe Ser Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Phe
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Asn Lys Val

```
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Ala Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Ala Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
```

305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ser Ala Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asp Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Asp Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe His Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Arg Gln Glu Pro
465 470 475 480

Lys Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln

500

<210> 670
<211> 498
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (497)..(497)
<223> Xaa can be any naturally occurring amino acid

<400> 670

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Ser Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Ser Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
85 90 95

Thr Gln Glu Ala Leu Glu Lys Ile Lys Glu Glu Gln Asp Lys Ser Lys
100 105 110

Lys Arg Ala Gln Gln Ala Glu Ala Gly Thr Gly Asn Ser Ser Gln Ala
115 120 125

```
Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Leu Thr Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320
```

```
Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Asn Ser Thr Asn Ile Met Met Gln Lys Gly Asn Val Arg Asn
    370                 375                 380

Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe Pro
        435                 440                 445

Gln Ser Arg Thr Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
    450                 455                 460

Gly Glu Gln Thr Thr Pro His Gln Lys Gln Glu Pro Ile Asp Gln Glu
465                 470                 475                 480

Arg Ser Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Leu
                485                 490                 495

Xaa Gln
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<210> 671
<211> 503
<212> PRT
<213> Human immunodeficiency virus

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<400> 671

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Arg Leu Lys

```
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Arg Ile Leu Lys Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Gly Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Glu Ser Lys
            100                 105                 110

Lys Lys Thr Gln Gln Ala Ala Ala Gly Thr Gly Asn Asn Ser Gln Xaa
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Xaa Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Xaa Ala Gly Pro Val Ala
```

210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Xaa Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Lys
370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly Xaa
385 390 395 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys

405 410 415

Gly Gln Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu
450 455 460

Ser Phe Arg Phe Gly Glu Lys Thr Thr Thr Pro Pro Gln Lys Gln Glu
465 470 475 480

Xaa Leu Asp Lys Glu Leu Tyr Pro Val Thr Ser Leu Arg Ser Leu Phe
485 490 495

Gly Asn Asp Pro Ser Xaa Gln
500

<210> 672
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<400> 672

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Asn Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Ile Glu Thr Ala Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
50 55 60

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Ile Ala Val Leu Tyr Cys Val His Lys Arg Ile Glu Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Asn Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Glu Ala Asp Thr Gly Asn Ser Lys Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Ala Gln Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Val
                245                 250                 255
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```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys His Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Ser Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Ala Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Ser Gln Arg Lys Pro Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Thr Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

```
Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Ala Pro Ala Gln Lys Gln Glu Pro Ile Val
465                 470                 475                 480

Lys Glu Met Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
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<210> 673
<211> 507
<212> PRT
<213> Human immunodeficiency virus

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<400> 673

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Xaa Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Thr Gln Gln Ala Ala Ala Ala Ala Ala Ala Ala Ala Ala Asp
        115                 120                 125


Thr Gly Asn Arg Gly Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn
    130                 135                 140


Leu Gln Gly Gln Met Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn
145                 150                 155                 160


Ala Trp Val Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile
                165                 170                 175


Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn
```

180 185 190

Thr Met Leu Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Met Leu
195 200 205

Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro
210 215 220

Val His Ala Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly
225 230 235 240

Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp
245 250 255

Met Thr Asn Asn Pro Ala Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp
260 265 270

Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser
275 280 285

Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val
290 295 300

Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val
305 310 315 320

Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp
325 330 335

Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu
340 345 350

Met Met Thr Ala Cys Gln Gly Xaa Gly Gly Pro Ser His Lys Ala Arg
355 360 365

Val Leu Ala Glu Ala Met Ser Gln Ala Thr Asn Xaa Ala Thr Val Met

370 375 380

Met Gln Arg Gly Asn Phe Arg Asn Gln Arg Lys Thr Xaa Lys Xaa Phe
385 390 395 400

Asn Cys Gly Lys Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg
405 410 415

Lys Arg Gly Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp
420 425 430

Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His
435 440 445

Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala
450 455 460

Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Ala Thr Ala Pro Pro
465 470 475 480

Gln Lys Gln Glu Pro Thr Asp Lys Asp Leu Tyr Pro Leu Ala Ser Leu
485 490 495

Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 674
<211> 499
<212> PRT
<213> Human immunodeficiency virus

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<400> 674

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20   25   30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ala Asp Gly Cys Lys Lys Ile Leu Gly Gln Leu

50 55 60

His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Xaa Leu Xaa Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Gln
100 105 110

Lys Lys Ala Gln Gln Thr Ala Ala Gly Thr Gly Ser Gly Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Xaa Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Xaa
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
210 215 220

Pro Xaa Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Gly Xaa Pro Ala Ile

245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Met Asn Ser Ala Asn Val Met Met Gln Gln Gly Asn Phe Lys Gly
370 375 380

Gln Arg Arg Ile Xaa Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385 390 395 400

Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
405 410 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Asn Gly Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Val Trp Pro Ser Ser Lys Gly Arg Pro Gly Xaa Phe

435 440 445

Pro Gln Ser Arg Ile Glu Pro Ser Ala Pro Pro Glu Glu Ser Leu Arg
450 455 460

Phe Gly Glu Glu Met Thr Pro Pro Gln Lys Gln Gly Gln Thr Asp Lys
465 470 475 480

Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Ser Asp Pro
485 490 495

Ser Ser Gln

<210> 675
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<400> 675

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1   5   10   15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20   25   30

His Xaa Val Trp Ala Ser Arg Xaa Leu Glu Arg Phe Ala Val Asn Pro
        35   40   45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50   55   60

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Gln Xaa Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Xaa Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Xaa Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Xaa Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Xaa Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Xaa
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Xaa Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Ser Ser Ala Thr Val Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Pro Val Lys Cys Phe Asn Cys Gly Lys Asp Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

```
Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460


Xaa Gly Glu Glu Thr Thr Xaa Pro Ser Gln Lys Gln Glu Thr Ile Asp
465                 470                 475                 480


Lys Asp Leu Tyr Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Thr
            500


<210>  676
<211>  503
<212>  PRT
<213>  Human immunodeficiency virus


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<400> 676

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Met Xaa Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Ala Trp
1               5                  10                  15


Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Asp Gly Cys Arg Gln Ile Leu Met Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Val Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Arg Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Ala Thr Gly Glu Ser Ser Arg Glu
        115                 120                 125


Asn Ser Gln Val Ser His Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly
    130                 135                 140
```

```
Gln Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val
145                 150                 155                 160


Lys Val Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
                165                 170                 175


Thr Ala Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu
            180                 185                 190


Asn Thr Val Gly Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr
        195                 200                 205


Ile Asn Glu Glu Ala Ala Asp Trp Asp Arg Val His Pro Val His Ala
    210                 215                 220


Gly Pro Ile Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225                 230                 235                 240


Ala Gly Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser
                245                 250                 255


Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu
            260                 265                 270


Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp
        275                 280                 285


Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
    290                 295                 300


Tyr Lys Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp
305                 310                 315                 320


Met Thr Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr
                325                 330                 335
```

```
Ile Leu Lys Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr
            340                 345                 350

Ala Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala
        355                 360                 365

Glu Ala Met Ser Gln Val Thr Asn Ser Ala Thr Val Met Met Gln Lys
    370                 375                 380

Gly Asn Phe Arg Asn Gln Lys Lys Ile Val Lys Cys Phe Asn Cys Gly
385                 390                 395                 400

Lys Val Gly His Ile Ala Arg Asn Cys Arg Ala Pro Xaa Lys Xaa Gly
                405                 410                 415

Cys Trp Lys Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Asn Glu
            420                 425                 430

Gly Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg
        435                 440                 445

Pro Gly Asn Phe Pro Gln Ser Arg Leu Glu Pro Thr Ala Pro Pro Xaa
    450                 455                 460

Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Pro Pro Xaa Lys Xaa Glu
465                 470                 475                 480

Pro Thr Xaa Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe
                485                 490                 495

Gly Asn Asp Pro Ser Ser Gln
            500
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<210> 677
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<400> 677

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Ile Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Lys Arg Ile Leu Ile Gln Leu
    50                  55                  60


His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Gln Ile Glu Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Xaa Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Gln Glu Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln
        115                 120                 125


Val Ser His Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140
```

```
His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160


Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175


Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190


Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205


Glu Xaa Ala Glu Trp Asp Arg Leu His Pro Val His Ala Xaa Pro Ile
    210                 215                 220


Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240


Thr Ser Xaa Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro
                245                 250                 255


Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Xaa Gly Leu Asn
            260                 265                 270


Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285


Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Xaa
    290                 295                 300


Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320


Thr Leu Xaa Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335
```

Ala Xaa Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
340 345 350

Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met
355 360 365

Ser Gln Val Thr Ser Ser Ala Thr Val Met Met Gln Arg Gly Asn Gly
370 375 380

Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Arg Glu Gly
385 390 395 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
405 410 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Xaa Arg Gln Ala
420 425 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser Xaa Lys Gly Arg Pro Gly Asn
435 440 445

Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe
450 455 460

Arg Phe Gly Glu Glu Thr Thr Thr Pro Ala Gln Lys Gln Glu Pro Ile
465 470 475 480

Asp Lys Glu Xaa Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn
485 490 495

Asp Pro Ser Ser Gln
500

<210> 678
<211> 504
<212> PRT
<213> Human immunodeficiency virus

<220>
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<400> 678

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Met Gly Ala Xaa Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
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Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Ile Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Ser Gln
        115                 120                 125


Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val
    130                 135                 140


His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile
145                 150                 155                 160
```

```
Glu Glu Lys Asn Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ala Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val
    210                 215                 220

Ala Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350
```

```
Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Asn Pro Ala Thr Val Met Val Gln Lys Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Gln Glu Gly His Gln Met Lys Asp Cys Ser Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460

Arg Phe Gly Glu Gly Thr Thr Thr His Pro Gln Lys Gln Glu Lys Gln
465                 470                 475                 480

Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu
                485                 490                 495

Phe Gly Asn Asp Pro Ser Ser Gln
            500
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<210> 679
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<400> 679

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Asp Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Gly Gly Cys Lys Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ala Leu Arg Thr Gly Ser Glu Glu Leu Thr Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Phe Cys Val His Gln Lys Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

```
Lys Lys Ala Gln Gln Ala Xaa Ala Asp Ala Gly Asn Lys Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Xaa Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Ile Ala Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Xaa Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Pro Ala Thr Val Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Ile Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Gln Tyr Pro Xaa Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495
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Pro Ser Ser Gln
500

<210> 680
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

<400> 680

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Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Asp Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Xaa Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110
```

```
Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Asn Gln Val
        115                 120                 125

Ser Arg Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Asn Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Xaa Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Val Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Xaa Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Xaa Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys His Ile Xaa Lys Ala
                325                 330                 335


Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350


Val Gly Gly Pro Ala His Xaa Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365


Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Leu Arg
    370                 375                 380


Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Arg Asn Cys Xaa Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser Pro Xaa Gly Xaa Pro Gly Asn Phe
        435                 440                 445


Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Xaa Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Pro Thr Xaa Pro Pro Gln Glu Leu Gly Gln Lys Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495
```

Pro Ser Ser Gln
500

<210> 681
<211> 505
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

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<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<400> 681

Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Xaa Gln Leu
50 55 60

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Xaa Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Ile Arg Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Gln Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Xaa Ser Gln Ala
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Xaa Gln Gly Gln Met Val His
    130                 135                 140


Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala
                165                 170                 175


Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190


Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205


Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220


Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240


Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255
```

```
Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Ala Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Val Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445
```

Leu Gln Ser Arg Pro Thr Ala Pro Pro Val Glu Pro Thr Ala Pro Pro
450 455 460

Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys
465 470 475 480

Gln Glu Leu Thr Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser
485 490 495

Leu Phe Gly Asn Asp Pro Leu Ser Gln
500 505

<210> 682
<211> 500
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

<400> 682

```
Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Thr Glu Xaa Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Lys Lys Ile Asp Val Arg Asp
                85                  90                  95
```

```
Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Ala Lys Ala Gln Gln Ala Ala Ala Gly Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Xaa Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Xaa Glu Xaa Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Xaa Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Xaa Asp Ile Lys Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Xaa Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Xaa Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Thr Ser Asn Ala Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Thr Lys Lys Xaa Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Xaa Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Arg Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Gln Ile Asp
465                 470                 475                 480
```

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 683
<211> 504
<212> PRT
<213> Human immunodeficiency virus

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<223> Xaa can be any naturally occurring amino acid

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<400> 683

Met Gly Ala Arg Ala Ser Val Leu Xaa Gly Gly Lys Leu Asp Arg Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Xaa Lys Lys Xaa Lys Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Xaa Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Xaa Ile Glu Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Asn Gln Val
115 120 125

```
Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gly Asp Leu Xaa Thr Met Leu Asn Ser Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Xaa His Xaa Val Xaa Ala Gly Pro Xaa Ala
    210                 215                 220

Pro Gly Gln Met Arg Xaa Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320
```

```
Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Thr Ser Asn Ala Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Gly Lys Xaa Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Arg Asn Cys Lys Xaa Pro Arg Lys Lys Gly Xaa Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Xaa Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Xaa Arg Xaa Glu Pro Thr Ala Pro Pro Ala Glu Pro Thr Ala
    450                 455                 460

Pro Pro Ala Glu Ser Phe Arg Phe Gly Glu Glu Thr Xaa Thr Pro Pro
465                 470                 475                 480

Gln Lys Gln Glu Ser Met Asp Lys Xaa Met Tyr Pro Leu Ala Ser Leu
                485                 490                 495

Arg Ser Leu Phe Gly Asn Asp Pro
            500
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<210> 684
<211> 500
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (278)..(278)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (446)..(446)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (471)..(471)
<223> Xaa can be any naturally occurring amino acid

<400> 684

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Val Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Lys Lys Ile Asp Val Lys Asp
85 90 95

```
Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Arg Lys Thr Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Xaa Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285
```

```
Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Arg Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Tyr Arg
    370                 375                 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Lys Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Leu Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Gln Lys Gly Arg Pro Xaa Asn Phe
        435                 440                 445

Pro Gln Gly Arg Leu Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Ser Gly Glu Glu Thr Thr Xaa Pro Asp Gln Lys Gln Glu Arg Thr Asp
465                 470                 475                 480
```

Lys Glu Met Tyr Pro Val Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Leu Ser Gln
500

<210> 685
<211> 507
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (431)..(431)
<223> Xaa can be any naturally occurring amino acid

<400> 685

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gly Gln Phe
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Asn Ile Glu Val Leu Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

```
Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Lys Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Pro Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Val
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300
```

```
Arg Ala Glu Gln Ala Ser Leu Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320


Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335


Leu Gly Pro Gly Ala Asn Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350


Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365


Gln Val Thr Gly Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Gly
    370                 375                 380


Asn Gln Arg Arg Ile Val Lys Cys Phe Asn Cys Gly Lys Asp Gly His
385                 390                 395                 400


Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Lys Glu Gly His Gln Met Lys Asp Cys Asp Gly Arg Gln Xaa Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Pro Thr Ala Pro
    450                 455                 460


Pro Ala Glu Ser Phe Gln Phe Gly Glu Glu Met Asn Pro Pro Gln Lys
465                 470                 475                 480


Gln Glu Gly Thr Asp Lys Gly Gln Gly Tyr Pro Pro Leu Ala Ser Leu
                485                 490                 495
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Lys Ser Leu Phe Gly Ser Asp Pro Leu Leu Gln
500 505

<210> 686
<211> 503
<212> PRT
<213> Human immunodeficiency virus

<220>
<221> misc_feature
<222> (435)..(435)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (470)..(470)
<223> Xaa can be any naturally occurring amino acid

<400> 686

Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Asp Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys

100 105 110

Gln Lys Thr Gln Gln Ala Ala Ala Ala Thr Gly Ser Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Ala Met Val His
130 135 140

Gln Pro Met Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Val Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Thr His Pro Val His Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Val
245 250 255

Gln Val Gly Glu Ile Tyr Lys Arg Trp Ile Val Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu

290 295 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Thr Ala Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Xaa Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Pro Pro Glu Glu
450 455 460

Ser Phe Arg Phe Gly Xaa Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu
465 470 475 480

Pro Ile Asp Lys Asp Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe

485 490 495

Gly Asn Asp Pro Ser Ser Gln
500

<210> 687
<211> 510
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (25)..(25)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (56)..(56)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (61)..(61)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (88)..(88)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (328)..(328)
<223> Xaa can be any naturally occurring amino acid

<400> 687

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Xaa Lys Lys Lys Tyr Lys Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Gly Xaa Cys Arg Gln Ile Xaa Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Xaa His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Arg Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Ser Asn Ser Asn Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val
    210                 215                 220
```

```
Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240


Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro
                245                 250                 255


Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270


Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285


Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Arg Thr
    290                 295                 300


Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320


Thr Leu Leu Val Gln Asn Ala Xaa Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335


Ala Leu Gly Pro Ala Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350


Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365


Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe
    370                 375                 380


Arg Ser Gln Gly Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400


His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415
```

Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
420 425 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
435 440 445

Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Gln Ser Arg Thr Glu
450 455 460

Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr
465 470 475 480

Thr Pro His Gln Lys Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu
485 490 495

Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
500 505 510

<210> 688
<211> 502
<212> PRT
<213> Human immunodeficiency virus

<220>
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<222> (165)..(165)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (179)..(179)
<223> Xaa can be any naturally occurring amino acid

<220>
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<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (190)..(190)

<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (201)..(201)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (231)..(231)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (242)..(242)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (245)..(245)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (247)..(247)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (279)..(279)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (309)..(309)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (313)..(313)
<223> Xaa can be any naturally occurring amino acid

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<222> (331)..(331)
<223> Xaa can be any naturally occurring amino acid

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<221> misc_feature
<222> (362)..(362)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (378)..(378)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (383)..(383)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (390)..(390)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (420)..(420)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (429)..(429)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (449)..(449)
<223> Xaa can be any naturally occurring amino acid

<220>
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<222> (475)..(475)
<223> Xaa can be any naturally occurring amino acid

<400> 688

Met Gly Ala Arg Ala Ser Val Leu Ser Ala Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Thr Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Lys Leu
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Lys Xaa Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
                165                 170                 175

Leu Ser Xaa Gly Xaa Thr Pro Gln Asp Leu Asn Thr Met Xaa Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Xaa Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro
    210                 215                 220
```

```
Val Ala Pro Gly Gln Leu Xaa Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Xaa Ser Asn Xaa Gln Xaa Gln Ile Ala Trp Met Thr His Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Xaa Ser Pro Ile Ser Ile Leu Glu Ile Arg
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Xaa Gln Ala Ser Xaa Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Xaa Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Ala His Lys Xaa Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Thr Asn Ser Asn Ala Xaa Met Met Gln Arg Xaa Asn
    370                 375                 380

Phe Arg Asn Gln Arg Xaa Pro Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
                405                 410                 415
```

```
Lys Cys Gly Xaa Glu Gly His Gln Met Lys Asp Cys Xaa Glu Arg Gln
            420                 425                 430


Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
        435                 440                 445


Xaa Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser
    450                 455                 460


Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Xaa Gln Lys Gln Gly Ala
465                 470                 475                 480


Ile Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly
                485                 490                 495


Asn Asp Pro Ser Ser Gln
            500


<210>  689
<211>  501
<212>  PRT
<213>  Human immunodeficiency virus

<400>  689

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60
```

```
Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Ser Lys Gln Gly Ser Gly Ser
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val
    130                 135                 140

His Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile
    210                 215                 220

Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro
                245                 250                 255
```

```
Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Ile Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Met Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Ser Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Arg Arg Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445
```

Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe
450 455 460

Lys Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Thr Gly
465 470 475 480

Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn
485 490 495

Asp Pro Leu Ser Gln
500

<210> 690
<211> 505
<212> PRT
<213> Human immunodeficiency virus

<400> 690

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Gln Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys

100 105 110

Lys Gln Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser Ser
115 120 125

Lys Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
130 135 140

Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145 150 155 160

Val Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
165 170 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
180 185 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
195 200 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro
210 215 220

Ile Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225 230 235 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Thr Trp Met Thr Asn Asn Pro
245 250 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Val Leu Gly Leu
260 265 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
275 280 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Arg

```
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Ser Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Val Asn Ser Ser Ala Ile Met Met Gln Arg Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala
            420                 425                 430

Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn
        435                 440                 445

Phe Leu Gln Ser Arg Pro Glu Ser Arg Pro Glu Pro Thr Ala Pro Pro
    450                 455                 460

Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys
465                 470                 475                 480

Gln Asp Thr Ile Glu Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser
```

485 490 495

Leu Phe Gly Ser Asp Pro Ser Ser Gln
500 505

<210> 691
<211> 500
<212> PRT
<213> Artificial Sequence

<220>
<223> Tailored vaccine antigen episensus sequence

<400> 691

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

```
Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320
```

```
Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln
            500
```

<210> 692
<211> 502
<212> PRT
<213> Artificial Sequence

<220>
<223> Tailored vaccine antigen 1 sequence

<400> 692

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Asn Ser
        115                 120                 125


Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met
    130                 135                 140


Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
```

```
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Ser
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr
305                 310                 315                 320

Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
```

340 345 350

Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala
355 360 365

Met Ser Gln Ala Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn
370 375 380

Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu
385 390 395 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
405 410 415

Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
420 425 430

Val Asn Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro
465 470 475 480

Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 693
<211> 500
<212> PRT
<213> Artificial Sequence

<220>
<223> Tailored vaccine antigen 2 sequence

<400> 693

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Pro Ala Ala Ala Asp Thr Gly Ser Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser
                165                 170                 175
```

```
Glu Gly Ala Thr Pro Gln Asp Leu Asn Leu Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365
```

```
Gln Ala Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380


Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400


Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415


Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430


Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445


Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
    450                 455                 460


Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480


Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495


Pro Ser Ser Gln
            500
```

<210> 694
<211> 502
<212> PRT
<213> Artificial Sequence

<220>
<223> Tailored vaccine antigen 3 sequence

<400> 694

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp
```

```
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Asn Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met
    130                 135                 140

Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn
```

195 200 205

Glu Glu Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro
210 215 220

Ile Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225 230 235 240

Thr Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro
245 250 255

Pro Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu
260 265 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
275 280 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
290 295 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305 310 315 320

Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu
325 330 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
340 345 350

Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala
355 360 365

Met Ser Gln Ala Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn
370 375 380

Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu

385 390 395 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp
405 410 415

Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro
465 470 475 480

Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Ser Gln
500

<210> 695
<211> 501
<212> PRT
<213> Artificial Sequence

<220>
<223> Tailored vaccine antigen 4 sequence

<400> 695

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

```
His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Val Gln Gln Ala Ala Ala Ala Asp Thr Gly Asn Ser Asn Gln
        115                 120                 125

Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val
    130                 135                 140

His Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile
145                 150                 155                 160

Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu
                165                 170                 175

Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Ile
            180                 185                 190

Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu
        195                 200                 205

Glu Ala Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val
    210                 215                 220
```

```
Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr
225                 230                 235                 240

Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro
                245                 250                 255

Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn
            260                 265                 270

Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr
    290                 295                 300

Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu
305                 310                 315                 320

Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys
                325                 330                 335

Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met
        355                 360                 365

Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe
    370                 375                 380

Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly
385                 390                 395                 400

His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys
                405                 410                 415
```

```
Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala
            420                 425                 430


Asn Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn
        435                 440                 445


Phe Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe
    450                 455                 460


Arg Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Pro Ile
465                 470                 475                 480


Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn
                485                 490                 495


Asp Pro Ser Ser Gln
            500
```

<210> 696
<211> 500
<212> PRT
<213> Artificial Sequence

<220>
<223> Tailored vaccine antigen 5 sequence

<400> 696

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
```

```
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile
```

245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Ala Thr Asn Pro Ala Thr Ile Met Met Gln Arg Gly Asn Phe Lys
370 375 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe

435 440 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 697
<211> 500
<212> PRT
<213> Artificial Sequence

<220>
<223> EpiGraph antigen 1 sequence

<400> 697

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

```
Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460
```

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 698
<211> 500
<212> PRT
<213> Artificial Sequence

<220>
<223> Epigraph cocktail antigen 1

<400> 698

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys

100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu

```
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
```

485 490 495

Pro Ser Ser Gln
500

<210> 699
<211> 502
<212> PRT
<213> Artificial Sequence

<220>
<223> Epigraph cocktail antigen 2

<400> 699

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Asn Ser
115 120 125

```
Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Leu Met Leu Asn Thr
            180                 185                 190

Val Gly Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly Pro
    210                 215                 220

Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225                 230                 235                 240

Thr Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro
                245                 250                 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu
            260                 265                 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys
        275                 280                 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Val Tyr Lys
    290                 295                 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305                 310                 315                 320
```

```
Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu
                325                 330                 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
            340                 345                 350

Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala
        355                 360                 365

Met Ser Gln Ala Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn
    370                 375                 380

Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu
385                 390                 395                 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
                405                 410                 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln
            420                 425                 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly
        435                 440                 445

Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser
    450                 455                 460

Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro
465                 470                 475                 480

Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly
                485                 490                 495

Asn Asp Pro Ser Ser Gln
            500
```

<210> 700
<211> 500
<212> PRT
<213> Artificial Sequence

<220>
<223> Epigraph cocktail antigen 3

<400> 700

```
Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Lys Trp Glu Lys
1               5                   10                  15


Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys His Leu
            20                  25                  30


Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro Gly Leu
        35                  40                  45


Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu Gln Pro
    50                  55                  60


Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn Thr Val
65                  70                  75                  80


Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp Thr Lys
                85                  90                  95


Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys Lys Lys
            100                 105                 110


Val Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Asn Gln Val Ser Gln
        115                 120                 125


Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His Gln Pro
    130                 135                 140


Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Asp Lys
```

```
145                 150                 155                 160

Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ala Ala Leu Ser Glu Gly
                165                 170                 175

Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Ile Gly Gly His
            180                 185                 190

Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu Ala Ala
        195                 200                 205

Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala Pro Gly
    210                 215                 220

Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr
225                 230                 235                 240

Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile Pro Val
                245                 250                 255

Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val
            260                 265                 270

Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys
        275                 280                 285

Glu Ser Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala
    290                 295                 300

Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu
305                 310                 315                 320

Val Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu Lys Ala Leu Gly
                325                 330                 335

Pro Ala Ala Thr Leu Glu Glu Met Met Ser Ala Cys Gln Gly Val Gly
```

340 345 350

Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser Gln Val
355 360 365

Thr Asn Ser Thr Ala Ile Met Met Gln Arg Gly Asn Phe Lys Asn Gln
370 375 380

Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Arg Glu Gly His Ile Ala
385 390 395 400

Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Arg
405 410 415

Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Leu Gln
500

<210> 701
<211> 705
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B gag/nef fusion Epigraph 1

<400> 701

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                  10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140


Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160


Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175
```

```
Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365
```

```
Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
    450                 455                 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465                 470                 475                 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
                485                 490                 495

Pro Ser Ser Gln Gly Gly Lys Trp Ser Lys Ser Ser Ile Val Gly Trp
            500                 505                 510

Pro Ala Val Arg Glu Arg Met Arg Arg Ala Glu Pro Ala Ala Glu Gly
        515                 520                 525

Val Gly Ala Val Ser Arg Asp Leu Glu Lys His Gly Ala Ile Thr Ser
    530                 535                 540

Ser Asn Thr Ala Ala Thr Asn Ala Asp Cys Ala Trp Leu Glu Ala Gln
545                 550                 555                 560
```

```
Glu Glu Glu Glu Val Gly Phe Pro Val Arg Pro Gln Val Pro Leu Arg
                565                 570                 575


Pro Met Thr Tyr Lys Gly Ala Leu Asp Leu Ser His Phe Leu Lys Glu
            580                 585                 590


Lys Gly Gly Leu Glu Gly Leu Ile Tyr Ser Gln Lys Arg Gln Asp Ile
        595                 600                 605


Leu Asp Leu Trp Val Tyr His Thr Gln Gly Tyr Phe Pro Asp Trp Gln
    610                 615                 620


Asn Tyr Thr Pro Gly Pro Gly Ile Arg Tyr Pro Leu Thr Phe Gly Trp
625                 630                 635                 640


Cys Phe Lys Leu Val Pro Val Glu Pro Glu Lys Val Glu Glu Ala Asn
                645                 650                 655


Glu Gly Glu Asn Asn Ser Leu Leu His Pro Met Ser Gln His Gly Met
            660                 665                 670


Asp Asp Pro Glu Lys Glu Val Leu Met Trp Lys Phe Asp Ser Arg Leu
        675                 680                 685


Ala Phe His His Met Ala Arg Glu Leu His Pro Glu Tyr Tyr Lys Asp
    690                 695                 700


Cys
705
```

<210> 702
<211> 706
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B gag/nef fusion Epigraph 2

<400> 702

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Asn Ser
115 120 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met
130 135 140

Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145 150 155 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
165 170 175

Leu Ser Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr

180 185 190

Ile Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn
195 200 205

Glu Glu Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro
210 215 220

Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly
225 230 235 240

Thr Thr Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn Pro
245 250 255

Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu
260 265 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys
275 280 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Arg
290 295 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305 310 315 320

Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu
325 330 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
340 345 350

Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala
355 360 365

Met Ser Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn

370 375 380

Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu
385 390 395 400

Gly His Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
405 410 415

Lys Cys Gly Lys Glu Gly His Gln Met Lys Glu Cys Thr Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser
450 455 460

Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu Pro
465 470 475 480

Ile Asp Lys Glu Met Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly
485 490 495

Asn Asp Pro Ser Gln Gly Gly Lys Trp Ser Lys Arg Ser Val Pro Gly
500 505 510

Trp Asn Thr Ile Arg Glu Arg Met Arg Arg Thr Glu Pro Ala Ala Glu
515 520 525

Gly Val Gly Ala Ala Ser Arg Asp Leu Glu Arg His Gly Ala Ile Thr
530 535 540

Ser Ser Asn Thr Ala Ala Asn Asn Ala Ala Cys Ala Trp Leu Glu Ala
545 550 555 560

Gln Glu Asp Glu Glu Val Gly Phe Pro Val Lys Pro Gln Val Pro Leu

565 570 575

Arg Pro Met Thr Tyr Lys Ala Ala Val Asp Leu Ser His Phe Leu Lys
580 585 590

Glu Lys Gly Gly Leu Glu Gly Leu Ile His Ser Gln Lys Arg Gln Glu
595 600 605

Ile Leu Asp Leu Trp Val Tyr Asn Thr Gln Gly Tyr Phe Pro Asp Trp
610 615 620

His Asn Tyr Thr Pro Gly Pro Gly Thr Arg Phe Pro Leu Thr Phe Gly
625 630 635 640

Trp Cys Phe Lys Leu Val Pro Val Asp Pro Glu Gln Val Glu Lys Ala
645 650 655

Asn Glu Gly Glu Asn Asn Cys Leu Leu His Pro Met Ser Leu His Gly
660 665 670

Met Asp Asp Pro Glu Arg Glu Val Leu Val Trp Lys Phe Asp Ser Arg
675 680 685

Leu Ala Phe His His Val Ala Arg Glu Lys His Pro Glu Tyr Tyr Lys
690 695 700

Asp Cys
705

<210> 703
<211> 992
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B pol Epigraph 1

<400> 703

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Met Phe Phe Arg Glu Asn Leu Ala Phe Pro Gln Gly Lys Ala Arg Glu
1               5                  10                  15

Phe Ser Ser Glu Gln Thr Arg Ala Asn Ser Pro Thr Arg Arg Glu Leu
            20                  25                  30

Gln Val Trp Gly Arg Asp Asn Asn Ser Leu Ser Glu Ala Gly Ala Asp
        35                  40                  45

Arg Gln Gly Thr Val Ser Phe Ser Phe Pro Gln Ile Thr Leu Trp Gln
    50                  55                  60

Arg Pro Leu Val Thr Ile Lys Ile Gly Gly Gln Leu Lys Glu Ala Leu
65                  70                  75                  80

Leu Ala Asp Asp Thr Val Leu Glu Glu Met Asn Leu Pro Gly Arg Trp
                85                  90                  95

Lys Pro Lys Met Ile Gly Gly Ile Gly Gly Phe Ile Lys Val Arg Gln
            100                 105                 110

Tyr Asp Gln Ile Pro Ile Glu Ile Cys Gly His Lys Ala Ile Gly Thr
        115                 120                 125

Val Leu Val Gly Pro Thr Pro Val Asn Ile Ile Gly Arg Asn Leu Leu
    130                 135                 140

Thr Gln Ile Gly Cys Thr Leu Asn Phe Pro Ile Ser Pro Ile Glu Thr
145                 150                 155                 160

Val Pro Val Lys Leu Lys Pro Gly Met Asp Gly Pro Lys Val Lys Gln
                165                 170                 175

Trp Pro Leu Thr Glu Glu Lys Ile Lys Ala Leu Val Glu Ile Cys Thr
            180                 185                 190
```

```
Glu Met Glu Lys Glu Gly Lys Ile Ser Lys Ile Gly Pro Glu Asn Pro
        195                 200                 205

Tyr Asn Thr Pro Val Phe Ala Ile Lys Lys Lys Asp Ser Thr Lys Trp
    210                 215                 220

Arg Lys Leu Val Asp Phe Arg Glu Leu Asn Lys Arg Thr Gln Asp Phe
225                 230                 235                 240

Trp Glu Val Gln Leu Gly Ile Pro His Pro Ala Gly Leu Lys Lys Lys
                245                 250                 255

Lys Ser Val Thr Val Leu Asp Val Gly Asp Ala Tyr Phe Ser Val Pro
            260                 265                 270

Leu Asp Lys Asp Phe Arg Lys Tyr Thr Ala Phe Thr Ile Pro Ser Ile
        275                 280                 285

Asn Asn Glu Thr Pro Gly Ile Arg Tyr Gln Tyr Asn Val Leu Pro Gln
    290                 295                 300

Gly Trp Lys Gly Ser Pro Ala Ile Phe Gln Ser Ser Met Thr Lys Ile
305                 310                 315                 320

Leu Glu Pro Phe Arg Lys Gln Asn Pro Asp Ile Val Ile Tyr Gln Leu
                325                 330                 335

Tyr Val Gly Ser Asp Leu Glu Ile Gly Gln His Arg Thr Lys Ile Glu
            340                 345                 350

Glu Leu Arg Gln His Leu Leu Arg Trp Gly Phe Thr Thr Pro Asp Lys
        355                 360                 365

Lys His Gln Lys Glu Pro Pro Phe Leu Trp Met Gly Tyr Glu Leu His
    370                 375                 380
```

```
Pro Asp Lys Trp Thr Val Gln Pro Ile Val Leu Pro Glu Lys Asp Ser
385                 390                 395                 400

Trp Thr Val Asn Asp Ile Gln Lys Leu Val Gly Lys Leu Asn Trp Ala
                405                 410                 415

Ser Gln Ile Tyr Ala Gly Ile Lys Val Lys Gln Leu Cys Lys Leu Leu
            420                 425                 430

Arg Gly Thr Lys Ala Leu Thr Glu Val Val Pro Leu Thr Glu Glu Ala
        435                 440                 445

Glu Leu Glu Leu Ala Glu Asn Arg Glu Ile Leu Lys Glu Pro Val His
    450                 455                 460

Gly Val Tyr Tyr Asp Pro Ser Lys Asp Leu Ile Ala Glu Ile Gln Lys
465                 470                 475                 480

Gln Gly Gln Gly Gln Trp Thr Tyr Gln Ile Tyr Gln Glu Pro Phe Lys
                485                 490                 495

Asn Leu Lys Thr Gly Lys Tyr Ala Arg Met Arg Gly Ala His Thr Asn
            500                 505                 510

Asp Val Lys Gln Leu Thr Glu Ala Val Gln Lys Ile Ala Thr Glu Ser
        515                 520                 525

Ile Val Ile Trp Gly Lys Thr Pro Lys Phe Lys Leu Pro Ile Gln Lys
    530                 535                 540

Glu Thr Trp Glu Ala Trp Trp Thr Glu Tyr Trp Gln Ala Thr Trp Ile
545                 550                 555                 560

Pro Glu Trp Glu Phe Val Asn Thr Pro Pro Leu Val Lys Leu Trp Tyr
                565                 570                 575
```

```
Gln Leu Glu Lys Glu Pro Ile Val Gly Ala Glu Thr Phe Tyr Val Asp
            580                 585                 590

Gly Ala Ala Asn Arg Glu Thr Lys Leu Gly Lys Ala Gly Tyr Val Thr
        595                 600                 605

Asp Arg Gly Arg Gln Lys Val Val Ser Leu Thr Asp Thr Thr Asn Gln
    610                 615                 620

Lys Thr Gln Ala Ile His Leu Ala Leu Gln Asp Ser Gly Leu Glu Val
625                 630                 635                 640

Asn Ile Val Thr Asp Ser Gln Tyr Ala Leu Gly Ile Ile Gln Ala Gln
                645                 650                 655

Pro Asp Lys Ser Glu Ser Glu Leu Val Ser Gln Ile Ile Glu Gln Leu
            660                 665                 670

Ile Lys Lys Glu Lys Val Tyr Leu Ala Trp Val Pro Ala His Lys Gly
        675                 680                 685

Ile Gly Gly Asn Glu Gln Val Asp Lys Leu Val Ser Ala Gly Ile Arg
    690                 695                 700

Lys Val Leu Phe Leu Asp Gly Ile Asp Lys Ala Gln Glu Glu His Glu
705                 710                 715                 720

Lys Tyr His Ser Asn Trp Arg Ala Met Ala Ser Asp Phe Asn Leu Pro
                725                 730                 735

Pro Val Val Ala Lys Glu Ile Val Ala Ser Cys Asp Lys Cys Gln Leu
            740                 745                 750

Lys Gly Glu Ala Met His Gly Gln Val Asp Cys Ser Pro Gly Ile Trp
        755                 760                 765
```

```
Gln Leu Cys Thr His Leu Glu Gly Lys Ile Ile Leu Val Ala Val His
    770                 775                 780

Val Ala Ser Gly Tyr Ile Glu Ala Glu Val Ile Pro Ala Glu Thr Gly
785                 790                 795                 800

Gln Glu Thr Ala Tyr Phe Leu Leu Lys Leu Ala Gly Arg Trp Pro Val
                805                 810                 815

Lys Thr Ile His Thr Asn Gly Ser Asn Phe Thr Ser Thr Thr Val Lys
            820                 825                 830

Ala Ala Cys Trp Trp Ala Gly Ile Lys Gln Glu Phe Gly Ile Pro Tyr
        835                 840                 845

Asn Pro Gln Ser Gln Gly Val Val Ser Met Asn Lys Glu Leu Lys Lys
    850                 855                 860

Ile Ile Gly Gln Val Arg Asp Gln Ala Glu His Leu Lys Thr Ala Val
865                 870                 875                 880

Gln Met Ala Val Phe Ile His Asn Phe Lys Arg Lys Gly Gly Ile Gly
                885                 890                 895

Gly Tyr Ser Ala Gly Glu Arg Ile Val Asp Ile Ile Ala Thr Asp Ile
            900                 905                 910

Gln Thr Lys Glu Leu Gln Lys Gln Ile Thr Lys Ile Gln Asn Phe Arg
        915                 920                 925

Val Tyr Tyr Arg Asp Ser Arg Asp Pro Leu Trp Lys Gly Pro Ala Lys
    930                 935                 940

Leu Leu Trp Lys Gly Glu Gly Ala Val Val Ile Gln Asp Asn Ser Asp
945                 950                 955                 960
```

Ile Lys Val Val Pro Arg Arg Lys Ala Lys Ile Ile Arg Asp Tyr Gly
965 970 975

Lys Gln Met Ala Gly Asp Asp Cys Val Ala Ser Arg Gln Asp Glu Asp
980 985 990

<210> 704
<211> 993
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B pol Epigraph 2

<400> 704

Met Phe Phe Arg Glu Asp Leu Ala Phe Pro Gln Gly Glu Ala Arg Glu
1 5 10 15

Phe Pro Ser Glu Gln Thr Arg Ala Asn Ser Pro Thr Ser Arg Glu Leu
20 25 30

Gln Val Trp Gly Gly Asp Asn Asn Ser Pro Ser Glu Ala Gly Ala Asp
35 40 45

Arg Gln Gly Thr Val Ser Leu Ser Phe Pro Gln Ile Thr Leu Trp Gln
50 55 60

Arg Pro Leu Val Thr Val Lys Ile Gly Gly Gln Leu Lys Glu Ala Leu
65 70 75 80

Leu Ala Asp Asp Thr Val Leu Glu Glu Met Ser Leu Pro Gly Lys Trp
85 90 95

Lys Pro Lys Met Ile Gly Gly Ile Gly Gly Phe Ile Lys Val Arg Gln
100 105 110

Tyr Asp Gln Val Pro Ile Glu Ile Cys Gly His Lys Thr Ile Gly Thr

115 120 125

Val Leu Ile Gly Pro Thr Pro Val Asn Ile Ile Gly Arg Asn Leu Leu
130 135 140

Thr Gln Leu Gly Cys Thr Leu Asn Phe Pro Ile Ser Pro Ile Glu Thr
145 150 155 160

Val Pro Val Lys Leu Lys Pro Gly Met Asp Gly Pro Arg Val Lys Gln
165 170 175

Trp Pro Leu Thr Glu Glu Lys Ile Lys Ala Leu Ile Glu Ile Cys Thr
180 185 190

Glu Met Glu Lys Glu Gly Lys Ile Ser Arg Ile Gly Pro Glu Asn Pro
195 200 205

Tyr Asn Thr Pro Ile Phe Ala Ile Lys Lys Lys Asp Ser Thr Lys Trp
210 215 220

Arg Lys Leu Val Asp Phe Arg Glu Leu Asn Lys Lys Thr Gln Asp Phe
225 230 235 240

Trp Glu Val Gln Leu Gly Ile Pro His Pro Ser Gly Leu Lys Lys Lys
245 250 255

Lys Ser Val Thr Val Leu Asp Val Gly Asp Ala Tyr Phe Ser Val Pro
260 265 270

Leu Asp Lys Glu Phe Arg Lys Tyr Thr Ala Phe Thr Ile Pro Ser Thr
275 280 285

Asn Asn Glu Thr Pro Gly Ile Arg Tyr Gln Tyr Asn Val Leu Pro Gln
290 295 300

Gly Trp Lys Gly Ser Pro Ala Ile Phe Gln Cys Ser Met Thr Lys Ile

305 310 315 320

Leu Glu Pro Phe Arg Lys Gln Asn Pro Glu Ile Val Ile Tyr Gln Leu
325 330 335

Tyr Val Gly Ser Asp Leu Glu Ile Gly Gln His Arg Ala Lys Ile Glu
340 345 350

Glu Leu Arg Gln His Leu Leu Lys Trp Gly Phe Thr Thr Pro Asp Lys
355 360 365

Lys His Gln Lys Glu Pro Pro Phe Leu Trp Met Gly Tyr Glu Leu His
370 375 380

Pro Asp Lys Trp Thr Val Gln Pro Ile Glu Leu Pro Glu Lys Asp Ser
385 390 395 400

Trp Thr Val Asn Asp Ile Gln Lys Leu Val Gly Lys Leu Asn Trp Ala
405 410 415

Ser Gln Ile Tyr Pro Gly Ile Lys Val Arg Gln Leu Cys Lys Leu Leu
420 425 430

Arg Gly Ala Lys Ala Leu Thr Glu Val Ile Pro Leu Thr Lys Glu Ala
435 440 445

Glu Leu Glu Leu Ala Glu Asn Arg Glu Ile Leu Arg Glu Pro Val His
450 455 460

Gly Val Tyr Tyr Asp Pro Thr Lys Asp Leu Ile Ala Glu Ile Gln Lys
465 470 475 480

Gln Gly Leu Gly Gln Trp Thr Tyr Gln Ile Tyr Gln Glu Pro Phe Lys
485 490 495

Asn Leu Lys Thr Gly Lys Tyr Ala Arg Thr Arg Gly Ala His Thr Asn

```
            500                 505                 510

Asp Val Arg Gln Leu Thr Glu Ala Val Gln Lys Ile Thr Thr Glu Ser
        515                 520                 525

Ile Val Ile Trp Gly Lys Thr Pro Lys Phe Arg Leu Pro Ile Gln Lys
    530                 535                 540

Glu Thr Trp Glu Thr Trp Trp Thr Glu Tyr Trp Gln Ala Thr Trp Ile
545                 550                 555                 560

Pro Glu Trp Glu Phe Val Asn Thr Pro Pro Leu Val Lys Leu Trp Tyr
                565                 570                 575

Gln Leu Glu Lys Glu Pro Ile Ile Gly Ala Glu Thr Phe Tyr Val Asp
            580                 585                 590

Gly Ala Ser Asn Arg Glu Thr Lys Leu Gly Lys Ala Gly Tyr Val Thr
        595                 600                 605

Asn Arg Gly Arg Gln Lys Val Ile Ser Leu Thr Asp Thr Thr Asn Gln
    610                 615                 620

Lys Thr Leu Gln Ala Ile Tyr Leu Ala Leu Gln Asp Ser Gly Ser Glu
625                 630                 635                 640

Val Asn Ile Val Thr Asp Ser Gln Tyr Ala Leu Gly Ile Ile Gln Ala
                645                 650                 655

Gln Pro Asp Gln Ser Glu Ser Glu Leu Val Asn Gln Ile Ile Glu Gln
            660                 665                 670

Leu Ile Asn Lys Glu Lys Val Tyr Leu Ala Trp Val Pro Ala His Lys
        675                 680                 685

Gly Ile Gly Gly Asn Glu Gln Val Asp Lys Leu Val Ser Thr Gly Ile
```

690 695 700

Arg Lys Val Leu Phe Leu Asp Gly Ile Asp Arg Ala Gln Glu Glu His
705 710 715 720

Glu Lys Tyr His Asn Asn Trp Arg Ala Met Ala Ser Asp Phe Asn Leu
725 730 735

Pro Pro Ile Val Ala Lys Glu Ile Val Ala Ser Cys Asp Lys Cys Gln
740 745 750

Leu Lys Gly Glu Ala Ile His Gly Gln Val Asp Cys Ser Pro Gly Ile
755 760 765

Trp Gln Leu Cys Thr His Leu Glu Gly Lys Val Ile Leu Val Ala Val
770 775 780

His Val Ala Ser Gly Tyr Ile Glu Ala Glu Val Ile Pro Ala Glu Thr
785 790 795 800

Gly Gln Glu Thr Ala Tyr Phe Ile Leu Lys Leu Ala Gly Arg Trp Pro
805 810 815

Val Lys Thr Val His Thr Asn Gly Ser Asn Phe Thr Ser Ala Thr Val
820 825 830

Lys Ala Ala Cys Trp Trp Ala Gly Val Lys Gln Glu Phe Gly Ile Pro
835 840 845

Tyr Asn Pro Gln Ser Gln Gly Val Val Ser Met Asn Asn Glu Leu Lys
850 855 860

Lys Ile Ile Gly Gln Ile Arg Asp Gln Ala Glu His Leu Lys Thr Ala
865 870 875 880

Val Gln Met Ala Val Phe Ile His Asn Phe Lys Arg Lys Gly Gly Ile

885 890 895

Gly Glu Tyr Ser Ala Gly Glu Arg Ile Ile Asp Ile Ile Ala Thr Asp
900 905 910

Ile Gln Thr Arg Glu Leu Gln Lys Gln Ile Thr Lys Ile Gln Asn Phe
915 920 925

Arg Val Tyr Tyr Arg Asp Asn Arg Asp Pro Leu Trp Lys Gly Pro Ala
930 935 940

Lys Leu Leu Trp Lys Gly Glu Gly Ala Val Val Ile Gln Asp Asn Ser
945 950 955 960

Glu Ile Lys Val Val Pro Arg Arg Lys Val Lys Ile Ile Arg Asp Tyr
965 970 975

Gly Lys Gln Met Ala Gly Asp Asp Cys Val Ala Gly Arg Gln Asp Glu
980 985 990

Asp

<210> 705
<211> 704
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M gag/nef fusion Epigraph 1

<400> 705

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Ala Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

```
His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
    210                 215                 220
```

```
Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Gly Gln Lys Arg Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415
```

```
Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
    450                 455                 460

Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys
465                 470                 475                 480

Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
                485                 490                 495

Leu Ser Gln Gly Gly Lys Trp Ser Lys Ser Ser Ile Val Gly Trp Pro
            500                 505                 510

Ala Val Arg Glu Arg Met Arg Arg Ala Glu Pro Ala Ala Glu Gly Val
        515                 520                 525

Gly Ala Val Ser Arg Asp Leu Glu Lys His Gly Ala Ile Thr Ser Ser
    530                 535                 540

Asn Thr Ala Ala Thr Asn Ala Asp Cys Ala Trp Leu Glu Ala Gln Glu
545                 550                 555                 560

Glu Glu Glu Val Gly Phe Pro Val Arg Pro Gln Val Pro Leu Arg Pro
                565                 570                 575

Met Thr Tyr Lys Gly Ala Leu Asp Leu Ser His Phe Leu Lys Glu Lys
            580                 585                 590

Gly Gly Leu Glu Gly Leu Ile Tyr Ser Lys Lys Arg Gln Glu Ile Leu
        595                 600                 605
```

```
Asp Leu Trp Val Tyr His Thr Gln Gly Tyr Phe Pro Asp Trp Gln Asn
    610                 615                 620


Tyr Thr Pro Gly Pro Gly Ile Arg Tyr Pro Leu Thr Phe Gly Trp Cys
625                 630                 635                 640


Phe Lys Leu Val Pro Val Asp Pro Arg Glu Val Glu Glu Ala Asn Glu
                645                 650                 655


Gly Glu Asn Asn Cys Leu Leu His Pro Met Ser Gln His Gly Met Asp
            660                 665                 670


Asp Pro Glu Lys Glu Val Leu Met Trp Lys Phe Asp Ser Arg Leu Ala
        675                 680                 685


Phe His His Met Ala Arg Glu Leu His Pro Glu Tyr Tyr Lys Asp Cys
    690                 695                 700


<210>  706
<211>  314
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  HIV M gag/nef conserved Epigraph 1

<400>  706

Met Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala Ile
1               5                   10                  15


Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala
            20                  25                  30


Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly Ala
        35                  40                  45


Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln
```

50 55 60

Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu
65 70 75 80

Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln
85 90 95

Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu
100 105 110

Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro Val Gly
115 120 125

Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg
130 135 140

Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu
145 150 155 160

Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu
165 170 175

Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val
180 185 190

Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro
195 200 205

Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly
210 215 220

Pro Gly His Lys Ala Arg Val Leu Val Gly Phe Pro Val Arg Pro Gln
225 230 235 240

Val Pro Leu Arg Pro Met Thr Tyr Lys Gly Ala Leu Asp Leu Ser His

245 250 255

Phe Leu Lys Glu Lys Gly Gly Leu Glu Gly Leu Ile Tyr Ser Lys Lys
260 265 270

Arg Gln Glu Ile Leu Asp Leu Trp Val Tyr His Thr Gln Gly Tyr Phe
275 280 285

Pro Asp Trp Gln Asn Tyr Thr Pro Gly Pro Gly Ile Arg Tyr Pro Leu
290 295 300

Thr Phe Gly Trp Cys Phe Lys Leu Val Pro
305 310

<210> 707
<211> 701
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M gag/nef fusion Epigraph 2

<400> 707

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Gln Gln Ile Ile Glu Gln Leu
50 55 60

Gln Ser Thr Leu Lys Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

```
Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Gln
            100                 105                 110

Gln Lys Thr Gln Gln Ala Ala Ala Gly Thr Gly Ser Ser Ser Lys Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ala Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Met Met Leu Asn Ile Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Pro
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
            260                 265                 270
```

```
Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Asp Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
    370                 375                 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385                 390                 395                 400

Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
                405                 410                 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn
            420                 425                 430

Phe Leu Gly Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro Gly Asn Phe
        435                 440                 445

Pro Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
    450                 455                 460
```

```
Phe Glu Glu Thr Thr Pro Ala Pro Lys Gln Glu Pro Lys Asp Arg Glu
465                 470                 475                 480

Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Ser Asp Pro Leu Ser Gln
                485                 490                 495

Gly Ser Lys Trp Ser Lys Ser Ser Ile Val Gly Trp Pro Ala Ile Arg
            500                 505                 510

Glu Arg Met Arg Arg Thr Glu Pro Ala Ala Glu Gly Val Gly Ala Ala
        515                 520                 525

Ser Arg Asp Leu Glu Arg His Gly Ala Ile Thr Ser Ser Asn Thr Ala
    530                 535                 540

Ala Asn Asn Ala Asp Cys Ala Trp Leu Glu Ala Gln Glu Asp Glu Glu
545                 550                 555                 560

Val Gly Phe Pro Val Lys Pro Gln Val Pro Leu Arg Pro Met Thr Tyr
                565                 570                 575

Lys Ala Ala Phe Asp Leu Ser Phe Phe Leu Lys Glu Lys Gly Gly Leu
            580                 585                 590

Asp Gly Leu Ile Tyr Ser Gln Lys Arg Gln Asp Ile Leu Asp Leu Trp
        595                 600                 605

Val Tyr Asn Thr Gln Gly Phe Phe Pro Asp Trp Gln Asn Tyr Thr Pro
    610                 615                 620

Gly Pro Gly Val Arg Tyr Pro Leu Thr Phe Gly Trp Cys Phe Lys Leu
625                 630                 635                 640

Val Pro Val Glu Pro Glu Lys Val Glu Glu Ala Asn Glu Gly Glu Asn
                645                 650                 655
```

Asn Ser Leu Leu His Pro Met Ser Leu His Gly Met Asp Asp Pro Glu
660 665 670

Arg Glu Val Leu Met Trp Lys Phe Asp Ser Ser Leu Ala Arg Arg His
675 680 685

Met Ala Arg Glu Leu His Pro Glu Phe Tyr Lys Asp Cys
690 695 700

<210> 708
<211> 314
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M gag/nef conserved Epigraph 2

<400> 708

Met Pro Ile Val Gln Asn Ala Gln Gly Gln Met Val His Gln Pro Leu
1 5 10 15

Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala
20 25 30

Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala
35 40 45

Thr Pro Gln Asp Leu Asn Met Met Leu Asn Ile Val Gly Gly His Gln
50 55 60

Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu Ala Ala Glu
65 70 75 80

Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Pro Pro Gly Gln
85 90 95

Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu

100 105 110

Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile Pro Val Gly
115 120 125

Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg
130 135 140

Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu
145 150 155 160

Pro Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Thr Leu Arg Ala Glu
165 170 175

Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Asp Thr Leu Leu Val
180 185 190

Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg Ala Leu Gly Pro
195 200 205

Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly
210 215 220

Pro Ser His Lys Ala Arg Val Leu Val Gly Phe Pro Val Lys Pro Gln
225 230 235 240

Val Pro Leu Arg Pro Met Thr Tyr Lys Ala Ala Phe Asp Leu Ser Phe
245 250 255

Phe Leu Lys Glu Lys Gly Gly Leu Asp Gly Leu Ile Tyr Ser Gln Lys
260 265 270

Arg Gln Asp Ile Leu Asp Leu Trp Val Tyr Asn Thr Gln Gly Phe Phe
275 280 285

Pro Asp Trp Gln Asn Tyr Thr Pro Gly Pro Gly Val Arg Tyr Pro Leu

290 295 300

Thr Phe Gly Trp Cys Phe Lys Leu Val Pro
305 310

<210> 709
<211> 994
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M pol Epigraph 1

<400> 709

Met Phe Phe Arg Glu Asn Leu Ala Phe Pro Gln Gly Glu Ala Arg Glu
1 5 10 15

Phe Ser Ser Glu Gln Thr Arg Ala Asn Ser Pro Thr Arg Arg Glu Leu
20 25 30

Gln Val Trp Gly Arg Asp Asn Asn Ser Leu Ser Glu Ala Gly Ala Asp
35 40 45

Arg Gln Gly Thr Val Ser Phe Ser Phe Pro Gln Ile Thr Leu Trp Gln
50 55 60

Arg Pro Leu Val Thr Ile Lys Ile Gly Gly Gln Leu Lys Glu Ala Leu
65 70 75 80

Leu Ala Asp Asp Thr Val Leu Glu Asp Ile Asn Leu Pro Gly Lys Trp
85 90 95

Lys Pro Lys Met Ile Gly Gly Ile Gly Gly Phe Ile Lys Val Arg Gln
100 105 110

Tyr Asp Gln Ile Leu Ile Glu Ile Cys Gly Lys Lys Ala Ile Gly Thr
115 120 125

```
Val Leu Val Gly Pro Thr Pro Val Asn Ile Ile Gly Arg Asn Leu Leu
    130                 135                 140

Thr Gln Ile Gly Cys Thr Leu Asn Phe Pro Ile Ser Pro Ile Glu Thr
145                 150                 155                 160

Val Pro Val Lys Leu Lys Pro Gly Met Asp Gly Pro Lys Val Lys Gln
                165                 170                 175

Trp Pro Leu Thr Glu Glu Lys Ile Lys Ala Leu Val Glu Ile Cys Thr
            180                 185                 190

Glu Met Glu Lys Glu Gly Lys Ile Ser Lys Ile Gly Pro Glu Asn Pro
        195                 200                 205

Tyr Asn Thr Pro Val Phe Ala Ile Lys Lys Lys Asp Ser Thr Lys Trp
    210                 215                 220

Arg Lys Leu Val Asp Phe Arg Glu Leu Asn Lys Arg Thr Gln Asp Phe
225                 230                 235                 240

Trp Glu Val Gln Leu Gly Ile Pro His Pro Ala Gly Leu Lys Lys Lys
                245                 250                 255

Lys Ser Val Thr Val Leu Asp Val Gly Asp Ala Tyr Phe Ser Val Pro
            260                 265                 270

Leu Asp Lys Asp Phe Arg Lys Tyr Thr Ala Phe Thr Ile Pro Ser Ile
        275                 280                 285

Asn Asn Glu Thr Pro Gly Ile Arg Tyr Gln Tyr Asn Val Leu Pro Gln
    290                 295                 300

Gly Trp Lys Gly Ser Pro Ala Ile Phe Gln Ser Ser Met Thr Lys Ile
305                 310                 315                 320
```

```
Leu Glu Pro Phe Arg Lys Gln Asn Pro Asp Ile Val Ile Tyr Gln Leu
                325                 330                 335

Tyr Val Gly Ser Asp Leu Glu Ile Gly Gln His Arg Thr Lys Ile Glu
            340                 345                 350

Glu Leu Arg Gln His Leu Leu Lys Trp Gly Phe Thr Thr Pro Asp Lys
        355                 360                 365

Lys His Gln Lys Glu Pro Pro Phe Leu Trp Met Gly Tyr Glu Leu His
    370                 375                 380

Pro Asp Lys Trp Thr Val Gln Pro Ile Val Leu Pro Glu Lys Asp Ser
385                 390                 395                 400

Trp Thr Val Asn Asp Ile Gln Lys Leu Val Gly Lys Leu Asn Trp Ala
                405                 410                 415

Ser Gln Ile Tyr Pro Gly Ile Lys Val Lys Gln Leu Cys Lys Leu Leu
            420                 425                 430

Arg Gly Ala Lys Ala Leu Thr Asp Ile Val Pro Leu Thr Glu Glu Ala
        435                 440                 445

Glu Leu Glu Leu Ala Glu Asn Arg Glu Ile Leu Lys Glu Pro Val His
    450                 455                 460

Gly Val Tyr Tyr Asp Pro Ser Lys Asp Leu Ile Ala Glu Ile Gln Lys
465                 470                 475                 480

Gln Gly Gln Asp Gln Trp Thr Tyr Gln Ile Tyr Gln Glu Pro Phe Lys
                485                 490                 495

Asn Leu Lys Thr Gly Lys Tyr Ala Arg Met Arg Gly Ala His Thr Asn
            500                 505                 510
```

```
Asp Val Lys Gln Leu Thr Glu Ala Val Gln Lys Ile Ala Thr Glu Ser
        515                 520                 525

Ile Val Ile Trp Gly Lys Thr Pro Lys Phe Arg Leu Pro Ile Gln Lys
    530                 535                 540

Glu Thr Trp Glu Thr Trp Trp Thr Glu Tyr Trp Gln Ala Thr Trp Ile
545                 550                 555                 560

Pro Glu Trp Glu Phe Val Asn Thr Pro Pro Leu Val Lys Leu Trp Tyr
                565                 570                 575

Gln Leu Glu Lys Glu Pro Ile Val Gly Ala Glu Thr Phe Tyr Val Asp
            580                 585                 590

Gly Ala Ala Asn Arg Glu Thr Lys Leu Gly Lys Ala Gly Tyr Val Thr
        595                 600                 605

Asp Arg Gly Arg Gln Lys Val Val Ser Leu Thr Glu Thr Thr Asn Gln
    610                 615                 620

Lys Thr Leu Gln Ala Ile His Leu Ala Leu Gln Asp Ser Gly Ser Glu
625                 630                 635                 640

Val Asn Ile Val Thr Asp Ser Gln Tyr Ala Leu Gly Ile Ile Gln Ala
                645                 650                 655

Gln Pro Asp Lys Ser Glu Ser Glu Leu Val Asn Gln Ile Ile Glu Gln
            660                 665                 670

Leu Ile Lys Lys Glu Lys Val Tyr Leu Ser Trp Val Pro Ala His Lys
        675                 680                 685

Gly Ile Gly Gly Asn Glu Gln Val Asp Lys Leu Val Ser Ser Gly Ile
    690                 695                 700
```

```
Arg Lys Val Leu Phe Leu Asp Gly Ile Asp Lys Ala Gln Glu Glu His
705                 710                 715                 720


Glu Lys Tyr His Ser Asn Trp Arg Ala Met Ala Ser Asp Phe Asn Leu
                725                 730                 735


Pro Pro Ile Val Ala Lys Glu Ile Val Ala Ser Cys Asp Lys Cys Gln
            740                 745                 750


Leu Lys Gly Glu Ala Met His Gly Gln Val Asp Cys Ser Pro Gly Ile
        755                 760                 765


Trp Gln Leu Cys Thr His Leu Glu Gly Lys Val Ile Leu Val Ala Val
    770                 775                 780


His Val Ala Ser Gly Tyr Ile Glu Ala Glu Val Ile Pro Ala Glu Thr
785                 790                 795                 800


Gly Gln Glu Thr Ala Tyr Phe Leu Leu Lys Leu Ala Gly Arg Trp Pro
                805                 810                 815


Val Lys Val Ile His Thr Asn Gly Ser Asn Phe Thr Ser Ala Ala Val
            820                 825                 830


Lys Ala Ala Cys Trp Trp Ala Gly Ile Lys Gln Glu Phe Gly Ile Pro
        835                 840                 845


Tyr Asn Pro Gln Ser Gln Gly Val Val Ser Met Asn Lys Glu Leu Lys
    850                 855                 860


Lys Ile Ile Gly Gln Val Arg Asp Gln Ala Glu His Leu Lys Thr Ala
865                 870                 875                 880


Val Gln Met Ala Val Phe Ile His Asn Phe Lys Arg Lys Gly Gly Ile
                885                 890                 895
```

Gly Gly Tyr Ser Ala Gly Glu Arg Ile Ile Asp Ile Ile Ala Thr Asp
900 905 910

Ile Gln Thr Lys Glu Leu Gln Lys Gln Ile Thr Lys Ile Gln Asn Phe
915 920 925

Arg Val Tyr Tyr Arg Asp Ser Arg Asp Pro Ile Trp Lys Gly Pro Ala
930 935 940

Lys Leu Leu Trp Lys Gly Glu Gly Ala Val Val Ile Gln Asp Asn Ser
945 950 955 960

Asp Ile Lys Val Val Pro Arg Arg Lys Ala Lys Ile Ile Arg Asp Tyr
965 970 975

Gly Lys Gln Met Ala Gly Asp Asp Cys Val Ala Gly Arg Gln Asp Glu
980 985 990

Asp Gln

<210> 710
<211> 599
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M pol conserved Epigraph 1

<400> 710

Met Pro Gln Ile Thr Leu Trp Gln Arg Pro Leu Val Thr Ile Lys Ile
1 5 10 15

Gly Gly Gln Leu Lys Glu Ala Leu Leu Ala Asp Asp Thr Val Leu Glu
20 25 30

Asp Ile Asn Leu Pro Gly Lys Trp Lys Pro Lys Met Ile Gly Gly Ile

```
        35                  40                  45

Gly Gly Phe Ile Lys Val Arg Gln Tyr Asp Gln Ile Leu Ile Glu Ile
    50                  55                  60

Cys Gly Lys Lys Ala Ile Gly Thr Val Leu Val Gly Pro Thr Pro Val
65                  70                  75                  80

Asn Ile Ile Gly Arg Asn Leu Leu Thr Gln Ile Gly Cys Thr Leu Asn
                85                  90                  95

Phe Pro Ile Ser Pro Ile Glu Thr Val Pro Val Lys Leu Lys Pro Gly
            100                 105                 110

Met Asp Gly Pro Lys Val Lys Gln Trp Pro Leu Thr Glu Glu Lys Ile
        115                 120                 125

Lys Ala Leu Val Glu Ile Cys Thr Glu Met Glu Lys Glu Gly Lys Ile
    130                 135                 140

Ser Lys Ile Gly Pro Glu Asn Pro Tyr Asn Thr Pro Val Phe Ala Ile
145                 150                 155                 160

Lys Lys Lys Asp Ser Thr Lys Trp Arg Lys Leu Val Asp Phe Arg Glu
                165                 170                 175

Leu Asn Lys Arg Thr Gln Asp Phe Trp Glu Val Gln Leu Gly Ile Pro
            180                 185                 190

His Pro Ala Gly Leu Lys Lys Lys Lys Ser Val Thr Val Leu Asp Val
        195                 200                 205

Gly Asp Ala Tyr Phe Ser Val Pro Leu Asp Lys Asp Phe Arg Lys Tyr
    210                 215                 220

Thr Ala Phe Thr Ile Pro Ser Ile Asn Asn Glu Thr Pro Gly Ile Arg
```

225 230 235 240

Tyr Gln Tyr Asn Val Leu Pro Gln Gly Trp Lys Gly Ser Pro Ala Ile
245 250 255

Phe Gln Ser Ser Met Thr Lys Ile Leu Glu Pro Phe Arg Lys Gln Asn
260 265 270

Pro Asp Ile Val Ile Tyr Gln Leu Tyr Val Gly Ser Asp Leu Glu Ile
275 280 285

Gly Gln His Arg Thr Lys Ile Glu Glu Leu Arg Gln His Leu Leu Lys
290 295 300

Trp Gly Phe Thr Thr Pro Asp Lys Lys His Gln Lys Glu Pro Pro Phe
305 310 315 320

Leu Trp Met Gly Tyr Glu Leu His Pro Asp Lys Trp Thr Val Gln Pro
325 330 335

Ile Val Leu Pro Glu Lys Asp Ser Trp Thr Val Asn Asp Ile Gln Lys
340 345 350

Leu Val Gly Lys Leu Asn Trp Ala Ser Gln Ile Tyr His Gly Gln Val
355 360 365

Asp Cys Ser Pro Gly Ile Trp Gln Leu Cys Thr His Leu Glu Gly Lys
370 375 380

Val Ile Leu Val Ala Val His Val Ala Ser Gly Tyr Ile Glu Ala Glu
385 390 395 400

Val Ile Pro Ala Glu Thr Gly Gln Glu Thr Ala Tyr Phe Leu Leu Lys
405 410 415

Leu Ala Gly Arg Trp Pro Val Lys Val Ile His Thr Asn Gly Ser Asn

420 425 430

Phe Thr Ser Ala Ala Val Lys Ala Ala Cys Trp Trp Ala Gly Ile Lys
435 440 445

Gln Glu Phe Gly Ile Pro Tyr Asn Pro Gln Ser Gln Gly Val Val Ser
450 455 460

Met Asn Lys Glu Leu Lys Lys Ile Ile Gly Gln Val Arg Asp Gln Ala
465 470 475 480

Glu His Leu Lys Thr Ala Val Gln Met Ala Val Phe Ile His Asn Phe
485 490 495

Lys Arg Lys Gly Gly Ile Gly Gly Tyr Ser Ala Gly Glu Arg Ile Ile
500 505 510

Asp Ile Ile Ala Thr Asp Ile Gln Thr Lys Leu Gln Lys Gln Ile Thr
515 520 525

Lys Ile Gln Asn Phe Arg Val Tyr Tyr Arg Asp Ser Arg Asp Pro Ile
530 535 540

Trp Lys Gly Pro Ala Lys Leu Leu Trp Lys Gly Glu Gly Ala Val Val
545 550 555 560

Ile Gln Asp Asn Ser Asp Ile Lys Val Val Pro Arg Arg Lys Ala Lys
565 570 575

Ile Ile Arg Asp Tyr Gly Lys Gln Met Ala Gly Asp Asp Cys Val Ala
580 585 590

Gly Arg Gln Asp Glu Asp Gln
595

<210> 711

<211> 993
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M pol Epigraph 2

<400> 711

```
Met Phe Phe Arg Glu Asp Leu Ala Phe Pro Gln Gly Lys Ala Arg Glu
1               5                  10                  15


Phe Pro Ser Glu Gln Thr Arg Ala Asn Ser Pro Thr Arg Gly Glu Leu
            20                  25                  30


Gln Val Trp Gly Gly Asp Asn Asn Ser Pro Ser Glu Ala Gly Ala Asp
        35                  40                  45


Arg Gln Gly Thr Val Ser Phe Ser Phe Pro Gln Ile Thr Leu Trp Gln
    50                  55                  60


Arg Pro Leu Val Ser Ile Lys Val Gly Gly Gln Ile Lys Glu Ala Leu
65                  70                  75                  80


Leu Ala Asp Asp Thr Val Leu Glu Glu Met Asn Leu Pro Gly Arg Trp
                85                  90                  95


Lys Pro Lys Met Ile Gly Gly Ile Gly Gly Phe Ile Lys Val Arg Gln
            100                 105                 110


Tyr Asp Gln Ile Pro Ile Glu Ile Cys Gly His Lys Ala Ile Gly Thr
        115                 120                 125


Val Leu Ile Gly Pro Thr Pro Val Asn Ile Ile Gly Arg Asn Met Leu
    130                 135                 140


Thr Gln Leu Gly Cys Thr Leu Asn Phe Pro Ile Ser Pro Ile Asp Thr
145                 150                 155                 160
```

```
Val Pro Val Thr Leu Lys Pro Gly Met Asp Gly Pro Arg Val Lys Gln
                165                 170                 175

Trp Pro Leu Thr Glu Glu Lys Ile Lys Ala Leu Thr Glu Ile Cys Lys
            180                 185                 190

Glu Met Glu Lys Glu Gly Lys Ile Thr Lys Ile Gly Pro Glu Asn Pro
        195                 200                 205

Tyr Asn Thr Pro Ile Phe Ala Ile Lys Lys Lys Asp Ser Thr Lys Trp
    210                 215                 220

Arg Lys Leu Val Asp Phe Arg Glu Leu Asn Lys Lys Thr Gln Asp Phe
225                 230                 235                 240

Trp Glu Val Gln Leu Gly Ile Pro His Pro Ala Gly Leu Lys Lys Lys
                245                 250                 255

Lys Ser Val Thr Val Leu Asp Val Gly Asp Ala Tyr Phe Ser Val Pro
            260                 265                 270

Leu Asp Glu Ser Phe Arg Lys Tyr Thr Ala Phe Thr Ile Pro Ser Thr
        275                 280                 285

Asn Asn Glu Thr Pro Gly Ile Arg Tyr Gln Tyr Asn Val Leu Pro Gln
    290                 295                 300

Gly Trp Lys Gly Ser Pro Ala Ile Phe Gln Cys Ser Met Thr Lys Ile
305                 310                 315                 320

Leu Glu Pro Phe Arg Ile Lys Asn Pro Glu Ile Val Ile Tyr Gln Leu
                325                 330                 335

Tyr Val Gly Ser Asp Leu Glu Ile Gly Gln His Arg Ala Lys Ile Glu
            340                 345                 350
```

```
Glu Leu Arg Glu His Leu Leu Arg Trp Gly Phe Thr Thr Pro Asp Lys
        355                 360                 365

Lys His Gln Lys Glu Pro Pro Phe Leu Trp Met Gly Tyr Glu Leu His
    370                 375                 380

Pro Asp Arg Trp Thr Val Gln Pro Ile Glu Leu Pro Glu Lys Asp Ser
385                 390                 395                 400

Trp Thr Val Asn Asp Ile Gln Lys Leu Val Gly Lys Leu Asn Trp Ala
                405                 410                 415

Ser Gln Ile Tyr Ala Gly Ile Lys Val Arg Gln Leu Cys Lys Leu Leu
            420                 425                 430

Arg Gly Thr Lys Ala Leu Thr Glu Val Val Pro Leu Thr Glu Glu Ala
        435                 440                 445

Glu Leu Glu Leu Ala Glu Asn Arg Glu Ile Leu Lys Thr Pro Val His
    450                 455                 460

Gly Val Tyr Tyr Asp Pro Ser Lys Asp Leu Val Ala Glu Ile Gln Lys
465                 470                 475                 480

Gln Gly Gln Gly Gln Trp Thr Tyr Gln Ile Tyr Gln Glu Pro Tyr Lys
                485                 490                 495

Asn Leu Lys Thr Gly Lys Tyr Ala Arg Lys Arg Ser Ala His Thr Asn
            500                 505                 510

Asp Val Arg Gln Leu Thr Glu Val Val Gln Lys Ile Ala Thr Glu Ser
        515                 520                 525

Ile Val Ile Trp Gly Lys Thr Pro Lys Phe Lys Leu Pro Ile Gln Lys
    530                 535                 540
```

```
Glu Thr Trp Glu Ala Trp Trp Thr Asp Tyr Trp Gln Ala Thr Trp Ile
545                 550                 555                 560


Pro Asp Trp Glu Phe Val Asn Thr Pro Pro Leu Val Lys Leu Trp Tyr
                565                 570                 575


Gln Leu Glu Lys Asp Pro Ile Val Gly Ala Glu Thr Phe Tyr Val Asp
            580                 585                 590


Gly Ala Ala Ser Arg Glu Thr Lys Leu Gly Lys Ala Gly Tyr Val Thr
        595                 600                 605


Asn Arg Gly Arg Gln Lys Val Val Ser Leu Thr Asp Thr Thr Asn Gln
    610                 615                 620


Lys Thr Leu His Ala Ile His Leu Ala Leu Gln Asp Ser Gly Leu Glu
625                 630                 635                 640


Val Asn Ile Val Thr Asp Ser Gln Tyr Ala Leu Gly Ile Ile Gln Ala
                645                 650                 655


Gln Pro Asp Arg Ser Glu Ser Glu Val Val Asn Gln Ile Ile Glu Glu
            660                 665                 670


Leu Ile Lys Lys Glu Lys Val Tyr Leu Ala Trp Val Pro Ala His Lys
        675                 680                 685


Gly Ile Gly Gly Asn Glu Gln Val Asp Lys Leu Val Ser Ala Gly Ile
    690                 695                 700


Arg Lys Val Leu Phe Leu Asp Gly Ile Asp Lys Ala Gln Glu Glu His
705                 710                 715                 720


Glu Arg Tyr His Ser Asn Trp Arg Thr Met Ala Ser Asp Phe Asn Leu
                725                 730                 735
```

```
Pro Pro Val Val Ala Lys Glu Ile Val Ala Asn Cys Asp Lys Cys Gln
            740                 745                 750

Leu Lys Gly Glu Ala Ile His Gly Gln Val Asp Cys Ser Pro Gly Met
        755                 760                 765

Trp Gln Leu Cys Thr His Leu Glu Gly Lys Ile Ile Leu Val Ala Val
    770                 775                 780

His Val Ala Ser Gly Tyr Met Glu Ala Glu Val Ile Pro Ala Glu Thr
785                 790                 795                 800

Gly Gln Glu Thr Ala Tyr Phe Ile Leu Lys Leu Ala Gly Arg Trp Pro
                805                 810                 815

Val Lys Thr Ile His Thr Asn Gly Ser Asn Phe Thr Ser Thr Thr Val
            820                 825                 830

Lys Ala Ala Cys Trp Trp Ala Gly Ile Gln Gln Glu Phe Gly Ile Pro
        835                 840                 845

Tyr Asn Pro Gln Ser Gln Gly Val Val Ser Met Asn Asn Glu Leu Lys
    850                 855                 860

Lys Ile Ile Gly Gln Val Arg Glu Gln Ala Glu His Leu Lys Thr Ala
865                 870                 875                 880

Val Gln Met Ala Val Phe Ile His Asn Phe Lys Arg Arg Gly Gly Ile
                885                 890                 895

Gly Gly Tyr Ser Ala Gly Glu Arg Ile Val Asp Ile Ile Ala Thr Asp
            900                 905                 910

Ile Gln Thr Arg Glu Leu Gln Lys Gln Ile Ile Lys Ile Gln Asn Phe
        915                 920                 925
```

```
Arg Val Tyr Tyr Arg Asp Ser Arg Asp Pro Leu Trp Lys Gly Pro Ala
    930                 935                 940

Lys Leu Leu Trp Lys Gly Glu Gly Ala Val Val Ile Gln Asp Asn Ser
945                 950                 955                 960

Glu Ile Lys Val Val Pro Arg Arg Lys Val Lys Ile Ile Lys Asp Tyr
                965                 970                 975

Gly Lys Gln Met Ala Gly Asp Asp Cys Val Ala Ser Arg Gln Asp Glu
            980                 985                 990

Asp
```

<210> 712
<211> 598
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M pol conserved Epigraph 2

<400> 712

```
Met Pro Gln Ile Thr Leu Trp Gln Arg Pro Leu Val Ser Ile Lys Val
1               5                   10                  15

Gly Gly Gln Ile Lys Glu Ala Leu Leu Ala Asp Asp Thr Val Leu Glu
            20                  25                  30

Glu Met Asn Leu Pro Gly Arg Trp Lys Pro Lys Met Ile Gly Gly Ile
        35                  40                  45

Gly Gly Phe Ile Lys Val Arg Gln Tyr Asp Gln Ile Pro Ile Glu Ile
    50                  55                  60

Cys Gly His Lys Ala Ile Gly Thr Val Leu Ile Gly Pro Thr Pro Val
```

65 70 75 80

Asn Ile Ile Gly Arg Asn Met Leu Thr Gln Leu Gly Cys Thr Leu Asn
85 90 95

Phe Pro Ile Ser Pro Ile Asp Thr Val Pro Val Thr Leu Lys Pro Gly
100 105 110

Met Asp Gly Pro Arg Val Lys Gln Trp Pro Leu Thr Glu Glu Lys Ile
115 120 125

Lys Ala Leu Thr Glu Ile Cys Lys Glu Met Glu Lys Glu Gly Lys Ile
130 135 140

Thr Lys Ile Gly Pro Glu Asn Pro Tyr Asn Thr Pro Ile Phe Ala Ile
145 150 155 160

Lys Lys Lys Asp Ser Thr Lys Trp Arg Lys Leu Val Asp Phe Arg Glu
165 170 175

Leu Asn Lys Lys Thr Gln Asp Phe Trp Glu Val Gln Leu Gly Ile Pro
180 185 190

His Pro Ala Gly Leu Lys Lys Lys Lys Ser Val Thr Val Leu Asp Val
195 200 205

Gly Asp Ala Tyr Phe Ser Val Pro Leu Asp Glu Ser Phe Arg Lys Tyr
210 215 220

Thr Ala Phe Thr Ile Pro Ser Thr Asn Asn Glu Thr Pro Gly Ile Arg
225 230 235 240

Tyr Gln Tyr Asn Val Leu Pro Gln Gly Trp Lys Gly Ser Pro Ala Ile
245 250 255

Phe Gln Cys Ser Met Thr Lys Ile Leu Glu Pro Phe Arg Ile Lys Asn

260 265 270

Pro Glu Ile Val Ile Tyr Gln Leu Tyr Val Gly Ser Asp Leu Glu Ile
275 280 285

Gly Gln His Arg Ala Lys Ile Glu Glu Leu Arg Glu His Leu Leu Arg
290 295 300

Trp Gly Phe Thr Thr Pro Asp Lys Lys His Gln Lys Glu Pro Pro Phe
305 310 315 320

Leu Trp Met Gly Tyr Glu Leu His Pro Asp Arg Trp Thr Val Gln Pro
325 330 335

Ile Glu Leu Pro Glu Lys Asp Ser Trp Thr Val Asn Asp Ile Gln Lys
340 345 350

Leu Val Gly Lys Leu Asn Trp Ala Ser Gln Ile Tyr His Gly Gln Val
355 360 365

Asp Cys Ser Pro Gly Met Trp Gln Leu Cys Thr His Leu Glu Gly Lys
370 375 380

Ile Ile Leu Val Ala Val His Val Ala Ser Gly Tyr Met Glu Ala Glu
385 390 395 400

Val Ile Pro Ala Glu Thr Gly Gln Glu Thr Ala Tyr Phe Ile Leu Lys
405 410 415

Leu Ala Gly Arg Trp Pro Val Lys Thr Ile His Thr Asn Gly Ser Asn
420 425 430

Phe Thr Ser Thr Thr Val Lys Ala Ala Cys Trp Trp Ala Gly Ile Gln
435 440 445

Gln Glu Phe Gly Ile Pro Tyr Asn Pro Gln Ser Gln Gly Val Val Ser

```
    450                 455                 460

Met Asn Asn Glu Leu Lys Lys Ile Ile Gly Gln Val Arg Glu Gln Ala
465                 470                 475                 480

Glu His Leu Lys Thr Ala Val Gln Met Ala Val Phe Ile His Asn Phe
                485                 490                 495

Lys Arg Arg Gly Gly Ile Gly Gly Tyr Ser Ala Gly Glu Arg Ile Val
            500                 505                 510

Asp Ile Ile Ala Thr Asp Ile Gln Thr Arg Leu Gln Lys Gln Ile Ile
        515                 520                 525

Lys Ile Gln Asn Phe Arg Val Tyr Tyr Arg Asp Ser Arg Asp Pro Leu
    530                 535                 540

Trp Lys Gly Pro Ala Lys Leu Leu Trp Lys Gly Glu Gly Ala Val Val
545                 550                 555                 560

Ile Gln Asp Asn Ser Glu Ile Lys Val Val Pro Arg Arg Lys Val Lys
                565                 570                 575

Ile Ile Lys Asp Tyr Gly Lys Gln Met Ala Gly Asp Asp Cys Val Ala
            580                 585                 590

Ser Arg Gln Asp Glu Asp
        595
```

<210> 713
<211> 773
<212> PRT
<213> Artificial Sequence

<220>
<223> SIV gag/nef hybrid

<400> 713

```
Met Gly Ala Arg Gly Ser Val Leu Ser Gly Lys Lys Thr Asp Glu Leu
1               5                   10                  15

Glu Lys Val Arg Leu Arg Pro Gly Gly Arg Lys Lys Tyr Met Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ala Arg Glu Leu Asp Arg Phe Gly Ser Ala Glu
        35                  40                  45

Ser Leu Leu Glu Ser Lys Glu Gly Cys Gln Arg Ile Leu Ala Val Leu
    50                  55                  60

Ala Pro Leu Met Pro Thr Gly Ser Glu Asp Leu Lys Ser Leu Phe Ser
65                  70                  75                  80

Thr Val Cys Val Val Trp Cys Leu His Ala Glu Met Lys Val Lys Asp
                85                  90                  95

Thr Glu Glu Ala Lys Lys Thr Val Gln Ser His Leu Val Val Glu Ser
            100                 105                 110

Gly Thr Ala Glu Thr Met Pro Ala Gln Ser Arg Pro Thr Ala Pro Pro
        115                 120                 125

Ser Gly Arg Gly Gly Asn Tyr Pro Val Gln Gln Ile Gly Gly Asn Tyr
    130                 135                 140

Val His Leu Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Leu
145                 150                 155                 160

Ile Glu Glu Lys Lys Phe Gly Ala Glu Val Val Pro Gly Phe Gln Ala
                165                 170                 175

Leu Ser Glu Gly Cys Thr Pro Tyr Asp Ile Asn Gln Met Leu Asn Cys
            180                 185                 190
```

```
Val Gly Asp His Gln Ala Ala Met Gln Ile Ile Arg Asp Ile Ile Asn
        195                 200                 205

Glu Glu Ala Ala Asp Trp Asp Leu Gln His Pro Gln Pro Ala Pro Gln
    210                 215                 220

Gln Gly Gln Leu Arg Glu Pro Ser Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Ser Val Asp Glu Gln Ile Gln Trp Met Tyr Arg Gln Gln Asn Pro
                245                 250                 255

Ile Pro Val Gly Asn Ile Tyr Arg Arg Trp Ile Gln Leu Gly Leu Gln
            260                 265                 270

Lys Cys Val Arg Met Tyr Asn Pro Thr Asn Ile Leu Asp Val Lys Gln
        275                 280                 285

Gly Pro Lys Glu Pro Phe Gln Ser Tyr Val Asp Arg Phe Tyr Lys Ser
    290                 295                 300

Leu Arg Ala Glu Gln Thr Asp Ala Ala Val Lys Asn Trp Met Thr Gln
305                 310                 315                 320

Thr Leu Leu Ile Gln Asn Ala Asn Pro Asp Cys Lys Leu Val Leu Lys
                325                 330                 335

Gly Leu Gly Val Asn Pro Thr Leu Glu Glu Met Leu Thr Ala Cys Gln
            340                 345                 350

Gly Val Gly Gly Pro Gly Gln Lys Ala Arg Leu Met Ala Glu Ala Leu
        355                 360                 365

Lys Asp Ala Leu Thr Pro Gly Pro Ile Pro Phe Ala Ala Val Gln Gln
    370                 375                 380
```

```
Arg Gly Gln Arg Lys Ile Ile Lys Cys Trp Asn Cys Gly Lys Thr Gly
385                 390                 395                 400

His Ser Ala Arg Gln Cys Lys Ala Pro Arg Arg Lys Gly Cys Trp Lys
                405                 410                 415

Cys Gly Lys Ala Gly His Val Met Ala Lys Cys Pro Glu Arg Gln Ala
            420                 425                 430

Gly Phe Leu Gly Phe Gly Pro Trp Gly Lys Lys Pro His Asn Phe Pro
        435                 440                 445

Met Ala Gln Met Pro Gln Gly Leu Thr Pro Thr Ala Pro Pro Ala Asp
    450                 455                 460

Pro Ala Val Asp Met Leu Lys Asn Tyr Met Lys Met Gly Lys Arg Gln
465                 470                 475                 480

Arg Glu Lys Gln Arg Glu Asn Arg Glu Arg Pro Tyr Lys Glu Val Ser
                485                 490                 495

Glu Asp Leu Leu His Leu Ser Ser Leu Phe Gly Glu Asp Gln Pro Gly
            500                 505                 510

Gly Ala Thr Ser Lys Arg Arg Ser Lys Pro Ser Gly Asp Leu Arg Gln
        515                 520                 525

Lys Leu Leu Arg Ala Arg Gly Glu Asn Tyr Gly Arg Leu Trp Gly Glu
    530                 535                 540

Leu Glu Asp Gly Ser Ser Gln Ser Leu Gly Gly Leu Gly Lys Gly Leu
545                 550                 555                 560

Ser Ser Arg Ser Cys Glu Gly Gln Lys Tyr Ser Gln Gly Gln Phe Met
                565                 570                 575
```

```
Asn Thr Pro Trp Lys Asn Pro Ala Glu Glu Lys Glu Lys Leu Pro Tyr
            580                 585                 590

Arg Lys Gln Asn Ile Asp Asp Val Asp Glu Glu Asp Asn Asp Leu Val
        595                 600                 605

Gly Val Ser Val Arg Pro Lys Val Pro Leu Arg Thr Met Ser Tyr Lys
    610                 615                 620

Leu Ala Ile Asp Met Ser His Phe Ile Lys Glu Lys Gly Gly Leu Glu
625                 630                 635                 640

Gly Ile Tyr Tyr Ser Ala Arg Arg His Arg Ile Leu Asp Ile Tyr Leu
                645                 650                 655

Glu Lys Glu Glu Gly Ile Ile Pro Asp Trp Gln Asp Tyr Thr Ser Gly
            660                 665                 670

Pro Gly Ile Arg Tyr Pro Lys Thr Phe Gly Trp Leu Trp Lys Leu Val
        675                 680                 685

Pro Val Asp Met Ser Asn Glu Ala Gln Glu Asp Asp Thr His Tyr Leu
    690                 695                 700

Val His Pro Ala Gln Thr His Gln Trp Ser Asp Pro Trp Gly Glu Val
705                 710                 715                 720

Leu Val Trp Lys Phe Asp Pro Leu Leu Ala His Thr Tyr Glu Ala Phe
                725                 730                 735

Val Arg His Pro Glu Glu Phe Gly Trp Lys Ser Gly Leu Pro Lys Glu
            740                 745                 750

Glu Val Glu Arg Arg Leu Ala Ala Arg Gly Leu Leu Lys Met Ala Asp
        755                 760                 765
```

Lys Lys Glu Thr Arg
770

<210> 714
<211> 312
<212> PRT
<213> Artificial Sequence

<220>
<223> SIV gag/nef conserved

<400> 714

Met Pro Val Gln Gln Ile Gly Gly Asn Tyr Val His Leu Pro Leu Ser
1 5 10 15

Pro Arg Thr Leu Asn Ala Trp Val Lys Leu Ile Glu Glu Lys Lys Phe
20 25 30

Gly Ala Glu Val Val Pro Gly Phe Gln Ala Leu Ser Glu Gly Cys Thr
35 40 45

Pro Tyr Asp Ile Asn Gln Met Leu Asn Cys Val Gly Asp His Gln Ala
50 55 60

Ala Met Gln Ile Ile Arg Asp Ile Ile Asn Glu Glu Ala Ala Asp Trp
65 70 75 80

Asp Leu Gln His Pro Gln Pro Ala Pro Gln Gln Gly Gln Leu Arg Glu
85 90 95

Pro Ser Gly Ser Asp Ile Ala Gly Thr Thr Ser Ser Val Asp Glu Gln
100 105 110

Ile Gln Trp Met Tyr Arg Gln Gln Asn Pro Ile Pro Val Gly Asn Ile
115 120 125

Tyr Arg Arg Trp Ile Gln Leu Gly Leu Gln Lys Cys Val Arg Met Tyr

```
    130                 135                 140

Asn Pro Thr Asn Ile Leu Asp Val Lys Gln Gly Pro Lys Glu Pro Phe
145                 150                 155                 160

Gln Ser Tyr Val Asp Arg Phe Tyr Lys Ser Leu Arg Ala Glu Gln Thr
                165                 170                 175

Asp Ala Ala Val Lys Asn Trp Met Thr Gln Thr Leu Leu Ile Gln Asn
            180                 185                 190

Ala Asn Pro Asp Cys Lys Leu Val Leu Lys Gly Leu Gly Val Asn Pro
        195                 200                 205

Thr Leu Glu Glu Met Leu Thr Ala Cys Gln Gly Val Gly Gly Pro Gly
    210                 215                 220

Gln Lys Ala Arg Leu Met Val Gly Val Ser Val Arg Pro Lys Val Pro
225                 230                 235                 240

Leu Arg Thr Met Ser Tyr Lys Leu Ala Ile Asp Met Ser His Phe Ile
                245                 250                 255

Lys Glu Lys Gly Gly Leu Glu Gly Ile Tyr Tyr Ser Ala Arg Arg His
            260                 265                 270

Arg Ile Leu Asp Ile Tyr Leu Glu Lys Glu Glu Gly Ile Ile Pro Asp
        275                 280                 285

Trp Gln Asp Tyr Thr Ser Gly Pro Gly Ile Arg Tyr Pro Lys Thr Phe
    290                 295                 300

Gly Trp Leu Trp Lys Leu Val Pro
305                 310
```

<210> 715

<211> 1009
<212> PRT
<213> Artificial Sequence

<220>
<223> SIV pol hybrid

<400> 715

```
Met Phe Phe Arg Ala Trp Pro Met Gly Lys Glu Ala Ser Gln Phe Pro
1               5                  10                  15


His Gly Pro Asp Ala Ser Gly Ala Asp Thr Asn Cys Ser Pro Arg Gly
            20                  25                  30


Ser Ser Cys Gly Ser Thr Glu Glu Leu His Glu Val Gly Gln Lys Ala
        35                  40                  45


Glu Arg Lys Ala Glu Gly Glu Gln Arg Glu Thr Leu Gln Gly Gly Asn
    50                  55                  60


Gly Gly Phe Ala Ala Pro Gln Phe Ser Leu Trp Arg Arg Pro Val Val
65                  70                  75                  80


Thr Ala His Ile Glu Gly Gln Pro Val Glu Val Leu Leu Ala Asp Asp
                85                  90                  95


Ser Ile Val Thr Gly Ile Glu Leu Gly Pro His Tyr Thr Pro Lys Ile
            100                 105                 110


Val Gly Gly Ile Gly Gly Phe Ile Asn Thr Lys Glu Tyr Lys Asn Val
        115                 120                 125


Glu Ile Glu Val Leu Gly Lys Arg Ile Lys Gly Thr Ile Met Thr Gly
    130                 135                 140


Asp Thr Pro Ile Asn Ile Phe Gly Arg Asn Leu Leu Thr Ala Leu Gly
145                 150                 155                 160
```

```
Met Ser Leu Asn Phe Pro Ile Ala Lys Val Glu Pro Val Lys Val Ala
                165                 170                 175

Leu Lys Pro Gly Lys Asp Gly Pro Lys Leu Lys Gln Trp Pro Leu Ser
            180                 185                 190

Lys Glu Lys Ile Val Ala Leu Arg Glu Ile Cys Glu Lys Met Glu Lys
        195                 200                 205

Asp Gly Gln Leu Glu Glu Ala Pro Pro Thr Asn Pro Tyr Asn Thr Pro
    210                 215                 220

Thr Phe Ala Ile Lys Lys Lys Asp Lys Asn Lys Trp Arg Met Leu Ile
225                 230                 235                 240

Asp Phe Arg Glu Leu Asn Arg Val Thr Gln Asp Phe Thr Glu Val Gln
                245                 250                 255

Leu Gly Ile Pro His Pro Ala Gly Leu Ala Lys Arg Lys Arg Ile Thr
            260                 265                 270

Val Leu Asp Ile Gly Asp Ala Tyr Phe Ser Ile Pro Leu Asp Glu Glu
        275                 280                 285

Phe Arg Gln Tyr Thr Ala Phe Thr Leu Pro Ser Val Asn Asn Ala Glu
    290                 295                 300

Pro Gly Lys Arg Tyr Ile Tyr Lys Val Leu Pro Gln Gly Trp Lys Gly
305                 310                 315                 320

Ser Pro Ala Ile Phe Gln Tyr Thr Met Arg His Val Leu Glu Pro Phe
                325                 330                 335

Arg Lys Ala Asn Pro Asp Val Thr Leu Val Gln Ile Leu Ile Ala Ser
            340                 345                 350
```

```
Asp Arg Thr Asp Leu Glu His Asp Arg Val Val Leu Gln Ser Lys Glu
        355                 360                 365

Leu Leu Asn Ser Ile Gly Phe Ser Thr Pro Glu Glu Lys Phe Gln Lys
    370                 375                 380

Asp Pro Pro Phe Gln Trp Met Gly Tyr Glu Leu Trp Pro Thr Lys Trp
385                 390                 395                 400

Lys Leu Gln Lys Ile Glu Leu Pro Gln Arg Glu Thr Trp Thr Val Asn
                405                 410                 415

Asp Ile Gln Lys Leu Val Gly Val Leu Asn Trp Ala Ala Gln Ile Tyr
            420                 425                 430

Pro Gly Ile Lys Thr Lys Asn Leu Cys Lys Met Ile Arg Gly Lys Met
        435                 440                 445

Ala Leu Thr Glu Gly Val Gln Trp Thr Glu Leu Ala Glu Ala Glu Leu
    450                 455                 460

Glu Glu Asn Arg Ile Ile Leu Asn Gln Glu Gln Glu Gly Arg Tyr Tyr
465                 470                 475                 480

Arg Glu Asp Lys Pro Leu Glu Ala Thr Val Leu Lys Asn Gln Asp Asn
                485                 490                 495

Gln Trp Thr Tyr Lys Ile His Gln Gly Asp Arg Ile Leu Lys Val Gly
            500                 505                 510

Lys Tyr Ala Lys Val Lys Asn Thr His Thr Asn Gly Ile Arg Leu Leu
        515                 520                 525

Ala Asn Val Val Gln Lys Ile Gly Lys Glu Ser Ile Val Ile Trp Gly
    530                 535                 540
```

```
Gln Thr Pro Phe Phe His Leu Pro Val Glu Arg Glu Val Trp Asp Gln
545                 550                 555                 560

Trp Trp Thr Asp Tyr Trp Gln Ala Thr Trp Ile Pro Asp Trp Asp Phe
                565                 570                 575

Val Ser Thr Pro Pro Leu Ile Arg Leu Val Phe Asn Leu Val Lys Glu
            580                 585                 590

Pro Ile Glu Lys Glu Glu Val Tyr Tyr Ile Asp Gly Ser Cys Asn Arg
        595                 600                 605

Asn Ser Lys Glu Gly Lys Ala Gly Tyr Val Thr Asp Arg Gly Lys Glu
    610                 615                 620

Lys Val Leu Val Leu Glu Gln Ala Thr Asn Gln Gln Ala Leu Gln Ala
625                 630                 635                 640

Phe Leu Leu Ala Leu Lys Asp Ser Gly Pro Lys Ala Asn Ile Val Thr
                645                 650                 655

Asp Ser Gln Tyr Val Leu Gly Ile Ile Thr Gly Gln Pro Thr Glu Ser
            660                 665                 670

Asp Ser Arg Ile Val Ala Gln Ile Ile Glu Gln Met Ile Lys Lys Ser
        675                 680                 685

Glu Val Tyr Ile Gly Trp Val Pro Ala His Lys Gly Leu Gly Gly Asn
    690                 695                 700

Gln Glu Val Asp Arg Leu Val Ser Gln Glu Ile Arg Gln Val Leu Phe
705                 710                 715                 720

Leu Glu Ser Ile Glu Pro Ala Gln Glu Asp His Asp Lys Tyr His Ser
                725                 730                 735
```

```
Asn Ile Lys Glu Leu Ala Phe Lys Phe Gly Leu Pro Arg Leu Val Ala
            740                 745                 750

Lys Gln Ile Val Asp Thr Cys Asn Lys Cys Gln Gln Lys Gly Glu Ala
        755                 760                 765

Ile His Gly Gln Ala Asn Ser Asp Leu Gly Thr Trp Gln Met Cys Thr
    770                 775                 780

His Leu Glu Gly Lys Ile Ile Ile Val Ala Val His Val Ala Ser Gly
785                 790                 795                 800

Phe Ile Glu Ala Glu Val Ile Pro Gln Glu Thr Gly Arg Gln Thr Ala
                805                 810                 815

Leu Phe Leu Leu Lys Leu Ala Gly Arg Trp Pro Ile Thr His Leu His
            820                 825                 830

Thr Asn Gly Ala Asn Phe Ala Ser Gln Glu Val Lys Met Val Ala Trp
        835                 840                 845

Trp Ala Gly Ile Glu His Thr Phe Gly Val Pro Tyr Asn Pro Gln Ser
    850                 855                 860

Gln Gly Val Val Ala Met Asn His His Leu Lys Asn Gln Ile Asp Arg
865                 870                 875                 880

Ile Arg Glu Gln Ala Asn Ser Val Glu Thr Ile Val Leu Met Ala Val
                885                 890                 895

His Cys Met Asn Phe Lys Arg Arg Gly Gly Ile Gly Asp Met Thr Pro
            900                 905                 910

Ala Glu Arg Leu Ile Asn Met Ile Thr Thr Glu Gln Glu Ile Gln Phe
        915                 920                 925
```

```
Gln Gln Ser Lys Asn Ser Lys Phe Lys Asn Phe Arg Val Tyr Tyr Arg
    930                 935                 940


Glu Gly Arg Asp Gln Leu Trp Lys Gly Pro Gly Glu Leu Leu Trp Lys
945                 950                 955                 960


Gly Glu Gly Ala Val Ile Leu Lys Val Gly Thr Asp Ile Lys Val Val
                965                 970                 975


Pro Arg Arg Lys Ala Lys Ile Ile Lys Asp Tyr Gly Gly Gly Lys Glu
            980                 985                 990


Val Asp Ser Ser Ser His Met Glu  Asp Thr Gly Glu Ala  Arg Glu Val
        995                 1000                1005


Ala
```

<210> 716
<211> 604
<212> PRT
<213> Artificial Sequence

<220>
<223> SIV pol conserved

<400> 716

```
Met Pro Gln Phe Ser Leu Trp Arg Arg Pro Val Val Thr Ala His Ile
1               5                   10                  15


Glu Gly Gln Pro Val Glu Val Leu Leu Ala Asp Asp Ser Ile Val Thr
            20                  25                  30


Gly Ile Glu Leu Gly Pro His Tyr Thr Pro Lys Ile Val Gly Gly Ile
        35                  40                  45


Gly Gly Phe Ile Asn Thr Lys Glu Tyr Lys Asn Val Glu Ile Glu Val
```

```
    50                  55                  60

Leu Gly Lys Arg Ile Lys Gly Thr Ile Met Thr Gly Asp Thr Pro Ile
65                  70                  75                  80

Asn Ile Phe Gly Arg Asn Leu Leu Thr Ala Leu Gly Met Ser Leu Asn
                85                  90                  95

Phe Pro Ile Ala Lys Val Glu Pro Val Lys Val Ala Leu Lys Pro Gly
            100                 105                 110

Lys Asp Gly Pro Lys Leu Lys Gln Trp Pro Leu Ser Lys Glu Lys Ile
        115                 120                 125

Val Ala Leu Arg Glu Ile Cys Glu Lys Met Glu Lys Asp Gly Gln Leu
    130                 135                 140

Glu Glu Ala Pro Pro Thr Asn Pro Tyr Asn Thr Pro Thr Phe Ala Ile
145                 150                 155                 160

Lys Lys Lys Asp Lys Asn Lys Trp Arg Met Leu Ile Asp Phe Arg Glu
                165                 170                 175

Leu Asn Arg Val Thr Gln Asp Phe Thr Glu Val Gln Leu Gly Ile Pro
            180                 185                 190

His Pro Ala Gly Leu Ala Lys Arg Lys Arg Ile Thr Val Leu Asp Ile
        195                 200                 205

Gly Asp Ala Tyr Phe Ser Ile Pro Leu Asp Glu Glu Phe Arg Gln Tyr
    210                 215                 220

Thr Ala Phe Thr Leu Pro Ser Val Asn Asn Ala Glu Pro Gly Lys Arg
225                 230                 235                 240

Tyr Ile Tyr Lys Val Leu Pro Gln Gly Trp Lys Gly Ser Pro Ala Ile
```

245 250 255

Phe Gln Tyr Thr Met Arg His Val Leu Glu Pro Phe Arg Lys Ala Asn
260 265 270

Pro Asp Val Thr Leu Val Gln Ile Leu Ile Ala Ser Asp Arg Thr Asp
275 280 285

Leu Glu His Asp Arg Val Val Leu Gln Ser Lys Glu Leu Leu Asn Ser
290 295 300

Ile Gly Phe Ser Thr Pro Glu Glu Lys Phe Gln Lys Asp Pro Pro Phe
305 310 315 320

Gln Trp Met Gly Tyr Glu Leu Trp Pro Thr Lys Trp Lys Leu Gln Lys
325 330 335

Ile Glu Leu Pro Gln Arg Glu Thr Trp Thr Val Asn Asp Ile Gln Lys
340 345 350

Leu Val Gly Val Leu Asn Trp Ala Ala Gln Ile Tyr His Gly Gln Ala
355 360 365

Asn Ser Asp Leu Gly Thr Trp Gln Met Cys Thr His Leu Glu Gly Lys
370 375 380

Ile Ile Ile Val Ala Val His Val Ala Ser Gly Phe Ile Glu Ala Glu
385 390 395 400

Val Ile Pro Gln Glu Thr Gly Arg Gln Thr Ala Leu Phe Leu Leu Lys
405 410 415

Leu Ala Gly Arg Trp Pro Ile Thr His Leu His Thr Asn Gly Ala Asn
420 425 430

Phe Ala Ser Gln Glu Val Lys Met Val Ala Trp Trp Ala Gly Ile Glu

435 440 445

His Thr Phe Gly Val Pro Tyr Asn Pro Gln Ser Gln Gly Val Val Ala
450 455 460

Met Asn His His Leu Lys Asn Gln Ile Asp Arg Ile Arg Glu Gln Ala
465 470 475 480

Asn Ser Val Glu Thr Ile Val Leu Met Ala Val His Cys Met Asn Phe
485 490 495

Lys Arg Arg Gly Gly Ile Gly Asp Met Thr Pro Ala Glu Arg Leu Ile
500 505 510

Asn Met Ile Thr Thr Glu Gln Glu Ile Gln Phe Gln Gln Ser Lys Asn
515 520 525

Ser Lys Phe Lys Asn Phe Arg Val Tyr Tyr Arg Glu Gly Arg Asp Gln
530 535 540

Leu Trp Lys Gly Pro Gly Glu Leu Leu Trp Lys Gly Glu Gly Ala Val
545 550 555 560

Ile Leu Lys Val Gly Thr Asp Ile Lys Val Val Pro Arg Arg Lys Ala
565 570 575

Lys Ile Ile Lys Asp Tyr Gly Gly Gly Lys Glu Val Asp Ser Ser Ser
580 585 590

His Met Glu Asp Thr Gly Glu Ala Arg Glu Val Ala
595 600

<210> 717
<211> 1003
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B pol epigraph1

<400> 717

```
Phe Phe Arg Glu Asn Leu Ala Phe Pro Gln Gly Lys Ala Arg Glu Phe
1               5                  10                  15


Ser Ser Glu Gln Thr Arg Ala Asn Ser Pro Thr Arg Arg Glu Leu Gln
            20                  25                  30


Val Trp Gly Arg Asp Asn Asn Ser Leu Ser Glu Ala Gly Ala Asp Arg
        35                  40                  45


Gln Gly Thr Val Ser Phe Ser Phe Pro Gln Ile Thr Leu Trp Gln Arg
    50                  55                  60


Pro Leu Val Thr Ile Lys Ile Gly Gly Gln Leu Lys Glu Ala Leu Leu
65                  70                  75                  80


Asp Thr Gly Ala Asp Asp Thr Val Leu Glu Glu Met Asn Leu Pro Gly
                85                  90                  95


Arg Trp Lys Pro Lys Met Ile Gly Gly Ile Gly Gly Phe Ile Lys Val
            100                 105                 110


Arg Gln Tyr Asp Gln Ile Pro Ile Glu Ile Cys Gly His Lys Ala Ile
        115                 120                 125


Gly Thr Val Leu Val Gly Pro Thr Pro Val Asn Ile Ile Gly Arg Asn
    130                 135                 140


Leu Leu Thr Gln Ile Gly Cys Thr Leu Asn Phe Pro Ile Ser Pro Ile
145                 150                 155                 160


Glu Thr Val Pro Val Lys Leu Lys Pro Gly Met Asp Gly Pro Lys Val
                165                 170                 175
```

```
Lys Gln Trp Pro Leu Thr Glu Glu Lys Ile Lys Ala Leu Val Glu Ile
            180                 185                 190

Cys Thr Glu Met Glu Lys Glu Gly Lys Ile Ser Lys Ile Gly Pro Glu
        195                 200                 205

Asn Pro Tyr Asn Thr Pro Val Phe Ala Ile Lys Lys Lys Asp Ser Thr
    210                 215                 220

Lys Trp Arg Lys Leu Val Asp Phe Arg Glu Leu Asn Lys Arg Thr Gln
225                 230                 235                 240

Asp Phe Trp Glu Val Gln Leu Gly Ile Pro His Pro Ala Gly Leu Lys
                245                 250                 255

Lys Lys Lys Ser Val Thr Val Leu Asp Val Gly Asp Ala Tyr Phe Ser
            260                 265                 270

Val Pro Leu Asp Lys Asp Phe Arg Lys Tyr Thr Ala Phe Thr Ile Pro
        275                 280                 285

Ser Ile Asn Asn Glu Thr Pro Gly Ile Arg Tyr Gln Tyr Asn Val Leu
    290                 295                 300

Pro Gln Gly Trp Lys Gly Ser Pro Ala Ile Phe Gln Ser Ser Met Thr
305                 310                 315                 320

Lys Ile Leu Glu Pro Phe Arg Lys Gln Asn Pro Asp Ile Val Ile Tyr
                325                 330                 335

Gln Tyr Met Asp Asp Leu Tyr Val Gly Ser Asp Leu Glu Ile Gly Gln
            340                 345                 350

His Arg Thr Lys Ile Glu Glu Leu Arg Gln His Leu Leu Arg Trp Gly
        355                 360                 365
```

```
Phe Thr Thr Pro Asp Lys Lys His Gln Lys Glu Pro Pro Phe Leu Trp
    370                 375                 380

Met Gly Tyr Glu Leu His Pro Asp Lys Trp Thr Val Gln Pro Ile Val
385                 390                 395                 400

Leu Pro Glu Lys Asp Ser Trp Thr Val Asn Asp Ile Gln Lys Leu Val
                405                 410                 415

Gly Lys Leu Asn Trp Ala Ser Gln Ile Tyr Ala Gly Ile Lys Val Lys
            420                 425                 430

Gln Leu Cys Lys Leu Leu Arg Gly Thr Lys Ala Leu Thr Glu Val Val
        435                 440                 445

Pro Leu Thr Glu Glu Ala Glu Leu Glu Leu Ala Glu Asn Arg Glu Ile
    450                 455                 460

Leu Lys Glu Pro Val His Gly Val Tyr Tyr Asp Pro Ser Lys Asp Leu
465                 470                 475                 480

Ile Ala Glu Ile Gln Lys Gln Gly Gln Gly Gln Trp Thr Tyr Gln Ile
                485                 490                 495

Tyr Gln Glu Pro Phe Lys Asn Leu Lys Thr Gly Lys Tyr Ala Arg Met
            500                 505                 510

Arg Gly Ala His Thr Asn Asp Val Lys Gln Leu Thr Glu Ala Val Gln
        515                 520                 525

Lys Ile Ala Thr Glu Ser Ile Val Ile Trp Gly Lys Thr Pro Lys Phe
    530                 535                 540

Lys Leu Pro Ile Gln Lys Glu Thr Trp Glu Ala Trp Trp Thr Glu Tyr
545                 550                 555                 560
```

```
Trp Gln Ala Thr Trp Ile Pro Glu Trp Glu Phe Val Asn Thr Pro Pro
                565                 570                 575

Leu Val Lys Leu Trp Tyr Gln Leu Glu Lys Glu Pro Ile Val Gly Ala
            580                 585                 590

Glu Thr Phe Tyr Val Asp Gly Ala Ala Asn Arg Glu Thr Lys Leu Gly
        595                 600                 605

Lys Ala Gly Tyr Val Thr Asp Arg Gly Arg Gln Lys Val Val Ser Leu
    610                 615                 620

Thr Asp Thr Thr Asn Gln Lys Thr Glu Leu Gln Ala Ile His Leu Ala
625                 630                 635                 640

Leu Gln Asp Ser Gly Leu Glu Val Asn Ile Val Thr Asp Ser Gln Tyr
                645                 650                 655

Ala Leu Gly Ile Ile Gln Ala Gln Pro Asp Lys Ser Glu Ser Glu Leu
            660                 665                 670

Val Ser Gln Ile Ile Glu Gln Leu Ile Lys Lys Glu Lys Val Tyr Leu
        675                 680                 685

Ala Trp Val Pro Ala His Lys Gly Ile Gly Gly Asn Glu Gln Val Asp
    690                 695                 700

Lys Leu Val Ser Ala Gly Ile Arg Lys Val Leu Phe Leu Asp Gly Ile
705                 710                 715                 720

Asp Lys Ala Gln Glu Glu His Glu Lys Tyr His Ser Asn Trp Arg Ala
                725                 730                 735

Met Ala Ser Asp Phe Asn Leu Pro Pro Val Val Ala Lys Glu Ile Val
            740                 745                 750
```

```
Ala Ser Cys Asp Lys Cys Gln Leu Lys Gly Glu Ala Met His Gly Gln
        755                 760                 765

Val Asp Cys Ser Pro Gly Ile Trp Gln Leu Asp Cys Thr His Leu Glu
    770                 775                 780

Gly Lys Ile Ile Leu Val Ala Val His Val Ala Ser Gly Tyr Ile Glu
785                 790                 795                 800

Ala Glu Val Ile Pro Ala Glu Thr Gly Gln Glu Thr Ala Tyr Phe Leu
                805                 810                 815

Leu Lys Leu Ala Gly Arg Trp Pro Val Lys Thr Ile His Thr Asp Asn
            820                 825                 830

Gly Ser Asn Phe Thr Ser Thr Thr Val Lys Ala Ala Cys Trp Trp Ala
        835                 840                 845

Gly Ile Lys Gln Glu Phe Gly Ile Pro Tyr Asn Pro Gln Ser Gln Gly
    850                 855                 860

Val Val Glu Ser Met Asn Lys Glu Leu Lys Lys Ile Ile Gly Gln Val
865                 870                 875                 880

Arg Asp Gln Ala Glu His Leu Lys Thr Ala Val Gln Met Ala Val Phe
                885                 890                 895

Ile His Asn Phe Lys Arg Lys Gly Gly Ile Gly Gly Tyr Ser Ala Gly
            900                 905                 910

Glu Arg Ile Val Asp Ile Ile Ala Thr Asp Ile Gln Thr Lys Glu Leu
        915                 920                 925

Gln Lys Gln Ile Thr Lys Ile Gln Asn Phe Arg Val Tyr Tyr Arg Asp
    930                 935                 940
```

```
Ser Arg Asp Pro Leu Trp Lys Gly Pro Ala Lys Leu Leu Trp Lys Gly
945                 950                 955                 960


Glu Gly Ala Val Val Ile Gln Asp Asn Ser Asp Ile Lys Val Val Pro
                965                 970                 975


Arg Arg Lys Ala Lys Ile Ile Arg Asp Tyr Gly Lys Gln Met Ala Gly
            980                 985                 990


Asp Asp Cys Val Ala Ser Arg Gln  Asp Glu Asp
        995                 1000


<210>  718
<211>  499
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  HIV M gag Epigraph1

<400>  718

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Ala Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
```

85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly

```
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
    290                 295                 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
            340                 345                 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
        355                 360                 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Lys
    370                 375                 380

Gly Gln Lys Arg Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385                 390                 395                 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
                405                 410                 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
            420                 425                 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg Phe
    450                 455                 460

Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp Lys
```

465 470 475 480

Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
485 490 495

Leu Ser Gln

<210> 719
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M gag Epigraph1 Conserved

<400> 719

Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala Ile Ser
1 5 10 15

Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe
20 25 30

Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly Ala Thr
35 40 45

Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln Ala
50 55 60

Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp
65 70 75 80

Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln Met
85 90 95

Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln
100 105 110

```
Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro Val Gly Glu
        115                 120                 125


Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met
    130                 135                 140


Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro
145                 150                 155                 160


Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln
                165                 170                 175


Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln
            180                 185                 190


Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala
        195                 200                 205


Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
    210                 215                 220


Gly His Lys Ala Arg Val Leu
225                 230


<210>  720
<211>  496
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  HIV M gag Epigraph2

<400>  720

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
```

```
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Gln Gln Ile Ile Glu Gln Leu
    50                  55                  60

Gln Ser Thr Leu Lys Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Gln
            100                 105                 110

Gln Lys Thr Gln Gln Ala Ala Ala Gly Thr Gly Ser Ser Ser Lys Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ala Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Met Met Leu Asn Ile Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Pro
```

210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
245 250 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Asp Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg Ala
325 330 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys

405 410 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro Gly Asn Phe
435 440 445

Pro Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
450 455 460

Phe Glu Glu Thr Thr Pro Ala Pro Lys Gln Glu Pro Lys Asp Arg Glu
465 470 475 480

Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Ser Asp Pro Leu Ser Gln
485 490 495

<210> 721
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M gag Epigraph2 Conserved

<400> 721

Pro Ile Val Gln Asn Ala Gln Gly Gln Met Val His Gln Pro Leu Ser
1 5 10 15

Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala Phe
20 25 30

Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr
35 40 45

Pro Gln Asp Leu Asn Met Met Leu Asn Ile Val Gly Gly His Gln Ala
50 55 60

```
Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu Ala Ala Glu Trp
65                  70                  75                  80


Asp Arg Val His Pro Val His Ala Gly Pro Ile Pro Pro Gly Gln Met
                85                  90                  95


Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu Gln
            100                 105                 110


Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile Pro Val Gly Asp
        115                 120                 125


Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met
    130                 135                 140


Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro
145                 150                 155                 160


Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Thr Leu Arg Ala Glu Gln
                165                 170                 175


Ala Ser Gln Glu Val Lys Asn Trp Met Thr Asp Thr Leu Leu Val Gln
            180                 185                 190


Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg Ala Leu Gly Pro Gly
        195                 200                 205


Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
    210                 215                 220


Ser His Lys Ala Arg Val Leu
225                 230


<210>  722
<211>  206
<212>  PRT
```

<213> Artificial Sequence

<220>
<223> HIV M nef Epigraph1

<400> 722

```
Met Gly Gly Lys Trp Ser Lys Ser Ser Ile Val Gly Trp Pro Ala Val
1               5                   10                  15


Arg Glu Arg Met Arg Arg Ala Glu Pro Ala Ala Glu Gly Val Gly Ala
            20                  25                  30


Val Ser Arg Asp Leu Glu Lys His Gly Ala Ile Thr Ser Ser Asn Thr
        35                  40                  45


Ala Ala Thr Asn Ala Asp Cys Ala Trp Leu Glu Ala Gln Glu Glu Glu
    50                  55                  60


Glu Val Gly Phe Pro Val Arg Pro Gln Val Pro Leu Arg Pro Met Thr
65                  70                  75                  80


Tyr Lys Gly Ala Leu Asp Leu Ser His Phe Leu Lys Glu Lys Gly Gly
                85                  90                  95


Leu Glu Gly Leu Ile Tyr Ser Lys Lys Arg Gln Glu Ile Leu Asp Leu
            100                 105                 110


Trp Val Tyr His Thr Gln Gly Tyr Phe Pro Asp Trp Gln Asn Tyr Thr
        115                 120                 125


Pro Gly Pro Gly Ile Arg Tyr Pro Leu Thr Phe Gly Trp Cys Phe Lys
    130                 135                 140


Leu Val Pro Val Asp Pro Arg Glu Val Glu Glu Ala Asn Glu Gly Glu
145                 150                 155                 160


Asn Asn Cys Leu Leu His Pro Met Ser Gln His Gly Met Asp Asp Pro
```

165 170 175

Glu Lys Glu Val Leu Met Trp Lys Phe Asp Ser Arg Leu Ala Phe His
180 185 190

His Met Ala Arg Glu Leu His Pro Glu Tyr Tyr Lys Asp Cys
195 200 205

<210> 723
<211> 82
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M nef Epigraph1 Conserved

<400> 723

Val Gly Phe Pro Val Arg Pro Gln Val Pro Leu Arg Pro Met Thr Tyr
1 5 10 15

Lys Gly Ala Leu Asp Leu Ser His Phe Leu Lys Glu Lys Gly Gly Leu
20 25 30

Glu Gly Leu Ile Tyr Ser Lys Lys Arg Gln Glu Ile Leu Asp Leu Trp
35 40 45

Val Tyr His Thr Gln Gly Tyr Phe Pro Asp Trp Gln Asn Tyr Thr Pro
50 55 60

Gly Pro Gly Ile Arg Tyr Pro Leu Thr Phe Gly Trp Cys Phe Lys Leu
65 70 75 80

Val Pro

<210> 724
<211> 206
<212> PRT

<213> Artificial Sequence

<220>
<223> HIV M nef Epigraph2

<400> 724

```
Met Gly Ser Lys Trp Ser Lys Ser Ser Ile Val Gly Trp Pro Ala Ile
1               5                   10                  15


Arg Glu Arg Met Arg Arg Thr Glu Pro Ala Ala Glu Gly Val Gly Ala
            20                  25                  30


Ala Ser Arg Asp Leu Glu Arg His Gly Ala Ile Thr Ser Ser Asn Thr
        35                  40                  45


Ala Ala Asn Asn Ala Asp Cys Ala Trp Leu Glu Ala Gln Glu Asp Glu
    50                  55                  60


Glu Val Gly Phe Pro Val Lys Pro Gln Val Pro Leu Arg Pro Met Thr
65                  70                  75                  80


Tyr Lys Ala Ala Phe Asp Leu Ser Phe Phe Leu Lys Glu Lys Gly Gly
                85                  90                  95


Leu Asp Gly Leu Ile Tyr Ser Gln Lys Arg Gln Asp Ile Leu Asp Leu
            100                 105                 110


Trp Val Tyr Asn Thr Gln Gly Phe Phe Pro Asp Trp Gln Asn Tyr Thr
        115                 120                 125


Pro Gly Pro Gly Val Arg Tyr Pro Leu Thr Phe Gly Trp Cys Phe Lys
    130                 135                 140


Leu Val Pro Val Glu Pro Glu Lys Val Glu Glu Ala Asn Glu Gly Glu
145                 150                 155                 160


Asn Asn Ser Leu Leu His Pro Met Ser Leu His Gly Met Asp Asp Pro
```

165 170 175

Glu Arg Glu Val Leu Met Trp Lys Phe Asp Ser Ser Leu Ala Arg Arg
180 185 190

His Met Ala Arg Glu Leu His Pro Glu Phe Tyr Lys Asp Cys
195 200 205

<210> 725
<211> 82
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M nef Epigraph2 Conserved

<400> 725

Val Gly Phe Pro Val Lys Pro Gln Val Pro Leu Arg Pro Met Thr Tyr
1 5 10 15

Lys Ala Ala Phe Asp Leu Ser Phe Phe Leu Lys Glu Lys Gly Gly Leu
20 25 30

Asp Gly Leu Ile Tyr Ser Gln Lys Arg Gln Asp Ile Leu Asp Leu Trp
35 40 45

Val Tyr Asn Thr Gln Gly Phe Phe Pro Asp Trp Gln Asn Tyr Thr Pro
50 55 60

Gly Pro Gly Val Arg Tyr Pro Leu Thr Phe Gly Trp Cys Phe Lys Leu
65 70 75 80

Val Pro

<210> 726
<211> 1004
<212> PRT

<213> Artificial Sequence

<220>
<223> HIV M pol Epigraph1

<400> 726

```
Phe Phe Arg Glu Asn Leu Ala Phe Pro Gln Gly Glu Ala Arg Glu Phe
1               5                  10                  15


Ser Ser Glu Gln Thr Arg Ala Asn Ser Pro Thr Arg Arg Glu Leu Gln
            20                  25                  30


Val Trp Gly Arg Asp Asn Asn Ser Leu Ser Glu Ala Gly Ala Asp Arg
        35                  40                  45


Gln Gly Thr Val Ser Phe Ser Phe Pro Gln Ile Thr Leu Trp Gln Arg
    50                  55                  60


Pro Leu Val Thr Ile Lys Ile Gly Gly Gln Leu Lys Glu Ala Leu Leu
65                  70                  75                  80


Asp Thr Gly Ala Asp Asp Thr Val Leu Glu Asp Ile Asn Leu Pro Gly
                85                  90                  95


Lys Trp Lys Pro Lys Met Ile Gly Gly Ile Gly Gly Phe Ile Lys Val
            100                 105                 110


Arg Gln Tyr Asp Gln Ile Leu Ile Glu Ile Cys Gly Lys Lys Ala Ile
        115                 120                 125


Gly Thr Val Leu Val Gly Pro Thr Pro Val Asn Ile Ile Gly Arg Asn
    130                 135                 140


Leu Leu Thr Gln Ile Gly Cys Thr Leu Asn Phe Pro Ile Ser Pro Ile
145                 150                 155                 160


Glu Thr Val Pro Val Lys Leu Lys Pro Gly Met Asp Gly Pro Lys Val
```

```
               165                 170                 175

Lys Gln Trp Pro Leu Thr Glu Glu Lys Ile Lys Ala Leu Val Glu Ile
            180                 185                 190

Cys Thr Glu Met Glu Lys Glu Gly Lys Ile Ser Lys Ile Gly Pro Glu
        195                 200                 205

Asn Pro Tyr Asn Thr Pro Val Phe Ala Ile Lys Lys Lys Asp Ser Thr
    210                 215                 220

Lys Trp Arg Lys Leu Val Asp Phe Arg Glu Leu Asn Lys Arg Thr Gln
225                 230                 235                 240

Asp Phe Trp Glu Val Gln Leu Gly Ile Pro His Pro Ala Gly Leu Lys
                245                 250                 255

Lys Lys Lys Ser Val Thr Val Leu Asp Val Gly Asp Ala Tyr Phe Ser
            260                 265                 270

Val Pro Leu Asp Lys Asp Phe Arg Lys Tyr Thr Ala Phe Thr Ile Pro
        275                 280                 285

Ser Ile Asn Asn Glu Thr Pro Gly Ile Arg Tyr Gln Tyr Asn Val Leu
    290                 295                 300

Pro Gln Gly Trp Lys Gly Ser Pro Ala Ile Phe Gln Ser Ser Met Thr
305                 310                 315                 320

Lys Ile Leu Glu Pro Phe Arg Lys Gln Asn Pro Asp Ile Val Ile Tyr
                325                 330                 335

Gln Tyr Met Asp Asp Leu Tyr Val Gly Ser Asp Leu Glu Ile Gly Gln
            340                 345                 350

His Arg Thr Lys Ile Glu Glu Leu Arg Gln His Leu Leu Lys Trp Gly
```

```
        355                 360                 365

Phe Thr Thr Pro Asp Lys Lys His Gln Lys Glu Pro Pro Phe Leu Trp
    370                 375                 380

Met Gly Tyr Glu Leu His Pro Asp Lys Trp Thr Val Gln Pro Ile Val
385                 390                 395                 400

Leu Pro Glu Lys Asp Ser Trp Thr Val Asn Asp Ile Gln Lys Leu Val
                405                 410                 415

Gly Lys Leu Asn Trp Ala Ser Gln Ile Tyr Pro Gly Ile Lys Val Lys
            420                 425                 430

Gln Leu Cys Lys Leu Leu Arg Gly Ala Lys Ala Leu Thr Asp Ile Val
        435                 440                 445

Pro Leu Thr Glu Glu Ala Glu Leu Glu Leu Ala Glu Asn Arg Glu Ile
    450                 455                 460

Leu Lys Glu Pro Val His Gly Val Tyr Tyr Asp Pro Ser Lys Asp Leu
465                 470                 475                 480

Ile Ala Glu Ile Gln Lys Gln Gly Gln Asp Gln Trp Thr Tyr Gln Ile
                485                 490                 495

Tyr Gln Glu Pro Phe Lys Asn Leu Lys Thr Gly Lys Tyr Ala Arg Met
            500                 505                 510

Arg Gly Ala His Thr Asn Asp Val Lys Gln Leu Thr Glu Ala Val Gln
        515                 520                 525

Lys Ile Ala Thr Glu Ser Ile Val Ile Trp Gly Lys Thr Pro Lys Phe
    530                 535                 540

Arg Leu Pro Ile Gln Lys Glu Thr Trp Glu Thr Trp Trp Thr Glu Tyr
```

545 550 555 560

Trp Gln Ala Thr Trp Ile Pro Glu Trp Glu Phe Val Asn Thr Pro Pro
565 570 575

Leu Val Lys Leu Trp Tyr Gln Leu Glu Lys Glu Pro Ile Val Gly Ala
580 585 590

Glu Thr Phe Tyr Val Asp Gly Ala Ala Asn Arg Glu Thr Lys Leu Gly
595 600 605

Lys Ala Gly Tyr Val Thr Asp Arg Gly Arg Gln Lys Val Val Ser Leu
610 615 620

Thr Glu Thr Thr Asn Gln Lys Thr Glu Leu Gln Ala Ile His Leu Ala
625 630 635 640

Leu Gln Asp Ser Gly Ser Glu Val Asn Ile Val Thr Asp Ser Gln Tyr
645 650 655

Ala Leu Gly Ile Ile Gln Ala Gln Pro Asp Lys Ser Glu Ser Glu Leu
660 665 670

Val Asn Gln Ile Ile Glu Gln Leu Ile Lys Lys Glu Lys Val Tyr Leu
675 680 685

Ser Trp Val Pro Ala His Lys Gly Ile Gly Gly Asn Glu Gln Val Asp
690 695 700

Lys Leu Val Ser Ser Gly Ile Arg Lys Val Leu Phe Leu Asp Gly Ile
705 710 715 720

Asp Lys Ala Gln Glu Glu His Glu Lys Tyr His Ser Asn Trp Arg Ala
725 730 735

Met Ala Ser Asp Phe Asn Leu Pro Pro Ile Val Ala Lys Glu Ile Val

740 745 750

Ala Ser Cys Asp Lys Cys Gln Leu Lys Gly Glu Ala Met His Gly Gln
755 760 765

Val Asp Cys Ser Pro Gly Ile Trp Gln Leu Asp Cys Thr His Leu Glu
770 775 780

Gly Lys Val Ile Leu Val Ala Val His Val Ala Ser Gly Tyr Ile Glu
785 790 795 800

Ala Glu Val Ile Pro Ala Glu Thr Gly Gln Glu Thr Ala Tyr Phe Leu
805 810 815

Leu Lys Leu Ala Gly Arg Trp Pro Val Lys Val Ile His Thr Asp Asn
820 825 830

Gly Ser Asn Phe Thr Ser Ala Ala Val Lys Ala Ala Cys Trp Trp Ala
835 840 845

Gly Ile Lys Gln Glu Phe Gly Ile Pro Tyr Asn Pro Gln Ser Gln Gly
850 855 860

Val Val Glu Ser Met Asn Lys Glu Leu Lys Lys Ile Ile Gly Gln Val
865 870 875 880

Arg Asp Gln Ala Glu His Leu Lys Thr Ala Val Gln Met Ala Val Phe
885 890 895

Ile His Asn Phe Lys Arg Lys Gly Gly Ile Gly Gly Tyr Ser Ala Gly
900 905 910

Glu Arg Ile Ile Asp Ile Ile Ala Thr Asp Ile Gln Thr Lys Glu Leu
915 920 925

Gln Lys Gln Ile Thr Lys Ile Gln Asn Phe Arg Val Tyr Tyr Arg Asp

930 935 940

Ser Arg Asp Pro Ile Trp Lys Gly Pro Ala Lys Leu Leu Trp Lys Gly
945 950 955 960

Glu Gly Ala Val Val Ile Gln Asp Asn Ser Asp Ile Lys Val Val Pro
965 970 975

Arg Arg Lys Ala Lys Ile Ile Arg Asp Tyr Gly Lys Gln Met Ala Gly
980 985 990

Asp Asp Cys Val Ala Gly Arg Gln Asp Glu Asp Gln
995 1000

<210> 727
<211> 609
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M pol Epigraph1 Conserved

<400> 727

Pro Gln Ile Thr Leu Trp Gln Arg Pro Leu Val Thr Ile Lys Ile Gly
1 5 10 15

Gly Gln Leu Lys Glu Ala Leu Leu Asp Thr Gly Ala Asp Asp Thr Val
20 25 30

Leu Glu Asp Ile Asn Leu Pro Gly Lys Trp Lys Pro Lys Met Ile Gly
35 40 45

Gly Ile Gly Gly Phe Ile Lys Val Arg Gln Tyr Asp Gln Ile Leu Ile
50 55 60

Glu Ile Cys Gly Lys Lys Ala Ile Gly Thr Val Leu Val Gly Pro Thr
65 70 75 80

```
Pro Val Asn Ile Ile Gly Arg Asn Leu Leu Thr Gln Ile Gly Cys Thr
                85                  90                  95

Leu Asn Phe Pro Ile Ser Pro Ile Glu Thr Val Pro Val Lys Leu Lys
            100                 105                 110

Pro Gly Met Asp Gly Pro Lys Val Lys Gln Trp Pro Leu Thr Glu Glu
        115                 120                 125

Lys Ile Lys Ala Leu Val Glu Ile Cys Thr Glu Met Glu Lys Glu Gly
    130                 135                 140

Lys Ile Ser Lys Ile Gly Pro Glu Asn Pro Tyr Asn Thr Pro Val Phe
145                 150                 155                 160

Ala Ile Lys Lys Lys Asp Ser Thr Lys Trp Arg Lys Leu Val Asp Phe
                165                 170                 175

Arg Glu Leu Asn Lys Arg Thr Gln Asp Phe Trp Glu Val Gln Leu Gly
            180                 185                 190

Ile Pro His Pro Ala Gly Leu Lys Lys Lys Lys Ser Val Thr Val Leu
        195                 200                 205

Asp Val Gly Asp Ala Tyr Phe Ser Val Pro Leu Asp Lys Asp Phe Arg
    210                 215                 220

Lys Tyr Thr Ala Phe Thr Ile Pro Ser Ile Asn Asn Glu Thr Pro Gly
225                 230                 235                 240

Ile Arg Tyr Gln Tyr Asn Val Leu Pro Gln Gly Trp Lys Gly Ser Pro
                245                 250                 255

Ala Ile Phe Gln Ser Ser Met Thr Lys Ile Leu Glu Pro Phe Arg Lys
            260                 265                 270
```

```
Gln Asn Pro Asp Ile Val Ile Tyr Gln Tyr Met Asp Asp Leu Tyr Val
        275                 280                 285

Gly Ser Asp Leu Glu Ile Gly Gln His Arg Thr Lys Ile Glu Glu Leu
    290                 295                 300

Arg Gln His Leu Leu Lys Trp Gly Phe Thr Thr Pro Asp Lys Lys His
305                 310                 315                 320

Gln Lys Glu Pro Pro Phe Leu Trp Met Gly Tyr Glu Leu His Pro Asp
                325                 330                 335

Lys Trp Thr Val Gln Pro Ile Val Leu Pro Glu Lys Asp Ser Trp Thr
            340                 345                 350

Val Asn Asp Ile Gln Lys Leu Val Gly Lys Leu Asn Trp Ala Ser Gln
        355                 360                 365

Ile Tyr His Gly Gln Val Asp Cys Ser Pro Gly Ile Trp Gln Leu Asp
    370                 375                 380

Cys Thr His Leu Glu Gly Lys Val Ile Leu Val Ala Val His Val Ala
385                 390                 395                 400

Ser Gly Tyr Ile Glu Ala Glu Val Ile Pro Ala Glu Thr Gly Gln Glu
                405                 410                 415

Thr Ala Tyr Phe Leu Leu Lys Leu Ala Gly Arg Trp Pro Val Lys Val
            420                 425                 430

Ile His Thr Asp Asn Gly Ser Asn Phe Thr Ser Ala Ala Val Lys Ala
        435                 440                 445

Ala Cys Trp Trp Ala Gly Ile Lys Gln Glu Phe Gly Ile Pro Tyr Asn
    450                 455                 460
```

```
Pro Gln Ser Gln Gly Val Val Glu Ser Met Asn Lys Glu Leu Lys Lys
465                 470                 475                 480


Ile Ile Gly Gln Val Arg Asp Gln Ala Glu His Leu Lys Thr Ala Val
                485                 490                 495


Gln Met Ala Val Phe Ile His Asn Phe Lys Arg Lys Gly Gly Ile Gly
            500                 505                 510


Gly Tyr Ser Ala Gly Glu Arg Ile Ile Asp Ile Ile Ala Thr Asp Ile
        515                 520                 525


Gln Thr Lys Glu Leu Gln Lys Gln Ile Thr Lys Ile Gln Asn Phe Arg
    530                 535                 540


Val Tyr Tyr Arg Asp Ser Arg Asp Pro Ile Trp Lys Gly Pro Ala Lys
545                 550                 555                 560


Leu Leu Trp Lys Gly Glu Gly Ala Val Val Ile Gln Asp Asn Ser Asp
                565                 570                 575


Ile Lys Val Val Pro Arg Arg Lys Ala Lys Ile Ile Arg Asp Tyr Gly
            580                 585                 590


Lys Gln Met Ala Gly Asp Asp Cys Val Ala Gly Arg Gln Asp Glu Asp
        595                 600                 605


Gln
```

<210> 728
<211> 1003
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M pol Epigraph2

<400> 728

```
Phe Phe Arg Glu Asp Leu Ala Phe Pro Gln Gly Lys Ala Arg Glu Phe
1               5                  10                  15

Pro Ser Glu Gln Thr Arg Ala Asn Ser Pro Thr Arg Gly Glu Leu Gln
            20                  25                  30

Val Trp Gly Gly Asp Asn Asn Ser Pro Ser Glu Ala Gly Ala Asp Arg
        35                  40                  45

Gln Gly Thr Val Ser Phe Ser Phe Pro Gln Ile Thr Leu Trp Gln Arg
    50                  55                  60

Pro Leu Val Ser Ile Lys Val Gly Gly Gln Ile Lys Glu Ala Leu Leu
65                  70                  75                  80

Asp Thr Gly Ala Asp Asp Thr Val Leu Glu Glu Met Asn Leu Pro Gly
                85                  90                  95

Arg Trp Lys Pro Lys Met Ile Gly Gly Ile Gly Gly Phe Ile Lys Val
            100                 105                 110

Arg Gln Tyr Asp Gln Ile Pro Ile Glu Ile Cys Gly His Lys Ala Ile
        115                 120                 125

Gly Thr Val Leu Ile Gly Pro Thr Pro Val Asn Ile Ile Gly Arg Asn
    130                 135                 140

Met Leu Thr Gln Leu Gly Cys Thr Leu Asn Phe Pro Ile Ser Pro Ile
145                 150                 155                 160

Asp Thr Val Pro Val Thr Leu Lys Pro Gly Met Asp Gly Pro Arg Val
                165                 170                 175

Lys Gln Trp Pro Leu Thr Glu Glu Lys Ile Lys Ala Leu Thr Glu Ile
```

180 185 190

Cys Lys Glu Met Glu Lys Glu Gly Lys Ile Thr Lys Ile Gly Pro Glu
195 200 205

Asn Pro Tyr Asn Thr Pro Ile Phe Ala Ile Lys Lys Lys Asp Ser Thr
210 215 220

Lys Trp Arg Lys Leu Val Asp Phe Arg Glu Leu Asn Lys Lys Thr Gln
225 230 235 240

Asp Phe Trp Glu Val Gln Leu Gly Ile Pro His Pro Ala Gly Leu Lys
245 250 255

Lys Lys Lys Ser Val Thr Val Leu Asp Val Gly Asp Ala Tyr Phe Ser
260 265 270

Val Pro Leu Asp Glu Ser Phe Arg Lys Tyr Thr Ala Phe Thr Ile Pro
275 280 285

Ser Thr Asn Asn Glu Thr Pro Gly Ile Arg Tyr Gln Tyr Asn Val Leu
290 295 300

Pro Gln Gly Trp Lys Gly Ser Pro Ala Ile Phe Gln Cys Ser Met Thr
305 310 315 320

Lys Ile Leu Glu Pro Phe Arg Ile Lys Asn Pro Glu Ile Val Ile Tyr
325 330 335

Gln Tyr Met Asp Asp Leu Tyr Val Gly Ser Asp Leu Glu Ile Gly Gln
340 345 350

His Arg Ala Lys Ile Glu Glu Leu Arg Glu His Leu Leu Arg Trp Gly
355 360 365

Phe Thr Thr Pro Asp Lys Lys His Gln Lys Glu Pro Pro Phe Leu Trp

370 375 380

Met Gly Tyr Glu Leu His Pro Asp Arg Trp Thr Val Gln Pro Ile Glu
385 390 395 400

Leu Pro Glu Lys Asp Ser Trp Thr Val Asn Asp Ile Gln Lys Leu Val
405 410 415

Gly Lys Leu Asn Trp Ala Ser Gln Ile Tyr Ala Gly Ile Lys Val Arg
420 425 430

Gln Leu Cys Lys Leu Leu Arg Gly Thr Lys Ala Leu Thr Glu Val Val
435 440 445

Pro Leu Thr Glu Glu Ala Glu Leu Glu Leu Ala Glu Asn Arg Glu Ile
450 455 460

Leu Lys Thr Pro Val His Gly Val Tyr Tyr Asp Pro Ser Lys Asp Leu
465 470 475 480

Val Ala Glu Ile Gln Lys Gln Gly Gln Gly Gln Trp Thr Tyr Gln Ile
485 490 495

Tyr Gln Glu Pro Tyr Lys Asn Leu Lys Thr Gly Lys Tyr Ala Arg Lys
500 505 510

Arg Ser Ala His Thr Asn Asp Val Arg Gln Leu Thr Glu Val Val Gln
515 520 525

Lys Ile Ala Thr Glu Ser Ile Val Ile Trp Gly Lys Thr Pro Lys Phe
530 535 540

Lys Leu Pro Ile Gln Lys Glu Thr Trp Glu Ala Trp Trp Thr Asp Tyr
545 550 555 560

Trp Gln Ala Thr Trp Ile Pro Asp Trp Glu Phe Val Asn Thr Pro Pro

565 570 575

Leu Val Lys Leu Trp Tyr Gln Leu Glu Lys Asp Pro Ile Val Gly Ala
580 585 590

Glu Thr Phe Tyr Val Asp Gly Ala Ala Ser Arg Glu Thr Lys Leu Gly
595 600 605

Lys Ala Gly Tyr Val Thr Asn Arg Gly Arg Gln Lys Val Val Ser Leu
610 615 620

Thr Asp Thr Thr Asn Gln Lys Thr Glu Leu His Ala Ile His Leu Ala
625 630 635 640

Leu Gln Asp Ser Gly Leu Glu Val Asn Ile Val Thr Asp Ser Gln Tyr
645 650 655

Ala Leu Gly Ile Ile Gln Ala Gln Pro Asp Arg Ser Glu Ser Glu Val
660 665 670

Val Asn Gln Ile Ile Glu Glu Leu Ile Lys Lys Glu Lys Val Tyr Leu
675 680 685

Ala Trp Val Pro Ala His Lys Gly Ile Gly Gly Asn Glu Gln Val Asp
690 695 700

Lys Leu Val Ser Ala Gly Ile Arg Lys Val Leu Phe Leu Asp Gly Ile
705 710 715 720

Asp Lys Ala Gln Glu Glu His Glu Arg Tyr His Ser Asn Trp Arg Thr
725 730 735

Met Ala Ser Asp Phe Asn Leu Pro Pro Val Val Ala Lys Glu Ile Val
740 745 750

Ala Asn Cys Asp Lys Cys Gln Leu Lys Gly Glu Ala Ile His Gly Gln

```
        755                 760                 765

Val Asp Cys Ser Pro Gly Met Trp Gln Leu Asp Cys Thr His Leu Glu
    770                 775                 780

Gly Lys Ile Ile Leu Val Ala Val His Val Ala Ser Gly Tyr Met Glu
785                 790                 795                 800

Ala Glu Val Ile Pro Ala Glu Thr Gly Gln Glu Thr Ala Tyr Phe Ile
                805                 810                 815

Leu Lys Leu Ala Gly Arg Trp Pro Val Lys Thr Ile His Thr Asp Asn
            820                 825                 830

Gly Ser Asn Phe Thr Ser Thr Thr Val Lys Ala Ala Cys Trp Trp Ala
        835                 840                 845

Gly Ile Gln Gln Glu Phe Gly Ile Pro Tyr Asn Pro Gln Ser Gln Gly
    850                 855                 860

Val Val Glu Ser Met Asn Asn Glu Leu Lys Lys Ile Ile Gly Gln Val
865                 870                 875                 880

Arg Glu Gln Ala Glu His Leu Lys Thr Ala Val Gln Met Ala Val Phe
                885                 890                 895

Ile His Asn Phe Lys Arg Arg Gly Gly Ile Gly Gly Tyr Ser Ala Gly
            900                 905                 910

Glu Arg Ile Val Asp Ile Ile Ala Thr Asp Ile Gln Thr Arg Glu Leu
        915                 920                 925

Gln Lys Gln Ile Ile Lys Ile Gln Asn Phe Arg Val Tyr Tyr Arg Asp
    930                 935                 940

Ser Arg Asp Pro Leu Trp Lys Gly Pro Ala Lys Leu Leu Trp Lys Gly
```

945 950 955 960

Glu Gly Ala Val Val Ile Gln Asp Asn Ser Glu Ile Lys Val Val Pro
965 970 975

Arg Arg Lys Val Lys Ile Ile Lys Asp Tyr Gly Lys Gln Met Ala Gly
980 985 990

Asp Asp Cys Val Ala Ser Arg Gln Asp Glu Asp
995 1000

<210> 729
<211> 608
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M pol Epigraph2 Conserved

<400> 729

Pro Gln Ile Thr Leu Trp Gln Arg Pro Leu Val Ser Ile Lys Val Gly
1 5 10 15

Gly Gln Ile Lys Glu Ala Leu Leu Asp Thr Gly Ala Asp Asp Thr Val
20 25 30

Leu Glu Glu Met Asn Leu Pro Gly Arg Trp Lys Pro Lys Met Ile Gly
35 40 45

Gly Ile Gly Gly Phe Ile Lys Val Arg Gln Tyr Asp Gln Ile Pro Ile
50 55 60

Glu Ile Cys Gly His Lys Ala Ile Gly Thr Val Leu Ile Gly Pro Thr
65 70 75 80

Pro Val Asn Ile Ile Gly Arg Asn Met Leu Thr Gln Leu Gly Cys Thr
85 90 95

```
Leu Asn Phe Pro Ile Ser Pro Ile Asp Thr Val Pro Val Thr Leu Lys
            100                 105                 110


Pro Gly Met Asp Gly Pro Arg Val Lys Gln Trp Pro Leu Thr Glu Glu
        115                 120                 125


Lys Ile Lys Ala Leu Thr Glu Ile Cys Lys Glu Met Glu Lys Glu Gly
    130                 135                 140


Lys Ile Thr Lys Ile Gly Pro Glu Asn Pro Tyr Asn Thr Pro Ile Phe
145                 150                 155                 160


Ala Ile Lys Lys Lys Asp Ser Thr Lys Trp Arg Lys Leu Val Asp Phe
                165                 170                 175


Arg Glu Leu Asn Lys Lys Thr Gln Asp Phe Trp Glu Val Gln Leu Gly
            180                 185                 190


Ile Pro His Pro Ala Gly Leu Lys Lys Lys Lys Ser Val Thr Val Leu
        195                 200                 205


Asp Val Gly Asp Ala Tyr Phe Ser Val Pro Leu Asp Glu Ser Phe Arg
    210                 215                 220


Lys Tyr Thr Ala Phe Thr Ile Pro Ser Thr Asn Asn Glu Thr Pro Gly
225                 230                 235                 240


Ile Arg Tyr Gln Tyr Asn Val Leu Pro Gln Gly Trp Lys Gly Ser Pro
                245                 250                 255


Ala Ile Phe Gln Cys Ser Met Thr Lys Ile Leu Glu Pro Phe Arg Ile
            260                 265                 270


Lys Asn Pro Glu Ile Val Ile Tyr Gln Tyr Met Asp Asp Leu Tyr Val
        275                 280                 285
```

```
Gly Ser Asp Leu Glu Ile Gly Gln His Arg Ala Lys Ile Glu Glu Leu
    290                 295                 300

Arg Glu His Leu Leu Arg Trp Gly Phe Thr Thr Pro Asp Lys Lys His
305                 310                 315                 320

Gln Lys Glu Pro Pro Phe Leu Trp Met Gly Tyr Glu Leu His Pro Asp
                325                 330                 335

Arg Trp Thr Val Gln Pro Ile Glu Leu Pro Glu Lys Asp Ser Trp Thr
            340                 345                 350

Val Asn Asp Ile Gln Lys Leu Val Gly Lys Leu Asn Trp Ala Ser Gln
        355                 360                 365

Ile Tyr His Gly Gln Val Asp Cys Ser Pro Gly Met Trp Gln Leu Asp
    370                 375                 380

Cys Thr His Leu Glu Gly Lys Ile Ile Leu Val Ala Val His Val Ala
385                 390                 395                 400

Ser Gly Tyr Met Glu Ala Glu Val Ile Pro Ala Glu Thr Gly Gln Glu
                405                 410                 415

Thr Ala Tyr Phe Ile Leu Lys Leu Ala Gly Arg Trp Pro Val Lys Thr
            420                 425                 430

Ile His Thr Asp Asn Gly Ser Asn Phe Thr Ser Thr Thr Val Lys Ala
        435                 440                 445

Ala Cys Trp Trp Ala Gly Ile Gln Gln Glu Phe Gly Ile Pro Tyr Asn
    450                 455                 460

Pro Gln Ser Gln Gly Val Val Glu Ser Met Asn Asn Glu Leu Lys Lys
465                 470                 475                 480
```

Ile Ile Gly Gln Val Arg Glu Gln Ala Glu His Leu Lys Thr Ala Val
485 490 495

Gln Met Ala Val Phe Ile His Asn Phe Lys Arg Arg Gly Gly Ile Gly
500 505 510

Gly Tyr Ser Ala Gly Glu Arg Ile Val Asp Ile Ile Ala Thr Asp Ile
515 520 525

Gln Thr Arg Glu Leu Gln Lys Gln Ile Ile Lys Ile Gln Asn Phe Arg
530 535 540

Val Tyr Tyr Arg Asp Ser Arg Asp Pro Leu Trp Lys Gly Pro Ala Lys
545 550 555 560

Leu Leu Trp Lys Gly Glu Gly Ala Val Val Ile Gln Asp Asn Ser Glu
565 570 575

Ile Lys Val Val Pro Arg Arg Lys Val Lys Ile Ile Lys Asp Tyr Gly
580 585 590

Lys Gln Met Ala Gly Asp Asp Cys Val Ala Ser Arg Gln Asp Glu Asp
595 600 605

<210> 730
<211> 500
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B gag Epigraph1

<400> 730

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys

```
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
    130                 135                 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
```

210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys

405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser Gln
500

<210> 731
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B gag Epigraph1 Conserved

<400> 731

Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala Ile Ser
1 5 10 15

Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe
20 25 30

Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly Ala Thr
35 40 45

```
Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln Ala
    50                  55                  60

Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp
65                  70                  75                  80

Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln Met
                85                  90                  95

Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln
            100                 105                 110

Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro Val Gly Glu
        115                 120                 125

Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met
    130                 135                 140

Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro
145                 150                 155                 160

Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln
                165                 170                 175

Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln
            180                 185                 190

Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala
        195                 200                 205

Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
    210                 215                 220

Gly His Lys Ala Arg Val Leu
225                 230
```

<210> 732
<211> 499
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B gag Epigraph2

<400> 732

```
Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95


Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110


Lys Arg Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Gln Val
        115                 120                 125


Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His
    130                 135                 140


Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
```

```
145                 150                 155                 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
                165                 170                 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Asp Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala
    210                 215                 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225                 230                 235                 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
                245                 250                 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
            260                 265                 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly
        275                 280                 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Val Leu
    290                 295                 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305                 310                 315                 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
                325                 330                 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
```

340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg
450 455 460

Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp
465 470 475 480

Lys Asp Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp
485 490 495

Pro Ser Ser

<210> 733
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B gag Epigraph2 Conserved

<400> 733

```
Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His Gln Pro Ile Ser
1               5                   10                  15


Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala Phe
            20                  25                  30


Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr
        35                  40                  45


Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln Ala
    50                  55                  60


Ala Met Gln Ile Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Asp Trp
65                  70                  75                  80


Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala Pro Gly Gln Met
                85                  90                  95


Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu Gln
            100                 105                 110


Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile Pro Val Gly Glu
        115                 120                 125


Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys Ile Val Arg Met
    130                 135                 140


Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro
145                 150                 155                 160


Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Val Leu Arg Ala Glu Gln
                165                 170                 175
```

Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln
180 185 190

Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Gly
195 200 205

Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
210 215 220

Ser His Lys Ala Arg Ile Leu
225 230

<210> 734
<211> 206
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B nef Epigraph1

<400> 734

Met Gly Gly Lys Trp Ser Lys Ser Ser Ile Val Gly Trp Pro Ala Val
1 5 10 15

Arg Glu Arg Met Arg Arg Ala Glu Pro Ala Ala Glu Gly Val Gly Ala
20 25 30

Val Ser Arg Asp Leu Glu Lys His Gly Ala Ile Thr Ser Ser Asn Thr
35 40 45

Ala Ala Thr Asn Ala Asp Cys Ala Trp Leu Glu Ala Gln Glu Glu Glu
50 55 60

Glu Val Gly Phe Pro Val Arg Pro Gln Val Pro Leu Arg Pro Met Thr
65 70 75 80

Tyr Lys Gly Ala Leu Asp Leu Ser His Phe Leu Lys Glu Lys Gly Gly

85 90 95

Leu Glu Gly Leu Ile Tyr Ser Gln Lys Arg Gln Asp Ile Leu Asp Leu
100 105 110

Trp Val Tyr His Thr Gln Gly Tyr Phe Pro Asp Trp Gln Asn Tyr Thr
115 120 125

Pro Gly Pro Gly Ile Arg Tyr Pro Leu Thr Phe Gly Trp Cys Phe Lys
130 135 140

Leu Val Pro Val Glu Pro Glu Lys Val Glu Glu Ala Asn Glu Gly Glu
145 150 155 160

Asn Asn Ser Leu Leu His Pro Met Ser Gln His Gly Met Asp Asp Pro
165 170 175

Glu Lys Glu Val Leu Met Trp Lys Phe Asp Ser Arg Leu Ala Phe His
180 185 190

His Met Ala Arg Glu Leu His Pro Glu Tyr Tyr Lys Asp Cys
195 200 205

<210> 735
<211> 81
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B nef Epigraph1 Conserved

<400> 735

Gly Phe Pro Val Arg Pro Gln Val Pro Leu Arg Pro Met Thr Tyr Lys
1 5 10 15

Gly Ala Leu Asp Leu Ser His Phe Leu Lys Glu Lys Gly Gly Leu Glu
20 25 30

Gly Leu Ile Tyr Ser Gln Lys Arg Gln Asp Ile Leu Asp Leu Trp Val
35 40 45

Tyr His Thr Gln Gly Tyr Phe Pro Asp Trp Gln Asn Tyr Thr Pro Gly
50 55 60

Pro Gly Ile Arg Tyr Pro Leu Thr Phe Gly Trp Cys Phe Lys Leu Val
65 70 75 80

Pro

<210> 736
<211> 206
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B nef Epigraph2

<400> 736

Met Gly Gly Lys Trp Ser Lys Ser Ser Val Val Gly Trp Pro Ala Ile
1 5 10 15

Arg Glu Arg Met Arg Arg Ala Glu Pro Ala Ala Asp Gly Val Gly Ala
20 25 30

Ala Ser Arg Asp Leu Glu Arg His Gly Ala Ile Thr Ser Ser Asn Thr
35 40 45

Ala Ala Asn Asn Ala Ala Cys Ala Trp Leu Glu Ala Gln Glu Asp Glu
50 55 60

Glu Val Gly Phe Pro Val Lys Pro Gln Val Pro Leu Arg Pro Met Thr
65 70 75 80

Tyr Lys Ala Ala Val Asp Leu Ser His Phe Leu Lys Glu Lys Gly Gly

85 90 95

Leu Glu Gly Leu Ile His Ser Gln Lys Arg Gln Glu Ile Leu Asp Leu
100 105 110

Trp Val Tyr His Thr Gln Gly Phe Phe Pro Asp Trp Gln Asn Tyr Thr
115 120 125

Pro Gly Pro Gly Thr Arg Phe Pro Leu Thr Phe Gly Trp Cys Phe Lys
130 135 140

Leu Val Pro Val Asp Pro Asp Lys Val Glu Glu Ala Asn Glu Gly Glu
145 150 155 160

Asn Asn Cys Leu Leu His Pro Met Ser Leu His Gly Met Asp Asp Pro
165 170 175

Glu Arg Glu Val Leu Val Trp Lys Phe Asp Ser Arg Leu Ala Phe His
180 185 190

His Val Ala Arg Glu Leu His Pro Glu Tyr Tyr Lys Asn Cys
195 200 205

<210> 737
<211> 81
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B nef Epigraph2 Conserved

<400> 737

Gly Phe Pro Val Lys Pro Gln Val Pro Leu Arg Pro Met Thr Tyr Lys
1 5 10 15

Ala Ala Val Asp Leu Ser His Phe Leu Lys Glu Lys Gly Gly Leu Glu
20 25 30

Gly Leu Ile His Ser Gln Lys Arg Gln Glu Ile Leu Asp Leu Trp Val
35 40 45

Tyr His Thr Gln Gly Phe Phe Pro Asp Trp Gln Asn Tyr Thr Pro Gly
50 55 60

Pro Gly Thr Arg Phe Pro Leu Thr Phe Gly Trp Cys Phe Lys Leu Val
65 70 75 80

Pro

<210> 738
<211> 1003
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B pol Epigraph1

<400> 738

Phe Phe Arg Glu Asn Leu Ala Phe Pro Gln Gly Lys Ala Arg Glu Phe
1 5 10 15

Ser Ser Glu Gln Thr Arg Ala Asn Ser Pro Thr Arg Arg Glu Leu Gln
20 25 30

Val Trp Gly Arg Asp Asn Asn Ser Leu Ser Glu Ala Gly Ala Asp Arg
35 40 45

Gln Gly Thr Val Ser Phe Ser Phe Pro Gln Ile Thr Leu Trp Gln Arg
50 55 60

Pro Leu Val Thr Ile Lys Ile Gly Gly Gln Leu Lys Glu Ala Leu Leu
65 70 75 80

Asp Thr Gly Ala Asp Asp Thr Val Leu Glu Glu Met Asn Leu Pro Gly

85 90 95

Arg Trp Lys Pro Lys Met Ile Gly Gly Ile Gly Gly Phe Ile Lys Val
100 105 110

Arg Gln Tyr Asp Gln Ile Pro Ile Glu Ile Cys Gly His Lys Ala Ile
115 120 125

Gly Thr Val Leu Val Gly Pro Thr Pro Val Asn Ile Ile Gly Arg Asn
130 135 140

Leu Leu Thr Gln Ile Gly Cys Thr Leu Asn Phe Pro Ile Ser Pro Ile
145 150 155 160

Glu Thr Val Pro Val Lys Leu Lys Pro Gly Met Asp Gly Pro Lys Val
165 170 175

Lys Gln Trp Pro Leu Thr Glu Glu Lys Ile Lys Ala Leu Val Glu Ile
180 185 190

Cys Thr Glu Met Glu Lys Glu Gly Lys Ile Ser Lys Ile Gly Pro Glu
195 200 205

Asn Pro Tyr Asn Thr Pro Val Phe Ala Ile Lys Lys Lys Asp Ser Thr
210 215 220

Lys Trp Arg Lys Leu Val Asp Phe Arg Glu Leu Asn Lys Arg Thr Gln
225 230 235 240

Asp Phe Trp Glu Val Gln Leu Gly Ile Pro His Pro Ala Gly Leu Lys
245 250 255

Lys Lys Lys Ser Val Thr Val Leu Asp Val Gly Asp Ala Tyr Phe Ser
260 265 270

Val Pro Leu Asp Lys Asp Phe Arg Lys Tyr Thr Ala Phe Thr Ile Pro

```
        275                 280                 285

Ser Ile Asn Asn Glu Thr Pro Gly Ile Arg Tyr Gln Tyr Asn Val Leu
    290                 295                 300

Pro Gln Gly Trp Lys Gly Ser Pro Ala Ile Phe Gln Ser Ser Met Thr
305                 310                 315                 320

Lys Ile Leu Glu Pro Phe Arg Lys Gln Asn Pro Asp Ile Val Ile Tyr
                325                 330                 335

Gln Tyr Met Asp Asp Leu Tyr Val Gly Ser Asp Leu Glu Ile Gly Gln
            340                 345                 350

His Arg Thr Lys Ile Glu Glu Leu Arg Gln His Leu Leu Arg Trp Gly
        355                 360                 365

Phe Thr Thr Pro Asp Lys Lys His Gln Lys Glu Pro Pro Phe Leu Trp
    370                 375                 380

Met Gly Tyr Glu Leu His Pro Asp Lys Trp Thr Val Gln Pro Ile Val
385                 390                 395                 400

Leu Pro Glu Lys Asp Ser Trp Thr Val Asn Asp Ile Gln Lys Leu Val
                405                 410                 415

Gly Lys Leu Asn Trp Ala Ser Gln Ile Tyr Ala Gly Ile Lys Val Lys
            420                 425                 430

Gln Leu Cys Lys Leu Leu Arg Gly Thr Lys Ala Leu Thr Glu Val Val
        435                 440                 445

Pro Leu Thr Glu Glu Ala Glu Leu Glu Leu Ala Glu Asn Arg Glu Ile
    450                 455                 460

Leu Lys Glu Pro Val His Gly Val Tyr Tyr Asp Pro Ser Lys Asp Leu
```

```
465                 470                 475                 480

Ile Ala Glu Ile Gln Lys Gln Gly Gln Gly Gln Trp Thr Tyr Gln Ile
                485                 490                 495

Tyr Gln Glu Pro Phe Lys Asn Leu Lys Thr Gly Lys Tyr Ala Arg Met
            500                 505                 510

Arg Gly Ala His Thr Asn Asp Val Lys Gln Leu Thr Glu Ala Val Gln
        515                 520                 525

Lys Ile Ala Thr Glu Ser Ile Val Ile Trp Gly Lys Thr Pro Lys Phe
    530                 535                 540

Lys Leu Pro Ile Gln Lys Glu Thr Trp Glu Ala Trp Trp Thr Glu Tyr
545                 550                 555                 560

Trp Gln Ala Thr Trp Ile Pro Glu Trp Glu Phe Val Asn Thr Pro Pro
                565                 570                 575

Leu Val Lys Leu Trp Tyr Gln Leu Glu Lys Glu Pro Ile Val Gly Ala
            580                 585                 590

Glu Thr Phe Tyr Val Asp Gly Ala Ala Asn Arg Glu Thr Lys Leu Gly
        595                 600                 605

Lys Ala Gly Tyr Val Thr Asp Arg Gly Arg Gln Lys Val Val Ser Leu
    610                 615                 620

Thr Asp Thr Thr Asn Gln Lys Thr Glu Leu Gln Ala Ile His Leu Ala
625                 630                 635                 640

Leu Gln Asp Ser Gly Leu Glu Val Asn Ile Val Thr Asp Ser Gln Tyr
                645                 650                 655

Ala Leu Gly Ile Ile Gln Ala Gln Pro Asp Lys Ser Glu Ser Glu Leu
```

660 665 670

Val Ser Gln Ile Ile Glu Gln Leu Ile Lys Lys Glu Lys Val Tyr Leu
675 680 685

Ala Trp Val Pro Ala His Lys Gly Ile Gly Gly Asn Glu Gln Val Asp
690 695 700

Lys Leu Val Ser Ala Gly Ile Arg Lys Val Leu Phe Leu Asp Gly Ile
705 710 715 720

Asp Lys Ala Gln Glu Glu His Glu Lys Tyr His Ser Asn Trp Arg Ala
725 730 735

Met Ala Ser Asp Phe Asn Leu Pro Pro Val Val Ala Lys Glu Ile Val
740 745 750

Ala Ser Cys Asp Lys Cys Gln Leu Lys Gly Glu Ala Met His Gly Gln
755 760 765

Val Asp Cys Ser Pro Gly Ile Trp Gln Leu Asp Cys Thr His Leu Glu
770 775 780

Gly Lys Ile Ile Leu Val Ala Val His Val Ala Ser Gly Tyr Ile Glu
785 790 795 800

Ala Glu Val Ile Pro Ala Glu Thr Gly Gln Glu Thr Ala Tyr Phe Leu
805 810 815

Leu Lys Leu Ala Gly Arg Trp Pro Val Lys Thr Ile His Thr Asp Asn
820 825 830

Gly Ser Asn Phe Thr Ser Thr Thr Val Lys Ala Ala Cys Trp Trp Ala
835 840 845

Gly Ile Lys Gln Glu Phe Gly Ile Pro Tyr Asn Pro Gln Ser Gln Gly

```
    850                 855                 860

Val Val Glu Ser Met Asn Lys Glu Leu Lys Lys Ile Ile Gly Gln Val
865                 870                 875                 880

Arg Asp Gln Ala Glu His Leu Lys Thr Ala Val Gln Met Ala Val Phe
                885                 890                 895

Ile His Asn Phe Lys Arg Lys Gly Gly Ile Gly Gly Tyr Ser Ala Gly
            900                 905                 910

Glu Arg Ile Val Asp Ile Ile Ala Thr Asp Ile Gln Thr Lys Glu Leu
        915                 920                 925

Gln Lys Gln Ile Thr Lys Ile Gln Asn Phe Arg Val Tyr Tyr Arg Asp
    930                 935                 940

Ser Arg Asp Pro Leu Trp Lys Gly Pro Ala Lys Leu Leu Trp Lys Gly
945                 950                 955                 960

Glu Gly Ala Val Val Ile Gln Asp Asn Ser Asp Ile Lys Val Val Pro
                965                 970                 975

Arg Arg Lys Ala Lys Ile Ile Arg Asp Tyr Gly Lys Gln Met Ala Gly
            980                 985                 990

Asp Asp Cys Val Ala Ser Arg Gln  Asp Glu Asp
        995                 1000
```

<210> 739
<211> 608
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B pol Epigraph1 Conserved

<400> 739

```
Pro Gln Ile Thr Leu Trp Gln Arg Pro Leu Val Thr Ile Lys Ile Gly
1               5                  10                  15

Gly Gln Leu Lys Glu Ala Leu Leu Asp Thr Gly Ala Asp Asp Thr Val
            20                  25                  30

Leu Glu Glu Met Asn Leu Pro Gly Arg Trp Lys Pro Lys Met Ile Gly
        35                  40                  45

Gly Ile Gly Gly Phe Ile Lys Val Arg Gln Tyr Asp Gln Ile Pro Ile
    50                  55                  60

Glu Ile Cys Gly His Lys Ala Ile Gly Thr Val Leu Val Gly Pro Thr
65                  70                  75                  80

Pro Val Asn Ile Ile Gly Arg Asn Leu Leu Thr Gln Ile Gly Cys Thr
                85                  90                  95

Leu Asn Phe Pro Ile Ser Pro Ile Glu Thr Val Pro Val Lys Leu Lys
            100                 105                 110

Pro Gly Met Asp Gly Pro Lys Val Lys Gln Trp Pro Leu Thr Glu Glu
        115                 120                 125

Lys Ile Lys Ala Leu Val Glu Ile Cys Thr Glu Met Glu Lys Glu Gly
    130                 135                 140

Lys Ile Ser Lys Ile Gly Pro Glu Asn Pro Tyr Asn Thr Pro Val Phe
145                 150                 155                 160

Ala Ile Lys Lys Lys Asp Ser Thr Lys Trp Arg Lys Leu Val Asp Phe
                165                 170                 175

Arg Glu Leu Asn Lys Arg Thr Gln Asp Phe Trp Glu Val Gln Leu Gly
            180                 185                 190
```

```
Ile Pro His Pro Ala Gly Leu Lys Lys Lys Lys Ser Val Thr Val Leu
        195                 200                 205


Asp Val Gly Asp Ala Tyr Phe Ser Val Pro Leu Asp Lys Asp Phe Arg
    210                 215                 220


Lys Tyr Thr Ala Phe Thr Ile Pro Ser Ile Asn Asn Glu Thr Pro Gly
225                 230                 235                 240


Ile Arg Tyr Gln Tyr Asn Val Leu Pro Gln Gly Trp Lys Gly Ser Pro
                245                 250                 255


Ala Ile Phe Gln Ser Ser Met Thr Lys Ile Leu Glu Pro Phe Arg Lys
            260                 265                 270


Gln Asn Pro Asp Ile Val Ile Tyr Gln Tyr Met Asp Asp Leu Tyr Val
        275                 280                 285


Gly Ser Asp Leu Glu Ile Gly Gln His Arg Thr Lys Ile Glu Glu Leu
    290                 295                 300


Arg Gln His Leu Leu Arg Trp Gly Phe Thr Thr Pro Asp Lys Lys His
305                 310                 315                 320


Gln Lys Glu Pro Pro Phe Leu Trp Met Gly Tyr Glu Leu His Pro Asp
                325                 330                 335


Lys Trp Thr Val Gln Pro Ile Val Leu Pro Glu Lys Asp Ser Trp Thr
            340                 345                 350


Val Asn Asp Ile Gln Lys Leu Val Gly Lys Leu Asn Trp Ala Ser Gln
        355                 360                 365


Ile Tyr His Gly Gln Val Asp Cys Ser Pro Gly Ile Trp Gln Leu Asp
    370                 375                 380
```

```
Cys Thr His Leu Glu Gly Lys Ile Ile Leu Val Ala Val His Val Ala
385                 390                 395                 400


Ser Gly Tyr Ile Glu Ala Glu Val Ile Pro Ala Glu Thr Gly Gln Glu
                405                 410                 415


Thr Ala Tyr Phe Leu Leu Lys Leu Ala Gly Arg Trp Pro Val Lys Thr
            420                 425                 430


Ile His Thr Asp Asn Gly Ser Asn Phe Thr Ser Thr Thr Val Lys Ala
        435                 440                 445


Ala Cys Trp Trp Ala Gly Ile Lys Gln Glu Phe Gly Ile Pro Tyr Asn
    450                 455                 460


Pro Gln Ser Gln Gly Val Val Glu Ser Met Asn Lys Glu Leu Lys Lys
465                 470                 475                 480


Ile Ile Gly Gln Val Arg Asp Gln Ala Glu His Leu Lys Thr Ala Val
                485                 490                 495


Gln Met Ala Val Phe Ile His Asn Phe Lys Arg Lys Gly Gly Ile Gly
            500                 505                 510


Gly Tyr Ser Ala Gly Glu Arg Ile Val Asp Ile Ile Ala Thr Asp Ile
        515                 520                 525


Gln Thr Lys Glu Leu Gln Lys Gln Ile Thr Lys Ile Gln Asn Phe Arg
    530                 535                 540


Val Tyr Tyr Arg Asp Ser Arg Asp Pro Leu Trp Lys Gly Pro Ala Lys
545                 550                 555                 560


Leu Leu Trp Lys Gly Glu Gly Ala Val Val Ile Gln Asp Asn Ser Asp
                565                 570                 575
```

Ile Lys Val Val Pro Arg Arg Lys Ala Lys Ile Ile Arg Asp Tyr Gly
580 585 590

Lys Gln Met Ala Gly Asp Asp Cys Val Ala Ser Arg Gln Asp Glu Asp
595 600 605

<210> 740
<211> 1003
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B pol Epigraph2

<400> 740

Phe Phe Arg Glu Asp Leu Ala Phe Pro Gln Gly Glu Ala Arg Glu Phe
1 5 10 15

Pro Ser Glu Gln Thr Arg Ala Asn Ser Pro Thr Arg Gly Glu Leu Gln
20 25 30

Val Trp Gly Gly Asp Asn Asn Ser Pro Ser Glu Ala Gly Ala Asp Arg
35 40 45

Gln Gly Thr Val Ser Leu Ser Phe Pro Gln Ile Thr Leu Trp Gln Arg
50 55 60

Pro Leu Val Thr Ile Lys Val Gly Gly Gln Leu Lys Glu Ala Leu Leu
65 70 75 80

Asp Thr Gly Ala Asp Asp Thr Val Leu Glu Asp Met Asn Leu Pro Gly
85 90 95

Lys Trp Lys Pro Lys Met Ile Gly Gly Ile Gly Gly Phe Ile Lys Val
100 105 110

Arg Gln Tyr Asp Gln Ile Leu Ile Glu Ile Cys Gly His Lys Ala Ile

```
        115                 120                 125

Gly Thr Val Leu Ile Gly Pro Thr Pro Val Asn Ile Ile Gly Arg Asn
    130                 135                 140

Leu Leu Thr Gln Leu Gly Cys Thr Leu Asn Phe Pro Ile Ser Pro Ile
145                 150                 155                 160

Asp Thr Val Pro Val Lys Leu Lys Pro Gly Met Asp Gly Pro Arg Val
                165                 170                 175

Lys Gln Trp Pro Leu Thr Glu Glu Lys Ile Lys Ala Leu Ile Glu Ile
            180                 185                 190

Cys Thr Glu Met Glu Lys Glu Gly Lys Ile Ser Arg Ile Gly Pro Glu
        195                 200                 205

Asn Pro Tyr Asn Thr Pro Ile Phe Ala Ile Lys Lys Lys Asp Ser Thr
    210                 215                 220

Lys Trp Arg Lys Leu Val Asp Phe Arg Glu Leu Asn Lys Lys Thr Gln
225                 230                 235                 240

Asp Phe Trp Glu Val Gln Leu Gly Ile Pro His Pro Ser Gly Leu Lys
                245                 250                 255

Lys Lys Lys Ser Val Thr Val Leu Asp Val Gly Asp Ala Tyr Phe Ser
            260                 265                 270

Val Pro Leu Asp Lys Glu Phe Arg Lys Tyr Thr Ala Phe Thr Ile Pro
        275                 280                 285

Ser Thr Asn Asn Glu Thr Pro Gly Ile Arg Tyr Gln Tyr Asn Val Leu
    290                 295                 300

Pro Gln Gly Trp Lys Gly Ser Pro Ala Ile Phe Gln Cys Ser Met Thr
```

305 310 315 320

Lys Ile Leu Glu Pro Phe Arg Lys Gln Asn Pro Glu Ile Val Ile Tyr
325 330 335

Gln Tyr Met Asp Asp Leu Tyr Val Gly Ser Asp Leu Glu Ile Glu Gln
340 345 350

His Arg Thr Lys Ile Glu Glu Leu Arg Gln His Leu Leu Lys Trp Gly
355 360 365

Phe Thr Thr Pro Asp Lys Lys His Gln Lys Glu Pro Pro Phe Leu Trp
370 375 380

Met Gly Tyr Glu Leu His Pro Asp Lys Trp Thr Val Gln Pro Ile Met
385 390 395 400

Leu Pro Glu Lys Asp Ser Trp Thr Val Asn Asp Ile Gln Lys Leu Val
405 410 415

Gly Lys Leu Asn Trp Ala Ser Gln Ile Tyr Pro Gly Ile Lys Val Arg
420 425 430

Gln Leu Cys Lys Leu Leu Arg Gly Ala Lys Ala Leu Thr Glu Val Ile
435 440 445

Pro Leu Thr Glu Glu Ala Glu Leu Glu Leu Ala Glu Asn Arg Glu Ile
450 455 460

Leu Arg Glu Pro Val His Gly Val Tyr Tyr Asp Pro Thr Lys Asp Leu
465 470 475 480

Ile Ala Glu Ile Gln Lys Gln Gly Leu Gly Gln Trp Thr Tyr Gln Ile
485 490 495

Tyr Gln Glu Pro Tyr Lys Asn Leu Lys Thr Gly Lys Tyr Ala Arg Thr

```
            500                 505                 510

Arg Gly Ala His Thr Asn Asp Val Arg Gln Leu Thr Glu Ala Val Gln
        515                 520                 525

Lys Ile Thr Thr Glu Ser Ile Val Ile Trp Gly Lys Thr Pro Lys Phe
    530                 535                 540

Arg Leu Pro Ile Gln Lys Glu Thr Trp Glu Thr Trp Trp Thr Glu Tyr
545                 550                 555                 560

Trp Gln Ala Thr Trp Ile Pro Glu Trp Glu Phe Val Asn Thr Pro Pro
                565                 570                 575

Leu Val Lys Leu Trp Tyr Gln Leu Glu Lys Glu Pro Ile Ile Gly Ala
            580                 585                 590

Glu Thr Phe Tyr Val Asp Gly Ala Ala Asn Arg Asp Thr Lys Leu Gly
        595                 600                 605

Lys Ala Gly Tyr Val Thr Asn Lys Gly Arg Gln Lys Val Val Thr Leu
    610                 615                 620

Thr Asp Thr Thr Asn Gln Lys Thr Glu Leu Gln Ala Ile Tyr Leu Ala
625                 630                 635                 640

Leu Gln Asp Ser Gly Ser Glu Val Asn Ile Val Thr Asp Ser Gln Tyr
                645                 650                 655

Ala Leu Gly Ile Ile Gln Ala Gln Pro Asp Lys Ser Glu Ser Glu Leu
            660                 665                 670

Val Asn Gln Ile Ile Glu Gln Leu Ile Lys Lys Glu Lys Ile Tyr Leu
        675                 680                 685

Ala Trp Val Pro Ala His Lys Gly Ile Gly Gly Asn Glu Gln Val Asp
```

690 695 700

Lys Leu Val Ser Ser Gly Ile Arg Lys Val Leu Phe Leu Asp Gly Ile
705 710 715 720

Asp Lys Ala Gln Glu Asp His Glu Lys Tyr His Ser Asn Trp Lys Ala
725 730 735

Met Ala Ser Asp Phe Asn Leu Pro Pro Ile Val Ala Lys Glu Ile Val
740 745 750

Ala Ser Cys Asp Lys Cys Gln Leu Lys Gly Glu Ala Ile His Gly Gln
755 760 765

Val Asp Cys Ser Pro Gly Ile Trp Gln Leu Asp Cys Thr His Leu Glu
770 775 780

Gly Lys Val Ile Leu Val Ala Val His Val Ala Ser Gly Tyr Ile Glu
785 790 795 800

Ala Glu Val Ile Pro Ala Glu Thr Gly Gln Glu Thr Ala Tyr Phe Ile
805 810 815

Leu Lys Leu Ala Gly Arg Trp Pro Val Lys Thr Val His Thr Asp Asn
820 825 830

Gly Ser Asn Phe Thr Ser Ala Thr Val Lys Ala Ala Cys Trp Trp Ala
835 840 845

Gly Val Lys Gln Glu Phe Gly Ile Pro Tyr Asn Pro Gln Ser Gln Gly
850 855 860

Val Val Glu Ser Met Asn Asn Glu Leu Lys Lys Ile Ile Gly Gln Ile
865 870 875 880

Arg Asp Gln Ala Glu His Leu Lys Thr Ala Val Gln Met Ala Val Phe

885 890 895

Ile His Asn Phe Lys Arg Lys Gly Gly Ile Gly Gly Tyr Ser Ala Gly
900 905 910

Glu Arg Ile Ile Asp Ile Ile Ala Thr Asp Ile Gln Thr Arg Glu Leu
915 920 925

Gln Lys Gln Ile Thr Lys Ile Gln Asn Phe Arg Val Tyr Tyr Arg Asp
930 935 940

Asn Arg Asp Pro Leu Trp Lys Gly Pro Ala Lys Leu Leu Trp Lys Gly
945 950 955 960

Glu Gly Ala Val Val Ile Gln Asp Asn Ser Glu Ile Lys Val Val Pro
965 970 975

Arg Arg Lys Val Lys Ile Ile Arg Asp Tyr Gly Lys Gln Met Ala Gly
980 985 990

Asp Asp Cys Val Ala Gly Arg Gln Asp Glu Asp
995 1000

<210> 741
<211> 608
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B pol Epigraph2 Conserved

<400> 741

Pro Gln Ile Thr Leu Trp Gln Arg Pro Leu Val Thr Ile Lys Val Gly
1 5 10 15

Gly Gln Leu Lys Glu Ala Leu Leu Asp Thr Gly Ala Asp Asp Thr Val
20 25 30

```
Leu Glu Asp Met Asn Leu Pro Gly Lys Trp Lys Pro Lys Met Ile Gly
        35                  40                  45

Gly Ile Gly Gly Phe Ile Lys Val Arg Gln Tyr Asp Gln Ile Leu Ile
    50                  55                  60

Glu Ile Cys Gly His Lys Ala Ile Gly Thr Val Leu Ile Gly Pro Thr
65                  70                  75                  80

Pro Val Asn Ile Ile Gly Arg Asn Leu Leu Thr Gln Leu Gly Cys Thr
                85                  90                  95

Leu Asn Phe Pro Ile Ser Pro Ile Asp Thr Val Pro Val Lys Leu Lys
            100                 105                 110

Pro Gly Met Asp Gly Pro Arg Val Lys Gln Trp Pro Leu Thr Glu Glu
        115                 120                 125

Lys Ile Lys Ala Leu Ile Glu Ile Cys Thr Glu Met Glu Lys Glu Gly
    130                 135                 140

Lys Ile Ser Arg Ile Gly Pro Glu Asn Pro Tyr Asn Thr Pro Ile Phe
145                 150                 155                 160

Ala Ile Lys Lys Lys Asp Ser Thr Lys Trp Arg Lys Leu Val Asp Phe
                165                 170                 175

Arg Glu Leu Asn Lys Lys Thr Gln Asp Phe Trp Glu Val Gln Leu Gly
            180                 185                 190

Ile Pro His Pro Ser Gly Leu Lys Lys Lys Lys Ser Val Thr Val Leu
        195                 200                 205

Asp Val Gly Asp Ala Tyr Phe Ser Val Pro Leu Asp Lys Glu Phe Arg
    210                 215                 220
```

```
Lys Tyr Thr Ala Phe Thr Ile Pro Ser Thr Asn Asn Glu Thr Pro Gly
225                 230                 235                 240


Ile Arg Tyr Gln Tyr Asn Val Leu Pro Gln Gly Trp Lys Gly Ser Pro
                245                 250                 255


Ala Ile Phe Gln Cys Ser Met Thr Lys Ile Leu Glu Pro Phe Arg Lys
            260                 265                 270


Gln Asn Pro Glu Ile Val Ile Tyr Gln Tyr Met Asp Asp Leu Tyr Val
        275                 280                 285


Gly Ser Asp Leu Glu Ile Glu Gln His Arg Thr Lys Ile Glu Glu Leu
    290                 295                 300


Arg Gln His Leu Leu Lys Trp Gly Phe Thr Thr Pro Asp Lys Lys His
305                 310                 315                 320


Gln Lys Glu Pro Pro Phe Leu Trp Met Gly Tyr Glu Leu His Pro Asp
                325                 330                 335


Lys Trp Thr Val Gln Pro Ile Met Leu Pro Glu Lys Asp Ser Trp Thr
            340                 345                 350


Val Asn Asp Ile Gln Lys Leu Val Gly Lys Leu Asn Trp Ala Ser Gln
        355                 360                 365


Ile Tyr His Gly Gln Val Asp Cys Ser Pro Gly Ile Trp Gln Leu Asp
    370                 375                 380


Cys Thr His Leu Glu Gly Lys Val Ile Leu Val Ala Val His Val Ala
385                 390                 395                 400


Ser Gly Tyr Ile Glu Ala Glu Val Ile Pro Ala Glu Thr Gly Gln Glu
                405                 410                 415
```

```
Thr Ala Tyr Phe Ile Leu Lys Leu Ala Gly Arg Trp Pro Val Lys Thr
            420                 425                 430

Val His Thr Asp Asn Gly Ser Asn Phe Thr Ser Ala Thr Val Lys Ala
        435                 440                 445

Ala Cys Trp Trp Ala Gly Val Lys Gln Glu Phe Gly Ile Pro Tyr Asn
    450                 455                 460

Pro Gln Ser Gln Gly Val Val Glu Ser Met Asn Asn Glu Leu Lys Lys
465                 470                 475                 480

Ile Ile Gly Gln Ile Arg Asp Gln Ala Glu His Leu Lys Thr Ala Val
                485                 490                 495

Gln Met Ala Val Phe Ile His Asn Phe Lys Arg Lys Gly Gly Ile Gly
            500                 505                 510

Gly Tyr Ser Ala Gly Glu Arg Ile Ile Asp Ile Ile Ala Thr Asp Ile
        515                 520                 525

Gln Thr Arg Glu Leu Gln Lys Gln Ile Thr Lys Ile Gln Asn Phe Arg
    530                 535                 540

Val Tyr Tyr Arg Asp Asn Arg Asp Pro Leu Trp Lys Gly Pro Ala Lys
545                 550                 555                 560

Leu Leu Trp Lys Gly Glu Gly Ala Val Val Ile Gln Asp Asn Ser Glu
                565                 570                 575

Ile Lys Val Val Pro Arg Arg Lys Val Lys Ile Ile Arg Asp Tyr Gly
            580                 585                 590

Lys Gln Met Ala Gly Asp Asp Cys Val Ala Gly Arg Gln Asp Glu Asp
        595                 600                 605
```

<210> 742
<211> 498
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C gag Epigraph1

<400> 742

```
Met Gly Ala Arg Ala Ser Ile Leu Arg Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys His Tyr Met Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Met Lys Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Thr Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Glu Lys Ile Glu Val Arg Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Gln
            100                 105                 110


Gln Lys Thr Gln Gln Ala Lys Ala Ala Asp Gly Lys Val Ser Gln Asn
        115                 120                 125


Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala Ile
    130                 135                 140


Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala
```

```
145                 150                 155                 160

Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala
                165                 170                 175

Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln
            180                 185                 190

Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu Ala Ala Glu
        195                 200                 205

Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln
    210                 215                 220

Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu
225                 230                 235                 240

Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Ile Pro Val Gly
                245                 250                 255

Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg
            260                 265                 270

Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu
        275                 280                 285

Pro Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Thr Leu Arg Ala Glu
    290                 295                 300

Gln Ala Thr Gln Asp Val Lys Asn Trp Met Thr Asp Thr Leu Leu Val
305                 310                 315                 320

Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg Ala Leu Gly Pro
                325                 330                 335

Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly
```

340 345 350

Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Ala Asn
355 360 365

Ser Asn Ile Met Met Gln Arg Ser Asn Phe Lys Gly Pro Lys Arg Ile
370 375 380

Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala Arg Asn Cys
385 390 395 400

Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His
405 410 415

Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile
420 425 430

Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro
435 440 445

Glu Pro Thr Ala Pro Pro Ala Glu Pro Thr Ala Pro Pro Ala Glu Ser
450 455 460

Phe Arg Phe Glu Glu Thr Thr Pro Ala Pro Lys Gln Glu Pro Lys Asp
465 470 475 480

Arg Glu Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Ser Asp Pro Leu
485 490 495

Ser Gln

<210> 743
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C gag Epigraph1 Conserved

<400> 743

```
Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala Ile Ser
1               5                   10                  15


Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala Phe
            20                  25                  30


Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr
        35                  40                  45


Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln Ala
    50                  55                  60


Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu Ala Ala Glu Trp
65                  70                  75                  80


Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln Met
                85                  90                  95


Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln
            100                 105                 110


Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Ile Pro Val Gly Asp
        115                 120                 125


Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met
    130                 135                 140


Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro
145                 150                 155                 160


Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Thr Leu Arg Ala Glu Gln
                165                 170                 175
```

Ala Thr Gln Asp Val Lys Asn Trp Met Thr Asp Thr Leu Leu Val Gln
180 185 190

Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg Ala Leu Gly Pro Gly
195 200 205

Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
210 215 220

Gly His Lys Ala Arg Val Leu
225 230

<210> 744
<211> 500
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C gag Epigraph2

<400> 744

Met Gly Ala Arg Ala Ser Val Leu Arg Gly Glu Lys Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Met Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Lys Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Lys Gln Ile Ile Lys Gln Leu
50 55 60

His Pro Ala Leu Gln Thr Gly Thr Glu Glu Leu Lys Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Lys Lys Ile Asp Val Arg Asp

85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Cys Gln
100 105 110

Gln Lys Thr Gln Gln Ala Glu Ala Ala Asp Lys Gly Lys Val Ser Gln
115 120 125

Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala
130 135 140

Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys
145 150 155 160

Ala Phe Ser Pro Glu Ile Ile Pro Met Phe Thr Ala Leu Ser Glu Gly
165 170 175

Ala Thr Pro Thr Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His
180 185 190

Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu Ala Ala
195 200 205

Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Val Ala Pro Gly
210 215 220

Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn
225 230 235 240

Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile Pro Val
245 250 255

Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val
260 265 270

Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys

```
        275                 280                 285

Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Val Leu Arg Ala
    290                 295                 300

Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu
305                 310                 315                 320

Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg Ala Leu Gly
                325                 330                 335

Pro Gly Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly
            340                 345                 350

Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Ala
        355                 360                 365

Asn Asn Ala Asn Ile Met Met Gln Arg Ser Asn Phe Lys Gly Ser Lys
    370                 375                 380

Arg Ile Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala Lys
385                 390                 395                 400

Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Arg Glu
                405                 410                 415

Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn Phe Leu Gly
            420                 425                 430

Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro Gly Asn Phe Leu Gln Asn
        435                 440                 445

Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu Pro Thr Ala Pro Pro Ala
    450                 455                 460

Glu Ser Phe Lys Phe Glu Glu Thr Thr Pro Ala Pro Lys Gln Glu Ser
```

465 470 475 480

Lys Asp Arg Glu Pro Leu Ile Ser Leu Lys Ser Leu Phe Gly Asn Asp
485 490 495

Pro Leu Ser Gln
500

<210> 745
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C gag Epigraph2 Conserved

<400> 745

Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala Leu Ser
1 5 10 15

Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe
20 25 30

Ser Pro Glu Ile Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr
35 40 45

Pro Thr Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln Ala
50 55 60

Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu Ala Ala Glu Trp
65 70 75 80

Asp Arg Val His Pro Val His Ala Gly Pro Val Ala Pro Gly Gln Met
85 90 95

Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu Gln
100 105 110

```
Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile Pro Val Gly Glu
        115                 120                 125


Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met
    130                 135                 140


Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro
145                 150                 155                 160


Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Val Leu Arg Ala Glu Gln
                165                 170                 175


Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln
            180                 185                 190


Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg Ala Leu Gly Pro Gly
        195                 200                 205


Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
    210                 215                 220


Ser His Lys Ala Arg Val Leu
225                 230


<210>  746
<211>  207
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  HIV C nef Epigraph1

<400>  746

Met Gly Gly Lys Trp Ser Lys Ser Ser Ile Val Gly Trp Pro Ala Val
1               5                   10                  15


Arg Glu Arg Ile Arg Arg Thr Glu Pro Ala Ala Glu Gly Val Gly Ala
```

20 25 30

Ala Ser Gln Asp Leu Asp Lys Tyr Gly Ala Leu Thr Ser Ser Asn Thr
35 40 45

Ala His Asn Asn Ala Asp Cys Ala Trp Leu Gln Ala Gln Glu Glu Glu
50 55 60

Glu Glu Val Gly Phe Pro Val Arg Pro Gln Val Pro Leu Arg Pro Met
65 70 75 80

Thr Tyr Lys Ala Ala Phe Asp Leu Ser Phe Phe Leu Lys Glu Lys Gly
85 90 95

Gly Leu Glu Gly Leu Ile Tyr Ser Lys Lys Arg Gln Glu Ile Leu Asp
100 105 110

Leu Trp Val Tyr His Thr Gln Gly Phe Phe Pro Asp Trp Gln Asn Tyr
115 120 125

Thr Pro Gly Pro Gly Val Arg Tyr Pro Leu Thr Phe Gly Trp Cys Phe
130 135 140

Lys Leu Val Pro Val Asp Pro Arg Glu Val Glu Glu Ala Asn Glu Gly
145 150 155 160

Glu Asn Asn Cys Leu Leu His Pro Met Ser Gln His Gly Met Glu Asp
165 170 175

Glu Asp Arg Glu Val Leu Lys Trp Gln Phe Asp Ser Ser Leu Ala Arg
180 185 190

Arg His Met Ala Arg Glu Leu His Pro Glu Tyr Tyr Lys Asp Cys
195 200 205

<210> 747

<211> 80
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C nef Epigraph1 Conserved

<400> 747

Gly Phe Pro Val Arg Pro Gln Val Pro Leu Arg Pro Met Thr Tyr Lys
1 5 10 15

Ala Ala Phe Asp Leu Ser Phe Phe Leu Lys Glu Lys Gly Gly Leu Glu
20 25 30

Gly Leu Ile Tyr Ser Lys Lys Arg Gln Glu Ile Leu Asp Leu Trp Val
35 40 45

Tyr His Thr Gln Gly Phe Phe Pro Asp Trp Gln Asn Tyr Thr Pro Gly
50 55 60

Pro Gly Val Arg Tyr Pro Leu Thr Phe Gly Trp Cys Phe Lys Leu Val
65 70 75 80

<210> 748
<211> 207
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C nef Epigraph2

<400> 748

Met Gly Ser Lys Trp Ser Lys Ser Ser Ile Val Gly Trp Pro Ala Val
1 5 10 15

Arg Glu Arg Met Arg Arg Ala Glu Pro Ala Ala Glu Gly Val Gly Ala
20 25 30

Ala Ser Arg Asp Leu Asp Lys His Gly Ala Leu Thr Ser Ser Asn Thr

```
        35                  40                  45

Pro Ala Asn Asn Ala Asp Cys Ala Trp Leu Glu Ala Gln Glu Glu Glu
    50                  55                  60

Gly Glu Val Gly Phe Pro Val Lys Pro Gln Val Pro Leu Arg Pro Met
65                  70                  75                  80

Thr Tyr Lys Gly Ala Phe Asp Leu Gly Phe Phe Leu Lys Glu Lys Gly
                85                  90                  95

Gly Leu Asp Gly Leu Ile Tyr Ser Lys Lys Arg Gln Asp Ile Leu Asp
            100                 105                 110

Leu Trp Val Tyr Asn Thr Gln Gly Tyr Phe Pro Asp Trp Gln Asn Tyr
        115                 120                 125

Thr Pro Gly Pro Gly Ile Arg Tyr Pro Leu Thr Phe Gly Trp Cys Tyr
    130                 135                 140

Lys Leu Val Pro Val Asp Pro Ser Glu Val Glu Glu Ala Asn Lys Gly
145                 150                 155                 160

Glu Asn Asn Cys Leu Leu His Pro Met Ser Leu His Gly Met Glu Asp
                165                 170                 175

Glu His Arg Glu Val Leu Lys Trp Lys Phe Asp Ser Ser Leu Ala Arg
            180                 185                 190

Arg His Leu Ala Arg Glu Lys His Pro Glu Phe Tyr Lys Asp Cys
        195                 200                 205
```

<210> 749
<211> 80
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C nef Epigraph2 Conserved

<400> 749

Gly Phe Pro Val Lys Pro Gln Val Pro Leu Arg Pro Met Thr Tyr Lys
1   5   10   15

Gly Ala Phe Asp Leu Gly Phe Phe Leu Lys Glu Lys Gly Gly Leu Asp
            20   25   30

Gly Leu Ile Tyr Ser Lys Lys Arg Gln Asp Ile Leu Asp Leu Trp Val
        35   40   45

Tyr Asn Thr Gln Gly Tyr Phe Pro Asp Trp Gln Asn Tyr Thr Pro Gly
    50   55   60

Pro Gly Ile Arg Tyr Pro Leu Thr Phe Gly Trp Cys Tyr Lys Leu Val
65   70   75   80

<210> 750
<211> 1007
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C pol Epigraph1

<400> 750

Phe Phe Arg Glu Asn Leu Ala Phe Pro Gln Gly Glu Ala Arg Glu Phe
1   5   10   15

Pro Ser Glu Gln Thr Arg Ala Asn Ser Pro Thr Ser Arg Ala Asn Ser
            20   25   30

Pro Thr Ser Arg Glu Leu Gln Val Arg Gly Asp Asn Pro Arg Ser Glu
        35   40   45

Ala Gly Ala Glu Arg Gln Gly Thr Leu Asn Phe Pro Gln Ile Thr Leu

```
    50                  55                  60

Trp Gln Arg Pro Leu Val Ser Ile Lys Val Gly Gly Gln Ile Lys Glu
65                  70                  75                  80

Ala Leu Leu Asp Thr Gly Ala Asp Asp Thr Val Leu Glu Glu Ile Asn
                85                  90                  95

Leu Pro Gly Lys Trp Lys Pro Lys Met Ile Gly Gly Ile Gly Gly Phe
            100                 105                 110

Ile Lys Val Arg Gln Tyr Asp Gln Ile Leu Ile Glu Ile Cys Gly Lys
        115                 120                 125

Lys Ala Ile Gly Thr Val Leu Val Gly Pro Thr Pro Val Asn Ile Ile
    130                 135                 140

Gly Arg Asn Met Leu Thr Gln Leu Gly Cys Thr Leu Asn Phe Pro Ile
145                 150                 155                 160

Ser Pro Ile Glu Thr Val Pro Val Lys Leu Lys Pro Gly Met Asp Gly
                165                 170                 175

Pro Lys Val Lys Gln Trp Pro Leu Thr Glu Glu Lys Ile Lys Ala Leu
            180                 185                 190

Thr Ala Ile Cys Glu Glu Met Glu Lys Glu Gly Lys Ile Thr Lys Ile
        195                 200                 205

Gly Pro Glu Asn Pro Tyr Asn Thr Pro Val Phe Ala Ile Lys Lys Lys
    210                 215                 220

Asp Ser Thr Lys Trp Arg Lys Leu Val Asp Phe Arg Glu Leu Asn Lys
225                 230                 235                 240

Arg Thr Gln Asp Phe Trp Glu Val Gln Leu Gly Ile Pro His Pro Ala
```

245 250 255

Gly Leu Lys Lys Lys Lys Ser Val Thr Val Leu Asp Val Gly Asp Ala
260 265 270

Tyr Phe Ser Val Pro Leu Asp Glu Gly Phe Arg Lys Tyr Thr Ala Phe
275 280 285

Thr Ile Pro Ser Ile Asn Asn Glu Thr Pro Gly Ile Arg Tyr Gln Tyr
290 295 300

Asn Val Leu Pro Gln Gly Trp Lys Gly Ser Pro Ala Ile Phe Gln Ser
305 310 315 320

Ser Met Thr Lys Ile Leu Glu Pro Phe Arg Ala Gln Asn Pro Glu Ile
325 330 335

Val Ile Tyr Gln Tyr Met Asp Asp Leu Tyr Val Gly Ser Asp Leu Glu
340 345 350

Ile Gly Gln His Arg Ala Lys Ile Glu Glu Leu Arg Glu His Leu Leu
355 360 365

Lys Trp Gly Phe Thr Thr Pro Asp Lys Lys His Gln Lys Glu Pro Pro
370 375 380

Phe Leu Trp Met Gly Tyr Glu Leu His Pro Asp Lys Trp Thr Val Gln
385 390 395 400

Pro Ile Gln Leu Pro Glu Lys Asp Ser Trp Thr Val Asn Asp Ile Gln
405 410 415

Lys Leu Val Gly Lys Leu Asn Trp Ala Ser Gln Ile Tyr Pro Gly Ile
420 425 430

Lys Val Arg Gln Leu Cys Lys Leu Leu Arg Gly Ala Lys Ala Leu Thr

435 440 445

Asp Ile Val Pro Leu Thr Glu Glu Ala Glu Leu Glu Leu Ala Glu Asn
450 455 460

Arg Glu Ile Leu Lys Glu Pro Val His Gly Val Tyr Tyr Asp Pro Ser
465 470 475 480

Lys Asp Leu Ile Ala Glu Ile Gln Lys Gln Gly His Asp Gln Trp Thr
485 490 495

Tyr Gln Ile Tyr Gln Glu Pro Phe Lys Asn Leu Lys Thr Gly Lys Tyr
500 505 510

Ala Lys Met Arg Thr Ala His Thr Asn Asp Val Lys Gln Leu Thr Glu
515 520 525

Ala Val Gln Lys Ile Ala Met Glu Ser Ile Val Ile Trp Gly Lys Thr
530 535 540

Pro Lys Phe Arg Leu Pro Ile Gln Lys Glu Thr Trp Glu Thr Trp Trp
545 550 555 560

Thr Asp Tyr Trp Gln Ala Thr Trp Ile Pro Glu Trp Glu Phe Val Asn
565 570 575

Thr Pro Pro Leu Val Lys Leu Trp Tyr Gln Leu Glu Lys Glu Pro Ile
580 585 590

Ala Gly Ala Glu Thr Phe Tyr Val Asp Gly Ala Ala Asn Arg Glu Thr
595 600 605

Lys Ile Gly Lys Ala Gly Tyr Val Thr Asp Arg Gly Arg Gln Lys Ile
610 615 620

Val Ser Leu Thr Glu Thr Thr Asn Gln Lys Thr Glu Leu Gln Ala Ile

625 630 635 640

Gln Leu Ala Leu Gln Asp Ser Gly Ser Glu Val Asn Ile Val Thr Asp
645 650 655

Ser Gln Tyr Ala Leu Gly Ile Ile Gln Ala Gln Pro Asp Lys Ser Glu
660 665 670

Ser Glu Leu Val Asn Gln Ile Ile Glu Gln Leu Ile Lys Lys Glu Arg
675 680 685

Val Tyr Leu Ser Trp Val Pro Ala His Lys Gly Ile Gly Gly Asn Glu
690 695 700

Gln Val Asp Lys Leu Val Ser Ser Gly Ile Arg Lys Val Leu Phe Leu
705 710 715 720

Asp Gly Ile Asp Lys Ala Gln Glu Glu His Glu Lys Tyr His Ser Asn
725 730 735

Trp Arg Ala Met Ala Ser Glu Phe Asn Leu Pro Pro Ile Val Ala Lys
740 745 750

Glu Ile Val Ala Ser Cys Asp Lys Cys Gln Leu Lys Gly Glu Ala Ile
755 760 765

His Gly Gln Val Asp Cys Ser Pro Gly Ile Trp Gln Leu Asp Cys Thr
770 775 780

His Leu Glu Gly Lys Ile Ile Leu Val Ala Val His Val Ala Ser Gly
785 790 795 800

Tyr Ile Glu Ala Glu Val Ile Pro Ala Glu Thr Gly Gln Glu Thr Ala
805 810 815

Tyr Tyr Ile Leu Lys Leu Ala Gly Arg Trp Pro Val Lys Val Ile His

820 825 830

Thr Asp Asn Gly Ser Asn Phe Thr Ser Ala Ala Val Lys Ala Ala Cys
835 840 845

Trp Trp Ala Gly Ile Gln Gln Glu Phe Gly Ile Pro Tyr Asn Pro Gln
850 855 860

Ser Gln Gly Val Val Glu Ser Met Asn Lys Glu Leu Lys Lys Ile Ile
865 870 875 880

Gly Gln Val Arg Asp Gln Ala Glu His Leu Lys Thr Ala Val Gln Met
885 890 895

Ala Val Phe Ile His Asn Phe Lys Arg Lys Gly Gly Ile Gly Gly Tyr
900 905 910

Ser Ala Gly Glu Arg Ile Ile Asp Ile Ile Ala Thr Asp Ile Gln Thr
915 920 925

Lys Glu Leu Gln Lys Gln Ile Ile Lys Ile Gln Asn Phe Arg Val Tyr
930 935 940

Tyr Arg Asp Ser Arg Asp Pro Ile Trp Lys Gly Pro Ala Lys Leu Leu
945 950 955 960

Trp Lys Gly Glu Gly Ala Val Val Ile Gln Asp Asn Ser Asp Ile Lys
965 970 975

Val Val Pro Arg Arg Lys Val Lys Ile Ile Lys Asp Tyr Gly Lys Gln
980 985 990

Met Ala Gly Ala Asp Cys Val Ala Gly Arg Gln Asp Glu Asp Gln
995 1000 1005

<210> 751

<211> 609
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C pol Epigraph1 Conserved

<400> 751

```
Pro Gln Ile Thr Leu Trp Gln Arg Pro Leu Val Ser Ile Lys Val Gly
1               5                  10                  15


Gly Gln Ile Lys Glu Ala Leu Leu Asp Thr Gly Ala Asp Asp Thr Val
            20                  25                  30


Leu Glu Glu Ile Asn Leu Pro Gly Lys Trp Lys Pro Lys Met Ile Gly
        35                  40                  45


Gly Ile Gly Gly Phe Ile Lys Val Arg Gln Tyr Asp Gln Ile Leu Ile
    50                  55                  60


Glu Ile Cys Gly Lys Lys Ala Ile Gly Thr Val Leu Val Gly Pro Thr
65                  70                  75                  80


Pro Val Asn Ile Ile Gly Arg Asn Met Leu Thr Gln Leu Gly Cys Thr
                85                  90                  95


Leu Asn Phe Pro Ile Ser Pro Ile Glu Thr Val Pro Val Lys Leu Lys
            100                 105                 110


Pro Gly Met Asp Gly Pro Lys Val Lys Gln Trp Pro Leu Thr Glu Glu
        115                 120                 125


Lys Ile Lys Ala Leu Thr Ala Ile Cys Glu Glu Met Glu Lys Glu Gly
    130                 135                 140


Lys Ile Thr Lys Ile Gly Pro Glu Asn Pro Tyr Asn Thr Pro Val Phe
145                 150                 155                 160
```

```
Ala Ile Lys Lys Lys Asp Ser Thr Lys Trp Arg Lys Leu Val Asp Phe
                165                 170                 175

Arg Glu Leu Asn Lys Arg Thr Gln Asp Phe Trp Glu Val Gln Leu Gly
            180                 185                 190

Ile Pro His Pro Ala Gly Leu Lys Lys Lys Lys Ser Val Thr Val Leu
        195                 200                 205

Asp Val Gly Asp Ala Tyr Phe Ser Val Pro Leu Asp Glu Gly Phe Arg
    210                 215                 220

Lys Tyr Thr Ala Phe Thr Ile Pro Ser Ile Asn Asn Glu Thr Pro Gly
225                 230                 235                 240

Ile Arg Tyr Gln Tyr Asn Val Leu Pro Gln Gly Trp Lys Gly Ser Pro
                245                 250                 255

Ala Ile Phe Gln Ser Ser Met Thr Lys Ile Leu Glu Pro Phe Arg Ala
            260                 265                 270

Gln Asn Pro Glu Ile Val Ile Tyr Gln Tyr Met Asp Asp Leu Tyr Val
        275                 280                 285

Gly Ser Asp Leu Glu Ile Gly Gln His Arg Ala Lys Ile Glu Glu Leu
    290                 295                 300

Arg Glu His Leu Leu Lys Trp Gly Phe Thr Thr Pro Asp Lys Lys His
305                 310                 315                 320

Gln Lys Glu Pro Pro Phe Leu Trp Met Gly Tyr Glu Leu His Pro Asp
                325                 330                 335

Lys Trp Thr Val Gln Pro Ile Gln Leu Pro Glu Lys Asp Ser Trp Thr
            340                 345                 350
```

```
Val Asn Asp Ile Gln Lys Leu Val Gly Lys Leu Asn Trp Ala Ser Gln
        355                 360                 365

Ile Tyr His Gly Gln Val Asp Cys Ser Pro Gly Ile Trp Gln Leu Asp
    370                 375                 380

Cys Thr His Leu Glu Gly Lys Ile Ile Leu Val Ala Val His Val Ala
385                 390                 395                 400

Ser Gly Tyr Ile Glu Ala Glu Val Ile Pro Ala Glu Thr Gly Gln Glu
                405                 410                 415

Thr Ala Tyr Tyr Ile Leu Lys Leu Ala Gly Arg Trp Pro Val Lys Val
            420                 425                 430

Ile His Thr Asp Asn Gly Ser Asn Phe Thr Ser Ala Ala Val Lys Ala
        435                 440                 445

Ala Cys Trp Trp Ala Gly Ile Gln Gln Glu Phe Gly Ile Pro Tyr Asn
    450                 455                 460

Pro Gln Ser Gln Gly Val Val Glu Ser Met Asn Lys Glu Leu Lys Lys
465                 470                 475                 480

Ile Ile Gly Gln Val Arg Asp Gln Ala Glu His Leu Lys Thr Ala Val
                485                 490                 495

Gln Met Ala Val Phe Ile His Asn Phe Lys Arg Lys Gly Gly Ile Gly
            500                 505                 510

Gly Tyr Ser Ala Gly Glu Arg Ile Ile Asp Ile Ile Ala Thr Asp Ile
        515                 520                 525

Gln Thr Lys Glu Leu Gln Lys Gln Ile Ile Lys Ile Gln Asn Phe Arg
    530                 535                 540
```

```
Val Tyr Tyr Arg Asp Ser Arg Asp Pro Ile Trp Lys Gly Pro Ala Lys
545                 550                 555                 560


Leu Leu Trp Lys Gly Glu Gly Ala Val Val Ile Gln Asp Asn Ser Asp
                565                 570                 575


Ile Lys Val Val Pro Arg Arg Lys Val Lys Ile Ile Lys Asp Tyr Gly
            580                 585                 590


Lys Gln Met Ala Gly Ala Asp Cys Val Ala Gly Arg Gln Asp Glu Asp
        595                 600                 605


Gln
```

<210> 752
<211> 1006
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C pol Epigraph2

<400> 752

```
Phe Phe Arg Glu Asn Leu Ala Phe Gln Gln Gly Glu Ala Arg Glu Phe
1               5                   10                  15


Pro Ser Glu Gln Ala Arg Ala Asn Ser Pro Thr Ser Arg Ala Asn Ser
            20                  25                  30


Pro Thr Ser Arg Glu Leu Gln Val Arg Gly Asp Asn Pro Cys Ser Glu
        35                  40                  45


Ala Gly Ala Glu Arg Gln Gly Thr Phe Asn Phe Pro Gln Ile Thr Leu
    50                  55                  60


Trp Gln Arg Pro Leu Val Thr Ile Lys Val Gly Gly Gln Ile Lys Glu
```

65 70 75 80

Ala Leu Leu Asp Thr Gly Ala Asp Asp Thr Val Leu Glu Asp Ile Asn
85 90 95

Leu Pro Gly Lys Trp Lys Pro Arg Met Ile Gly Gly Ile Gly Gly Phe
100 105 110

Ile Lys Val Arg Gln Tyr Asp Gln Ile Pro Ile Glu Ile Cys Gly Lys
115 120 125

Lys Ala Ile Gly Ser Val Leu Val Gly Pro Thr Pro Val Asn Ile Ile
130 135 140

Gly Arg Asn Leu Leu Thr Gln Leu Gly Cys Thr Leu Asn Phe Pro Ile
145 150 155 160

Ser Pro Ile Glu Thr Ile Pro Val Lys Leu Lys Pro Gly Met Asp Gly
165 170 175

Pro Arg Val Lys Gln Trp Pro Leu Thr Glu Glu Lys Ile Lys Ala Leu
180 185 190

Thr Glu Ile Cys Glu Glu Met Glu Lys Glu Gly Lys Ile Ser Lys Ile
195 200 205

Gly Pro Glu Asn Pro Tyr Asn Thr Pro Ile Phe Ala Ile Lys Lys Lys
210 215 220

Asp Ser Thr Lys Trp Arg Lys Leu Val Asp Phe Arg Glu Leu Asn Lys
225 230 235 240

Arg Thr Gln Asp Phe Trp Glu Val Gln Leu Gly Ile Pro His Pro Ala
245 250 255

Gly Leu Lys Lys Lys Lys Ser Val Thr Val Leu Asp Val Gly Asp Ala

260 265 270

Tyr Phe Ser Val Pro Leu Asp Glu Ser Phe Arg Lys Tyr Thr Ala Phe
275 280 285

Thr Ile Pro Ser Thr Asn Asn Glu Thr Pro Gly Ile Arg Tyr Gln Tyr
290 295 300

Asn Val Leu Pro Gln Gly Trp Lys Gly Ser Pro Ala Ile Phe Gln Ser
305 310 315 320

Ser Met Thr Arg Ile Leu Glu Pro Phe Arg Ala Lys Asn Pro Glu Ile
325 330 335

Val Ile Tyr Gln Tyr Met Asp Asp Leu Tyr Val Gly Ser Asp Leu Glu
340 345 350

Ile Glu Gln His Arg Ala Lys Ile Glu Glu Leu Arg Glu His Leu Leu
355 360 365

Arg Trp Gly Phe Thr Thr Pro Asp Lys Lys His Gln Lys Glu Pro Pro
370 375 380

Phe Leu Trp Met Gly Tyr Glu Leu His Pro Asp Lys Trp Thr Val Gln
385 390 395 400

Pro Ile Gln Leu Pro Glu Lys Glu Ser Trp Thr Val Asn Asp Ile Gln
405 410 415

Lys Leu Val Gly Lys Leu Asn Trp Ala Ser Gln Ile Tyr Pro Gly Ile
420 425 430

Lys Val Lys Gln Leu Cys Lys Leu Leu Arg Gly Thr Lys Ala Leu Thr
435 440 445

Asp Ile Val Pro Leu Thr Glu Glu Ala Glu Leu Glu Leu Ala Glu Asn

```
    450                 455                 460

Arg Glu Ile Leu Arg Glu Pro Val His Gly Val Tyr Tyr Asp Pro Ser
465                 470                 475                 480

Lys Glu Leu Ile Ala Glu Ile Gln Lys Gln Gly Gln Asp Gln Trp Thr
                485                 490                 495

Tyr Gln Ile Tyr Gln Glu Pro Phe Lys Asn Leu Lys Thr Gly Lys Tyr
            500                 505                 510

Ala Lys Arg Arg Thr Ala His Thr Asn Asp Val Arg Gln Leu Thr Glu
        515                 520                 525

Ala Val Gln Lys Ile Ala Leu Glu Ser Ile Val Ile Trp Gly Lys Ile
    530                 535                 540

Pro Lys Phe Arg Leu Pro Ile Gln Lys Glu Thr Trp Glu Ile Trp Trp
545                 550                 555                 560

Thr Asp Tyr Trp Gln Ala Thr Trp Ile Pro Asp Trp Glu Phe Val Asn
                565                 570                 575

Thr Pro Pro Leu Val Lys Leu Trp Tyr Gln Leu Glu Lys Glu Pro Ile
            580                 585                 590

Ala Gly Val Glu Thr Phe Tyr Val Asp Gly Ala Ala Asn Arg Glu Thr
        595                 600                 605

Lys Leu Gly Lys Ala Gly Tyr Val Thr Asp Lys Gly Arg Gln Lys Ile
    610                 615                 620

Val Thr Leu Thr Glu Thr Thr Asn Gln Lys Ala Glu Leu Gln Ala Ile
625                 630                 635                 640

Gln Leu Ala Leu Gln Asp Ser Gly Pro Glu Val Asn Ile Val Thr Asp
```

645 650 655

Ser Gln Tyr Ala Leu Gly Ile Ile Gln Ala Gln Pro Asp Lys Ser Glu
660 665 670

Ser Glu Ile Val Asn Gln Ile Ile Glu Gln Leu Ile Asn Lys Glu Arg
675 680 685

Ile Tyr Leu Ser Trp Val Pro Ala His Lys Gly Ile Gly Gly Asn Glu
690 695 700

Gln Val Asp Lys Leu Val Ser Asn Gly Ile Arg Lys Val Leu Phe Leu
705 710 715 720

Asp Gly Ile Asp Lys Ala Gln Glu Glu His Glu Lys Tyr His Asn Asn
725 730 735

Trp Arg Ala Met Ala Ser Asp Phe Asn Leu Pro Pro Val Val Ala Lys
740 745 750

Glu Ile Val Ala Ser Cys Asp Gln Cys Gln Leu Lys Gly Glu Ala Met
755 760 765

His Gly Gln Val Asp Cys Ser Pro Gly Ile Trp Gln Leu Asp Cys Thr
770 775 780

His Leu Glu Gly Lys Val Ile Leu Val Ala Val His Val Ala Ser Gly
785 790 795 800

Tyr Met Glu Ala Glu Val Ile Pro Ala Glu Thr Gly Gln Glu Thr Ala
805 810 815

Tyr Phe Ile Leu Lys Leu Ala Gly Arg Trp Pro Val Lys Ile Ile His
820 825 830

Thr Asp Asn Gly Ser Asn Phe Thr Ser Thr Ala Val Lys Ala Ala Cys

```
        835                 840                 845

Trp Trp Ala Gly Ile Lys Gln Glu Phe Gly Ile Pro Tyr Asn Pro Gln
    850                 855                 860

Ser Gln Gly Val Val Glu Ser Met Asn Lys Glu Leu Lys Lys Ile Ile
865                 870                 875                 880

Gly Gln Val Arg Glu Gln Ala Glu His Leu Lys Thr Ala Val Gln Met
                885                 890                 895

Ala Val Phe Ile His Asn Phe Lys Arg Arg Gly Gly Ile Gly Gly Tyr
            900                 905                 910

Ser Ala Gly Glu Arg Ile Ile Asp Ile Ile Ala Ser Asp Ile Gln Thr
        915                 920                 925

Lys Glu Leu Gln Lys Gln Ile Thr Lys Ile Gln Asn Phe Arg Val Tyr
    930                 935                 940

Tyr Arg Asp Ser Arg Asp Pro Ile Trp Lys Gly Pro Ala Lys Leu Leu
945                 950                 955                 960

Trp Lys Gly Glu Gly Ala Val Val Leu Gln Asp Asn Ser Asp Ile Lys
                965                 970                 975

Val Val Pro Arg Arg Lys Ala Lys Ile Ile Arg Asp Tyr Gly Lys Gln
            980                 985                 990

Met Ala Gly Asp Asp Cys Val Ala  Gly Arg Gln Asp Glu  Asp
        995                 1000                1005
```

<210> 753
<211> 607
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C pol Epigraph2 Conserved

<400> 753

```
Pro Gln Ile Thr Leu Trp Gln Arg Pro Leu Val Thr Ile Lys Val Gly
1               5                  10                  15


Gly Gln Ile Lys Glu Ala Leu Leu Asp Thr Gly Ala Asp Asp Thr Val
            20                  25                  30


Leu Glu Asp Ile Asn Leu Pro Gly Lys Trp Lys Pro Arg Met Ile Gly
        35                  40                  45


Gly Ile Gly Gly Phe Ile Lys Val Arg Gln Tyr Asp Gln Ile Pro Ile
    50                  55                  60


Glu Ile Cys Gly Lys Lys Ala Ile Gly Ser Val Leu Val Gly Pro Thr
65                  70                  75                  80


Pro Val Asn Ile Ile Gly Arg Asn Leu Leu Thr Gln Leu Gly Cys Thr
                85                  90                  95


Leu Asn Phe Pro Ile Ser Pro Ile Glu Thr Ile Pro Val Lys Leu Lys
            100                 105                 110


Pro Gly Met Asp Gly Pro Arg Val Lys Gln Trp Pro Leu Thr Glu Glu
        115                 120                 125


Lys Ile Lys Ala Leu Thr Glu Ile Cys Glu Glu Met Glu Lys Glu Gly
    130                 135                 140


Lys Ile Ser Lys Ile Gly Pro Glu Asn Pro Tyr Asn Thr Pro Ile Phe
145                 150                 155                 160


Ala Ile Lys Lys Lys Asp Ser Thr Lys Trp Arg Lys Leu Val Asp Phe
                165                 170                 175
```

```
Arg Glu Leu Asn Lys Arg Thr Gln Asp Phe Trp Glu Val Gln Leu Gly
            180                 185                 190

Ile Pro His Pro Ala Gly Leu Lys Lys Lys Lys Ser Val Thr Val Leu
        195                 200                 205

Asp Val Gly Asp Ala Tyr Phe Ser Val Pro Leu Asp Glu Ser Phe Arg
    210                 215                 220

Lys Tyr Thr Ala Phe Thr Ile Pro Ser Thr Asn Asn Glu Thr Pro Gly
225                 230                 235                 240

Ile Arg Tyr Gln Tyr Asn Val Leu Pro Gln Gly Trp Lys Gly Ser Pro
                245                 250                 255

Ala Ile Phe Gln Ser Ser Met Thr Arg Ile Leu Glu Pro Phe Arg Ala
            260                 265                 270

Lys Asn Pro Glu Ile Val Ile Tyr Gln Tyr Met Asp Asp Leu Tyr Val
        275                 280                 285

Gly Ser Asp Leu Glu Ile Glu Gln His Arg Ala Lys Ile Glu Glu Leu
    290                 295                 300

Arg Glu His Leu Leu Arg Trp Gly Phe Thr Thr Pro Asp Lys Lys His
305                 310                 315                 320

Gln Lys Glu Pro Pro Phe Leu Trp Met Gly Tyr Glu Leu His Pro Asp
                325                 330                 335

Lys Trp Thr Val Gln Pro Ile Gln Leu Pro Glu Lys Glu Ser Trp Thr
            340                 345                 350

Val Asn Asp Ile Gln Lys Leu Val Gly Lys Leu Asn Trp Ala Ser Gln
        355                 360                 365
```

```
Ile Tyr His Gly Gln Val Asp Cys Ser Pro Gly Ile Trp Gln Leu Asp
    370                 375                 380

Cys Thr His Leu Glu Gly Lys Val Ile Leu Val Ala Val His Val Ala
385                 390                 395                 400

Ser Gly Tyr Met Glu Ala Glu Val Ile Pro Ala Glu Thr Gly Gln Glu
                405                 410                 415

Thr Ala Tyr Phe Ile Leu Lys Leu Ala Gly Arg Trp Pro Val Lys Ile
            420                 425                 430

Ile His Thr Asp Asn Gly Ser Asn Phe Thr Ser Thr Ala Val Lys Ala
        435                 440                 445

Ala Cys Trp Trp Ala Gly Ile Lys Gln Glu Phe Gly Ile Pro Tyr Asn
    450                 455                 460

Pro Gln Ser Gln Gly Val Val Glu Ser Met Asn Lys Glu Leu Lys Lys
465                 470                 475                 480

Ile Ile Gly Gln Val Arg Glu Gln Ala Glu His Leu Lys Thr Ala Val
                485                 490                 495

Gln Met Ala Val Phe Ile His Asn Phe Lys Arg Arg Gly Gly Ile Gly
            500                 505                 510

Gly Tyr Ser Ala Gly Glu Arg Ile Ile Asp Ile Ile Ala Ser Asp Ile
        515                 520                 525

Gln Thr Lys Glu Leu Gln Lys Gln Ile Thr Lys Ile Gln Asn Phe Arg
    530                 535                 540

Val Tyr Tyr Arg Asp Ser Arg Asp Pro Ile Trp Lys Gly Pro Ala Lys
545                 550                 555                 560
```

Leu Leu Trp Lys Gly Glu Gly Ala Val Val Leu Gln Asp Asn Ser Asp
565 570 575

Ile Lys Val Val Pro Arg Arg Lys Ala Lys Ile Ile Arg Asp Tyr Gly
580 585 590

Lys Gln Met Ala Gly Asp Asp Cys Val Ala Gly Arg Gln Asp Glu
595 600 605

<210> 754
<211> 520
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M Gag episensus EG-0, Tailored

<400> 754

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Ala Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
20 25 30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys

100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His
130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu

290 295 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala
325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Lys
370 375 380

Gly Gln Lys Arg Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile
385 390 395 400

Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly
405 410 415

Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe
420 425 430

Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu
435 440 445

Gln Ser Arg Pro Glu Pro Thr Ala Gln Ser Arg Pro Glu Pro Thr Ala
450 455 460

Pro Pro Ala Glu Ser Phe Arg Pro Gln Pro Thr Ala Pro Pro Glu Glu
465 470 475 480

Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln Lys Gln Glu

485 490 495

Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys Ser Leu Phe
500 505 510

Gly Asn Asp Pro Leu Ser Gln Tyr
515 520

<210> 755
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M gag episensus EG-0 Conserved, Tailored

<400> 755

Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala Ile Ser
1 5 10 15

Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe
20 25 30

Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly Ala Thr
35 40 45

Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln Ala
50 55 60

Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp
65 70 75 80

Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln Met
85 90 95

Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln
100 105 110

```
Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro Val Gly Glu
        115                 120                 125


Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met
    130                 135                 140


Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro
145                 150                 155                 160


Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln
                165                 170                 175


Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln
            180                 185                 190


Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala
        195                 200                 205


Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
    210                 215                 220


Gly His Lys Ala Arg Val Leu
225                 230


<210>  756
<211>  532
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  HIV M gag CEN-1, Tailored

<400>  756

Met Gly Ala Arg Ala Ser Val Leu Thr Gly Gly Lys Leu Asp Ala Trp
1               5                   10                  15


Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Met Lys
```

```
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Ile Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Gln Gln Ile Ile Glu Gln Leu
    50                  55                  60

Gln Ser Thr Leu Lys Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Trp Cys Val His Gln Arg Ile Glu Ile Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Leu Glu Glu Val Gln Asn Lys Ser Gln
            100                 105                 110

Gln Lys Thr Gln Gln Ala Ala Ala Gly Thr Gly Ser Ser Ser Lys Val
        115                 120                 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ala Gln Gly Gln Met Val His
    130                 135                 140

Gln Pro Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145                 150                 155                 160

Glu Lys Gly Phe Asn Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
                165                 170                 175

Asp Gly Ala Thr Pro Gln Asp Leu Asn Met Met Leu Asn Ile Val Gly
            180                 185                 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu
        195                 200                 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Pro
```

210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Glu Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
245 250 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu His Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Val Gly Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Ile Gln Asn Ala Asn Pro Asp Cys Lys Ser Ile Leu Lys Ala
325 330 335

Leu Gly Thr Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Ala Gln His Ala Asn Ile Met Met Gln Arg Gly Asn Phe Lys Gly
370 375 380

Gln Arg Lys Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His Leu Ala
385 390 395 400

Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys Gly Gln

405 410 415

Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn Phe Leu
420 425 430

Gly Lys Ile Trp Pro Ser Asn Lys Gly Arg Pro Gly Asn Phe Pro Gln
435 440 445

Ser Arg Pro Glu Pro Thr Ala Pro Arg Thr Glu Pro Thr Ala Pro Pro
450 455 460

Ala Arg Pro Glu Pro Thr Ala Pro Pro Leu Gln Ser Arg Leu Glu Pro
465 470 475 480

Thr Ala Pro Pro Ala Glu Pro Thr Ala Pro Pro Ala Glu Asn Trp Gly
485 490 495

Met Gly Glu Glu Ile Thr Ser Leu Leu Lys Gln Glu Gln Lys Asp Lys
500 505 510

Glu His Pro Pro Pro Leu Val Ser Leu Lys Ser Leu Phe Gly Asn Asp
515 520 525

Pro Leu Leu Gln
530

<210> 757
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M gag CEN-1 Conserved, Tailored

<400> 757

Pro Ile Val Gln Asn Ala Gln Gly Gln Met Val His Gln Pro Leu Ser
1 5 10 15

```
Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Gly Phe
            20                  25                  30

Asn Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Asp Gly Ala Thr
        35                  40                  45

Pro Gln Asp Leu Asn Met Met Leu Asn Ile Val Gly Gly His Gln Ala
    50                  55                  60

Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu Ala Ala Glu Trp
65                  70                  75                  80

Asp Arg Val His Pro Val His Ala Gly Pro Ile Pro Pro Gly Gln Met
                85                  90                  95

Arg Glu Pro Arg Glu Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu Gln
            100                 105                 110

Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile Pro Val Gly Asp
        115                 120                 125

Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu His Lys Ile Val Arg Met
    130                 135                 140

Tyr Ser Pro Val Gly Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro
145                 150                 155                 160

Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Thr Leu Arg Ala Glu Gln
                165                 170                 175

Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Ile Gln
            180                 185                 190

Asn Ala Asn Pro Asp Cys Lys Ser Ile Leu Lys Ala Leu Gly Thr Gly
        195                 200                 205
```

```
Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
    210                 215                 220


Ser His Lys Ala Arg Val Leu
225                 230


<210>  758
<211>  536
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  HIV M gag CEN-2, Tailored

<400>  758

Met Gly Ala Arg Ala Ser Ile Leu Arg Gly Gly Lys Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys His Tyr Met Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Lys Phe Ala Leu Asn Pro
        35                  40                  45


Asp Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Ile Lys Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Thr Glu Glu Leu Arg Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Glu Lys Ile Glu Val Arg Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Ser Gln
            100                 105                 110


Gln Lys Thr Gln Gln Ala Lys Ala Ala Asp Gly Lys Val Ser Gln Asn
```

```
        115                 120                 125

Tyr Pro Ile Val Gln Asn Ala Gln Gly Gln Met Val His Gln Ala Leu
    130                 135                 140

Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala
145                 150                 155                 160

Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala
                165                 170                 175

Thr Pro Ser Asp Leu Asn Thr Met Leu Asn Thr Ile Gly Gly His Gln
            180                 185                 190

Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu Ala Ala Glu
        195                 200                 205

Trp Asp Arg Val His Pro Val His Ala Gly Pro Val Ala Pro Gly Gln
    210                 215                 220

Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Ser Thr Ser Thr Leu
225                 230                 235                 240

Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Ile Pro Val Gly
                245                 250                 255

Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Lys
            260                 265                 270

Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu
        275                 280                 285

Pro Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Thr Leu Arg Ala Glu
    290                 295                 300

Gln Ala Thr Gln Asp Val Lys Asn Trp Met Thr Asp Thr Leu Leu Val
```

305 310 315 320

Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg Ala Leu Gly Pro
325 330 335

Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly
340 345 350

Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Ala Asn
355 360 365

Ser Asn Ile Met Met Gln Arg Ser Asn Phe Lys Gly Pro Lys Arg Ile
370 375 380

Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala Lys Asn Cys
385 390 395 400

Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Arg Glu Gly His
405 410 415

Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile
420 425 430

Trp Pro Ser Asn Lys Gly Arg Pro Gly Asn Phe Leu Gln Asn Arg Pro
435 440 445

Glu Pro Thr Ala Pro Pro Leu Gln Ser Arg Leu Glu Pro Thr Ala Pro
450 455 460

Leu Glu Pro Thr Ala Pro Pro Glu Pro Thr Ala Pro Pro Ala Val Val
465 470 475 480

Pro Thr Ala Pro Pro Val Glu Pro Thr Ala Pro Pro Ala Glu Pro Thr
485 490 495

Ala Pro Pro Ala Glu Ser Phe Arg Phe Glu Glu Thr Thr Pro Ala Pro

500 505 510

Lys Gln Glu Pro Lys Asp Arg Glu Pro Leu Thr Ser Leu Lys Ser Leu
515 520 525

Phe Gly Ser Asp Pro Leu Ser Gln
530 535

<210> 759
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M gag CEN-2 Conserved, Tailored

<400> 759

Pro Ile Val Gln Asn Ala Gln Gly Gln Met Val His Gln Ala Leu Ser
1 5 10 15

Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala Phe
20 25 30

Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr
35 40 45

Pro Ser Asp Leu Asn Thr Met Leu Asn Thr Ile Gly Gly His Gln Ala
50 55 60

Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu Ala Ala Glu Trp
65 70 75 80

Asp Arg Val His Pro Val His Ala Gly Pro Val Ala Pro Gly Gln Met
85 90 95

Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Ser Thr Ser Thr Leu Gln
100 105 110

```
Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Ile Pro Val Gly Asp
        115                 120                 125


Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Lys Met
    130                 135                 140


Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro
145                 150                 155                 160


Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Thr Leu Arg Ala Glu Gln
                165                 170                 175


Ala Thr Gln Asp Val Lys Asn Trp Met Thr Asp Thr Leu Leu Val Gln
            180                 185                 190


Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg Ala Leu Gly Pro Gly
        195                 200                 205


Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
    210                 215                 220


Ser His Lys Ala Arg Val Leu
225                 230


<210>  760
<211>  520
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  HIV M gag CEN-3, Tailored

<400>  760

Met Gly Ser Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
```

```
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
            100                 105                 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Asp Thr Gly Asn Asn Ser
        115                 120                 125

Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro Ser Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Ile Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn
        195                 200                 205

Glu Glu Ala Ala Asp Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro
```

210 215 220

Val Ala Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly
225 230 235 240

Thr Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro
245 250 255

Pro Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu
260 265 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys
275 280 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys
290 295 300

Thr Leu Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr
305 310 315 320

Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu
325 330 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
340 345 350

Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala
355 360 365

Met Ser Gln Ala Thr Asn Ser Ala Ala Ile Met Met Gln Arg Gly Asn
370 375 380

Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys Glu
385 390 395 400

Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp

405 410 415

Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Arg Ile Trp Pro Ser Asn Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Asn Phe Leu Gln
450 455 460

Ser Arg Pro Glu Pro Ser Ala Pro Pro Glu Pro Thr Ala Pro Pro Glu
465 470 475 480

Glu Ser Phe Arg Phe Gly Glu Glu Thr Ala Thr Pro Ser Gln Lys Gln
485 490 495

Glu Pro Thr Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Arg Ser Leu
500 505 510

Phe Gly Asn Asp Pro Ser Ser Gln
515 520

<210> 761
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M gag CEN-3 Conserved, Tailored

<400> 761

Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His Gln Ala Leu Ser
1 5 10 15

Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala Phe
20 25 30

```
Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr
        35                  40                  45

Pro Ser Asp Leu Asn Thr Met Leu Asn Thr Ile Gly Gly His Gln Ala
    50                  55                  60

Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu Ala Ala Asp Trp
65                  70                  75                  80

Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala Pro Gly Gln Met
                85                  90                  95

Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu Gln
            100                 105                 110

Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile Pro Val Gly Asp
        115                 120                 125

Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys Ile Val Arg Met
    130                 135                 140

Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro
145                 150                 155                 160

Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Thr Leu Arg Ala Glu Gln
                165                 170                 175

Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln
            180                 185                 190

Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Gly
        195                 200                 205

Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
    210                 215                 220
```

Ser His Lys Ala Arg Val Leu
225 230

<210> 762
<211> 506
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M gag CEN-4, Tailored

<400> 762

Met Gly Thr Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
100 105 110

Lys Lys Ala Gln Gln Thr Ala Ala Asp Thr Gly Asn Asn Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His

130 135 140

Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro His Asp Leu Asn Thr Met Leu Asn Thr Ile Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Val Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Lys Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile
245 250 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala

325 330 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Ser Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Ile Leu Ala Glu Ala Met Ser
355 360 365

Gln Ala Thr Asn Ser Ala Asn Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys
405 410 415

Gly Arg Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Glu Pro Thr Ala Pro
450 455 460

Pro Glu Glu Ser Phe Gly Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln
465 470 475 480

Lys Gln Glu Pro Ile Asp Lys Asp Leu Tyr Pro Leu Ala Ser Leu Arg
485 490 495

Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 763

<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M gag CEN-4 Conserved, Tailored

<400> 763

```
Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His Gln Pro Ile Ser
1               5                   10                  15


Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala Phe
            20                  25                  30


Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr
        35                  40                  45


Pro His Asp Leu Asn Thr Met Leu Asn Thr Ile Gly Gly His Gln Ala
    50                  55                  60


Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu Ala Ala Glu Trp
65                  70                  75                  80


Asp Arg Val His Pro Val His Ala Gly Pro Val Ala Pro Gly Gln Met
                85                  90                  95


Arg Glu Pro Lys Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu Gln
            100                 105                 110


Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile Pro Val Gly Asp
        115                 120                 125


Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys Ile Val Arg Met
    130                 135                 140


Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro
145                 150                 155                 160
```

```
Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Thr Leu Arg Ala Glu Gln
                165                 170                 175


Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln
            180                 185                 190


Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Gly
        195                 200                 205


Ala Thr Leu Glu Glu Met Met Ser Ala Cys Gln Gly Val Gly Gly Pro
    210                 215                 220


Ser His Lys Ala Arg Ile Leu
225                 230


<210>  764
<211>  514
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  HIV M gag CEN-5, Tailored

<400>  764

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Lys Leu Asp Ala Trp
1               5                   10                  15


Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Met Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Asp Arg Phe Ala Leu Asn Pro
        35                  40                  45


Ser Leu Leu Glu Thr Ala Glu Gly Cys Gln Gln Ile Met Glu Gln Leu
    50                  55                  60


Gln Pro Ala Leu Lys Thr Gly Thr Glu Glu Leu Arg Ser Leu Phe Asn
```

65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Ile Gln Asn Lys Ser Lys
100 105 110

Gln Lys Thr Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Lys Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Ala Gln Gly Gln Met Ile His
130 135 140

Gln Ser Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Met Met Leu Asn Ile Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Pro
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Gly Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Pro Gln Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile
245 250 255

Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu His Lys

260 265 270

Leu Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Gly Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Ile Gln Asn Ala Asn Pro Asp Cys Lys Ser Ile Leu Arg Ala
325 330 335

Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Gln His Thr Asn Ile Met Met Gln Arg Gly Asn Phe Arg Gly
370 375 380

Gln Lys Arg Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His Leu Ala
385 390 395 400

Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys Gly Arg
405 410 415

Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn Phe Leu
420 425 430

Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly Asn Phe Pro Gln
435 440 445

Ser Arg Pro Glu Pro Thr Ala Pro Gln Asn Arg Leu Glu Pro Thr Ala

450 455 460

Pro Pro Ala Glu Pro Thr Ala Pro Pro Ala Glu Ile Phe Gly Met Gly
465 470 475 480

Glu Glu Ile Thr Ser Pro Pro Lys Gln Glu Gln Lys Asp Arg Glu Gln
485 490 495

Ala Pro Pro Leu Val Ser Leu Lys Ser Leu Phe Gly Asn Asp Leu Leu
500 505 510

Ser Gln

<210> 765
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV M gag CEN-5 Conserved, Tailored

<400> 765

Pro Ile Val Gln Asn Ala Gln Gly Gln Met Ile His Gln Ser Leu Ser
1 5 10 15

Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala Phe
20 25 30

Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr
35 40 45

Pro Gln Asp Leu Asn Met Met Leu Asn Ile Val Gly Gly His Gln Ala
50 55 60

Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu Ala Ala Glu Trp
65 70 75 80

```
Asp Arg Val His Pro Val His Ala Gly Pro Ile Pro Pro Gly Gln Met
                85                  90                  95

Arg Glu Pro Arg Gly Gly Asp Ile Ala Gly Thr Thr Ser Thr Pro Gln
            100                 105                 110

Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile Pro Val Gly Asp
        115                 120                 125

Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu His Lys Leu Val Arg Met
    130                 135                 140

Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro
145                 150                 155                 160

Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Thr Leu Arg Ala Glu Gln
                165                 170                 175

Ala Thr Gln Glu Val Lys Gly Trp Met Thr Glu Thr Leu Leu Ile Gln
            180                 185                 190

Asn Ala Asn Pro Asp Cys Lys Ser Ile Leu Arg Ala Leu Gly Pro Gly
        195                 200                 205

Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
    210                 215                 220

Ser His Lys Ala Arg Val Leu
225                 230
```

<210> 766
<211> 498
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C gag episensus EG-0, Tailored

<400> 766

```
Met Gly Ala Arg Ala Ser Ile Leu Arg Gly Gly Lys Leu Asp Lys Trp
1               5                  10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys His Tyr Met Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Met Lys Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Thr Glu Glu Leu Arg Ser Leu Tyr Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Glu Lys Ile Glu Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Gln
            100                 105                 110

Gln Lys Thr Gln Gln Ala Lys Ala Ala Asp Gly Lys Val Ser Gln Asn
        115                 120                 125

Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala Ile
    130                 135                 140

Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala
145                 150                 155                 160

Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala
                165                 170                 175

Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln
```

180 185 190

Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu Ala Ala Glu
195 200 205

Trp Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala Pro Gly Gln
210 215 220

Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu
225 230 235 240

Gln Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Ile Pro Val Gly
245 250 255

Asp Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg
260 265 270

Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu
275 280 285

Pro Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Thr Leu Arg Ala Glu
290 295 300

Gln Ala Thr Gln Asp Val Lys Asn Trp Met Thr Asp Thr Leu Leu Val
305 310 315 320

Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg Ala Leu Gly Pro
325 330 335

Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly
340 345 350

Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Ala Asn
355 360 365

Ser Asn Ile Met Met Gln Arg Ser Asn Phe Lys Gly Pro Lys Arg Ile

370 375 380

Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala Arg Asn Cys
385 390 395 400

Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Lys Glu Gly His
405 410 415

Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile
420 425 430

Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu Gln Ser Arg Pro
435 440 445

Glu Pro Thr Ala Pro Pro Ala Glu Pro Thr Ala Pro Pro Ala Glu Ser
450 455 460

Phe Arg Phe Glu Glu Thr Thr Pro Ala Pro Lys Gln Glu Pro Lys Asp
465 470 475 480

Arg Glu Pro Leu Thr Ser Leu Lys Ser Leu Phe Gly Ser Asp Pro Leu
485 490 495

Ser Gln

<210> 767
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C gag episensus EG-0 Conserved, Tailored

<400> 767

Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala Ile Ser
1 5 10 15

```
Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala Phe
            20                  25                  30

Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr
        35                  40                  45

Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln Ala
    50                  55                  60

Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu Ala Ala Glu Trp
65                  70                  75                  80

Asp Arg Leu His Pro Val His Ala Gly Pro Val Ala Pro Gly Gln Met
                85                  90                  95

Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln
            100                 105                 110

Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Ile Pro Val Gly Asp
        115                 120                 125

Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met
    130                 135                 140

Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro
145                 150                 155                 160

Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Thr Leu Arg Ala Glu Gln
                165                 170                 175

Ala Thr Gln Asp Val Lys Asn Trp Met Thr Asp Thr Leu Leu Val Gln
            180                 185                 190

Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Arg Ala Leu Gly Pro Gly
        195                 200                 205
```

Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
210 215 220

Gly His Lys Ala Arg Val Leu
225 230

<210> 768
<211> 509
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C gag CEN-1, Tailored

<400> 768

Met Gly Ala Arg Ala Ser Ile Leu Arg Gly Glu Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Lys Leu Arg Pro Gly Gly Lys Lys Arg Tyr Met Leu Lys
20 25 30

His Leu Ile Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

Ser Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Ile Lys Gln Leu
50 55 60

Gln Pro Ala Leu Lys Thr Gly Thr Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Ala Gly Ile Glu Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Lys Cys Gln
100 105 110

Gln Lys Thr Gln Gln Ala Glu Ala Ala Asp Lys Gly Lys Val Ser Gln

```
        115                 120                 125

Asn Tyr Pro Ile Val Gln Asn Ala Gln Gly Gln Met Val His Gln Ala
    130                 135                 140

Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys
145                 150                 155                 160

Ala Phe Ser Pro Glu Ile Ile Pro Met Phe Thr Ala Leu Ser Glu Gly
                165                 170                 175

Ala Thr Pro Ser Asp Leu Asn Ser Met Leu Asn Thr Val Gly Gly His
            180                 185                 190

Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile Asn Asp Glu Ala Ala
        195                 200                 205

Glu Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala Pro Gly
    210                 215                 220

Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn
225                 230                 235                 240

Leu Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile Pro Val
                245                 250                 255

Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val
            260                 265                 270

Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys
        275                 280                 285

Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Cys Leu Arg Ala
    290                 295                 300

Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Asp Thr Leu Leu
```

```
305                 310                 315                 320

Ile Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly
                325                 330                 335

Pro Gly Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly
            340                 345                 350

Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Val
        355                 360                 365

Asn Asn Ala Asn Ile Met Met Gln Arg Gly Asn Phe Lys Gly Pro Lys
    370                 375                 380

Arg Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His Leu Ala Arg
385                 390                 395                 400

Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Gln Glu
                405                 410                 415

Gly His Gln Met Lys Asp Cys Ser Asn Glu Arg Gln Ala Asn Phe Leu
            420                 425                 430

Gly Lys Leu Trp Pro Ser His Lys Gly Gly Arg Pro Gly Asn Phe Leu
        435                 440                 445

Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Val Glu Pro Thr Ala Pro
    450                 455                 460

Pro Ala Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Lys Phe Glu Glu
465                 470                 475                 480

Thr Thr Pro Val Pro Lys Gln Glu Leu Lys Asp Arg Glu Pro Leu Ile
                485                 490                 495

Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
```

500 505

<210> 769
<211> 230
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C gag CEN-1 Conserved, Tailored

<400> 769

Ile Val Gln Asn Ala Gln Gly Gln Met Val His Gln Ala Leu Ser Pro
1 5 10 15

Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe Ser
20 25 30

Pro Glu Ile Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr Pro
35 40 45

Ser Asp Leu Asn Ser Met Leu Asn Thr Val Gly Gly His Gln Ala Ala
50 55 60

Met Gln Met Leu Lys Asp Thr Ile Asn Asp Glu Ala Ala Glu Trp Asp
65 70 75 80

Arg Val His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln Met Arg
85 90 95

Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu Gln Glu
100 105 110

Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile Pro Val Gly Glu Ile
115 120 125

Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met Tyr
130 135 140

```
Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro Phe
145                 150                 155                 160


Arg Asp Tyr Val Asp Arg Phe Phe Lys Cys Leu Arg Ala Glu Gln Ala
                165                 170                 175


Thr Gln Glu Val Lys Asn Trp Met Thr Asp Thr Leu Leu Ile Gln Asn
            180                 185                 190


Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Gly Ala
        195                 200                 205


Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro Ser
    210                 215                 220


His Lys Ala Arg Val Leu
225                 230


<210>  770
<211>  515
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  HIV C gag CEN-2, Tailored

<400>  770

Met Gly Ala Arg Ala Ser Ile Leu Arg Gly Glu Lys Leu Asp Lys Trp
1               5                   10                  15


Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys His Tyr Met Ile Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Lys Phe Ala Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Asp Gly Cys Lys Gln Ile Ile Lys Gln Leu
```

50 55 60

His Pro Ala Leu Gln Thr Gly Thr Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Glu Arg Ile Glu Val Arg Asp
85 90 95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Lys Cys Gln
100 105 110

Gln Lys Thr Gln Gln Ala Glu Ala Ala Asp Lys Gly Lys Val Ser Gln
115 120 125

Asn Tyr Pro Ile Val Gln Asn Ala Gln Gly Gln Met Val His Gln Pro
130 135 140

Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys
145 150 155 160

Ala Phe Ser Pro Glu Ile Ile Pro Met Phe Thr Ala Leu Ser Glu Gly
165 170 175

Ala Thr Pro Thr Asp Leu Asn Thr Met Leu Asn Thr Ile Gly Gly His
180 185 190

Gln Ala Ala Met Gln Ile Leu Lys Asp Thr Ile Asn Glu Glu Ala Val
195 200 205

Glu Trp Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala Pro Gly
210 215 220

Gln Ile Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn
225 230 235 240

Leu Gln Glu Gln Ile Ala Trp Met Thr Gly Asn Pro Pro Val Pro Val

```
                245                 250                 255

Gly Asp Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys Ile Val
            260                 265                 270

Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys
        275                 280                 285

Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Val Leu Arg Ala
    290                 295                 300

Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu
305                 310                 315                 320

Val Gln Asn Ala Asn Pro Asp Cys Lys Ile Ile Leu Lys Gly Leu Gly
                325                 330                 335

Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly
            340                 345                 350

Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Val
        355                 360                 365

Asn Asn Thr Asn Ile Met Met Gln Lys Ser Asn Phe Lys Gly Pro Lys
    370                 375                 380

Arg Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala Lys
385                 390                 395                 400

Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Arg Glu
                405                 410                 415

Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn Phe Leu Gly
            420                 425                 430

Lys Ile Trp Pro Ser Gln Lys Gly Arg Pro Gly Asn Phe Leu Gln Asn
```

435 440 445

Arg Pro Glu Pro Thr Ala Pro Arg Pro Glu Pro Thr Ala Pro Pro Arg
450 455 460

Leu Glu Pro Thr Ala Pro Pro Ala Glu Pro Ser Ala Pro Pro Ala Glu
465 470 475 480

Ser Phe Arg Phe Glu Gly Thr Thr Pro Ala Pro Lys Gln Glu Ser Lys
485 490 495

Asp Arg Glu Pro Leu Ile Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro
500 505 510

Leu Ser Gln
515

<210> 771
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C gag CEN-2 Conserved, Tailored

<400> 771

Pro Ile Val Gln Asn Ala Gln Gly Gln Met Val His Gln Pro Ile Ser
1 5 10 15

Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe
20 25 30

Ser Pro Glu Ile Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr
35 40 45

Pro Thr Asp Leu Asn Thr Met Leu Asn Thr Ile Gly Gly His Gln Ala
50 55 60

```
Ala Met Gln Ile Leu Lys Asp Thr Ile Asn Glu Glu Ala Val Glu Trp
65                  70                  75                  80


Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala Pro Gly Gln Ile
                85                  90                  95


Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu Gln
            100                 105                 110


Glu Gln Ile Ala Trp Met Thr Gly Asn Pro Pro Val Pro Val Gly Asp
        115                 120                 125


Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys Ile Val Arg Met
    130                 135                 140


Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro
145                 150                 155                 160


Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Val Leu Arg Ala Glu Gln
                165                 170                 175


Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln
            180                 185                 190


Asn Ala Asn Pro Asp Cys Lys Ile Ile Leu Lys Gly Leu Gly Pro Ala
        195                 200                 205


Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
    210                 215                 220


Ser His Lys Ala Arg Val Leu
225                 230
```

<210> 772
<211> 523
<212> PRT

<213> Artificial Sequence

<220>
<223> HIV C gag CEN-3, Tailored

<400> 772

```
Met Gly Ala Arg Ala Ser Ile Leu Arg Gly Glu Lys Leu Asp Arg Trp
1               5                  10                  15


Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Cys Tyr Met Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ser Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ala Glu Gly Cys Lys Gln Ile Ile Lys Gln Leu
    50                  55                  60


His Pro Ala Leu Gln Thr Gly Thr Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80


Thr Val Ala Thr Leu Tyr Cys Val His Lys Lys Ile Asp Val Arg Asp
                85                  90                  95


Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Cys Gln
            100                 105                 110


Gln Lys Thr Gln Gln Ala Lys Ala Ala Asp Glu Lys Val Ser Gln Asn
        115                 120                 125


Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His Gln Ala Leu
    130                 135                 140


Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala
145                 150                 155                 160


Phe Ser Pro Glu Ile Ile Pro Met Phe Thr Ala Leu Ser Glu Glu Ala
```

165 170 175

Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Ala Val Gly Gly His Gln
180 185 190

Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu
195 200 205

Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln
210 215 220

Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu
225 230 235 240

Gln Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile Pro Val Gly
245 250 255

Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg
260 265 270

Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu
275 280 285

Pro Phe Arg Asp Tyr Val Asp Arg Phe Phe Arg Val Leu Arg Ala Glu
290 295 300

Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Asp Thr Leu Leu Ile
305 310 315 320

Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro
325 330 335

Gly Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly
340 345 350

Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Ala Asn

```
        355                 360                 365

Asn Ile Asn Ile Met Met Gln Arg Gly Asn Phe Lys Gly Pro Lys Arg
    370                 375                 380

Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala Lys Asn
385                 390                 395                 400

Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys Gly Lys Glu Gly
                405                 410                 415

His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn Phe Leu Gly Arg
            420                 425                 430

Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe Leu Gln Asn Arg
        435                 440                 445

Pro Glu Pro Thr Ala Pro Ser Ala Glu Ser Phe Arg Gln Asn Arg Thr
    450                 455                 460

Glu Pro Thr Ala Pro Pro Ala Arg Leu Glu Pro Thr Ala Pro Pro Ala
465                 470                 475                 480

Glu Pro Ser Ala Pro Pro Val Glu Ser Phe Arg Phe Glu Glu Thr Thr
                485                 490                 495

Pro Ala Leu Lys Gln Glu Ser Lys Asp Arg Glu Pro Leu Thr Ser Leu
            500                 505                 510

Arg Ser Leu Phe Gly Ser Asp Pro Leu Phe Gln
        515                 520
```

<210> 773
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C gag CEN-3 Conserved, Tailored

<400> 773

```
Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His Gln Ala Leu Ser
1               5                   10                  15


Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe
            20                  25                  30


Ser Pro Glu Ile Ile Pro Met Phe Thr Ala Leu Ser Glu Glu Ala Thr
        35                  40                  45


Pro Gln Asp Leu Asn Thr Met Leu Asn Ala Val Gly Gly His Gln Ala
    50                  55                  60


Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp
65                  70                  75                  80


Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln Met
                85                  90                  95


Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu Gln
            100                 105                 110


Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Ile Pro Val Gly Glu
        115                 120                 125


Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met
    130                 135                 140


Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro
145                 150                 155                 160


Phe Arg Asp Tyr Val Asp Arg Phe Phe Arg Val Leu Arg Ala Glu Gln
                165                 170                 175
```

Ala Thr Gln Glu Val Lys Asn Trp Met Thr Asp Thr Leu Leu Ile Gln
180 185 190

Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Gly
195 200 205

Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
210 215 220

Ser His Lys Ala Arg Val Leu
225 230

<210> 774
<211> 513
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C gag CEN-4, Tailored

<400> 774

Met Gly Ala Arg Ala Ser Val Leu Arg Gly Glu Lys Leu Asp Lys Trp
1 5 10 15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Met Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Lys Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Lys Gln Ile Ile Lys Gln Leu
50 55 60

His Pro Ala Leu Gln Thr Gly Thr Glu Glu Leu Arg Ser Leu Phe Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Lys Gly Ile Asp Val Arg Asp

85 90 95

Thr Lys Glu Ala Leu Asp Lys Val Glu Glu Glu Gln Asn Lys Cys Gln
100 105 110

Gln Lys Thr Gln Gln Ala Glu Ala Asp Lys Lys Val Ser Gln Asn Tyr
115 120 125

Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His Gln Pro Leu Ser
130 135 140

Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe
145 150 155 160

Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly Ala Thr
165 170 175

Pro Gly Asp Leu Asn Thr Met Leu Asn Thr Ile Gly Gly His Gln Ala
180 185 190

Ala Met Gln Met Leu Lys Asp Thr Ile Asn Asp Glu Ala Ala Glu Trp
195 200 205

Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln Met
210 215 220

Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu Gln
225 230 235 240

Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Val Pro Val Gly Glu
245 250 255

Ile Tyr Lys Arg Trp Ile Val Leu Gly Leu Asn Lys Ile Val Arg Met
260 265 270

Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro

```
        275                 280                 285

Phe Arg Asp Tyr Val Asp Arg Phe Phe Arg Thr Leu Arg Ala Glu Gln
    290                 295                 300

Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln
305                 310                 315                 320

Asn Ala Asn Pro Asp Cys Lys Asn Ile Leu Arg Ala Leu Gly Pro Gly
                325                 330                 335

Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
            340                 345                 350

Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Ala Asn Asn
        355                 360                 365

Thr Asn Ile Met Met Gln Lys Ser Asn Phe Lys Gly Pro Arg Arg Ile
    370                 375                 380

Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala Lys Asn Cys
385                 390                 395                 400

Arg Ala Pro Arg Lys Arg Gly Cys Trp Lys Cys Gly Lys Glu Gly His
                405                 410                 415

Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn Phe Leu Gly Lys Ile
            420                 425                 430

Trp Pro Ser Asn Lys Gly Arg Pro Gly Asn Phe Leu Gln Asn Arg Pro
        435                 440                 445

Glu Pro Thr Ala Pro Gln Ser Arg Pro Glu Pro Thr Ala Pro Leu Glu
    450                 455                 460

Pro Thr Ala Pro Pro Ala Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe
```

465 470 475 480

Lys Phe Glu Glu Thr Thr Pro Ala Pro Lys Gln Glu Gln Lys Asp Arg
485 490 495

Glu Pro Leu Ile Ser Leu Lys Ser Leu Phe Gly Asn Asp Pro Leu Ser
500 505 510

Gln

<210> 775
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C gag CEN-4 Conserved, Tailored

<400> 775

Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His Gln Pro Leu Ser
1 5 10 15

Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe
20 25 30

Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly Ala Thr
35 40 45

Pro Gly Asp Leu Asn Thr Met Leu Asn Thr Ile Gly Gly His Gln Ala
50 55 60

Ala Met Gln Met Leu Lys Asp Thr Ile Asn Asp Glu Ala Ala Glu Trp
65 70 75 80

Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln Met
85 90 95

```
Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu Gln
            100                 105                 110


Glu Gln Ile Ala Trp Met Thr Asn Asn Pro Pro Val Pro Val Gly Glu
        115                 120                 125


Ile Tyr Lys Arg Trp Ile Val Leu Gly Leu Asn Lys Ile Val Arg Met
    130                 135                 140


Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro
145                 150                 155                 160


Phe Arg Asp Tyr Val Asp Arg Phe Phe Arg Thr Leu Arg Ala Glu Gln
                165                 170                 175


Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln
            180                 185                 190


Asn Ala Asn Pro Asp Cys Lys Asn Ile Leu Arg Ala Leu Gly Pro Gly
        195                 200                 205


Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
    210                 215                 220


Ser His Lys Ala Arg Val Leu
225                 230


<210>  776
<211>  507
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  HIV C gag CEN-5, Tailored

<400>  776

Met Gly Ala Arg Ala Ser Val Leu Arg Gly Glu Lys Leu Asp Lys Trp
```

```
1               5                   10                  15

Glu Arg Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Met Leu Lys
            20                  25                  30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Lys Phe Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Lys Gln Ile Ile Lys Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Thr Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Thr Leu Tyr Cys Val His Glu Lys Ile Asp Val Arg Asp
                85                  90                  95

Thr Lys Glu Ala Leu Asp Arg Ile Glu Glu Glu Gln Asn Lys Cys Gln
            100                 105                 110

Gln Lys Thr Gln Gln Ala Lys Ala Ala Asp Glu Lys Val Ser Gln Asn
        115                 120                 125

Tyr Pro Ile Val Gln Asn Ala Gln Gly Gln Met Val His Gln Ala Leu
    130                 135                 140

Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Gly
145                 150                 155                 160

Phe Asn Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Asp Gly Ala
                165                 170                 175

Thr Pro Gln Asp Leu Asn Ser Met Leu Asn Thr Val Gly Gly His Gln
            180                 185                 190

Ala Ala Met Gln Ile Leu Lys Asp Thr Ile Asn Glu Glu Ala Ala Glu
```

195 200 205

Trp Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln
210 215 220

Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu
225 230 235 240

Gln Glu Gln Ile Ala Trp Met Thr Gly Asn Pro Pro Ile Pro Val Gly
245 250 255

Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg
260 265 270

Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu
275 280 285

Pro Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Ala Leu Arg Ala Glu
290 295 300

Gln Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val
305 310 315 320

Gln Asn Ala Asn Pro Asp Cys Lys Asn Ile Leu Arg Ala Leu Gly Pro
325 330 335

Gly Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly
340 345 350

Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala Met Ser Gln Ala Asn
355 360 365

Asn Thr Asn Ile Met Met Gln Arg Asn Asn Phe Lys Gly Pro Lys Arg
370 375 380

Ile Ile Lys Cys Phe Asn Cys Gly Lys Glu Gly His Ile Ala Lys Asn

385 390 395 400

Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys Gly Arg Glu Gly
405 410 415

His Gln Met Lys Asp Cys Asn Glu Arg Gln Ala Asn Phe Leu Gly Arg
420 425 430

Ile Trp Pro Ser His Lys Gly Gly Arg Pro Gly Asn Phe Leu Gln Asn
435 440 445

Arg Pro Glu Pro Thr Ala Pro Pro Val Glu Pro Thr Ala Pro Pro Ala
450 455 460

Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Lys Phe Glu Glu Thr Thr
465 470 475 480

Pro Thr Pro Lys Gln Glu Gln Lys Asp Arg Glu Pro Leu Ile Ser Leu
485 490 495

Lys Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
500 505

<210> 777
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV C gag CEN-5 Conserved, Tailored

<400> 777

Pro Ile Val Gln Asn Ala Gln Gly Gln Met Val His Gln Ala Leu Ser
1 5 10 15

Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Gly Phe
20 25 30

```
Asn Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Asp Gly Ala Thr
        35                  40                  45

Pro Gln Asp Leu Asn Ser Met Leu Asn Thr Val Gly Gly His Gln Ala
    50                  55                  60

Ala Met Gln Ile Leu Lys Asp Thr Ile Asn Glu Glu Ala Ala Glu Trp
65                  70                  75                  80

Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln Met
                85                  90                  95

Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu Gln
            100                 105                 110

Glu Gln Ile Ala Trp Met Thr Gly Asn Pro Pro Ile Pro Val Gly Glu
        115                 120                 125

Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met
    130                 135                 140

Tyr Ser Pro Val Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro
145                 150                 155                 160

Phe Arg Asp Tyr Val Asp Arg Phe Phe Lys Ala Leu Arg Ala Glu Gln
                165                 170                 175

Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln
            180                 185                 190

Asn Ala Asn Pro Asp Cys Lys Asn Ile Leu Arg Ala Leu Gly Pro Gly
        195                 200                 205

Ala Ser Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
    210                 215                 220
```

Ser His Lys Ala Arg Val Leu
225 230

<210> 778
<211> 506
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B gag episensus EG-0, Tailored

<400> 778

Met Gly Ala Arg Ala Ser Val Leu Ser Gly Gly Glu Leu Asp Arg Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
50 55 60

Gln Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Thr Leu Tyr Cys Val His Gln Lys Ile Asp Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Asp Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Asp Thr Gly Asn Ser Ser Gln Val
115 120 125

Ser Gln Asn Tyr Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His

130 135 140

Gln Ala Ile Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu
145 150 155 160

Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser
165 170 175

Glu Gly Ala Thr Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly
180 185 190

Gly His Gln Ala Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu
195 200 205

Ala Ala Glu Trp Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala
210 215 220

Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr
225 230 235 240

Ser Thr Leu Gln Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile
245 250 255

Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys
260 265 270

Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly
275 280 285

Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu
290 295 300

Arg Ala Glu Gln Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr
305 310 315 320

Leu Leu Val Gln Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala

325 330 335

Leu Gly Pro Ala Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly
340 345 350

Val Gly Gly Pro Gly His Lys Ala Arg Val Leu Ala Glu Ala Met Ser
355 360 365

Gln Val Thr Asn Ser Ala Thr Ile Met Met Gln Arg Gly Asn Phe Arg
370 375 380

Asn Gln Arg Lys Thr Val Lys Cys Phe Asn Cys Gly Lys Glu Gly His
385 390 395 400

Ile Ala Arg Asn Cys Arg Ala Pro Arg Lys Lys Gly Cys Trp Lys Cys
405 410 415

Gly Lys Glu Gly His Gln Met Lys Asp Cys Thr Glu Arg Gln Ala Asn
420 425 430

Phe Leu Gly Lys Ile Trp Pro Ser His Lys Gly Arg Pro Gly Asn Phe
435 440 445

Leu Gln Ser Arg Pro Glu Pro Thr Ala Pro Pro Glu Pro Thr Ala Pro
450 455 460

Pro Glu Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr Thr Pro Ser Gln
465 470 475 480

Lys Gln Glu Pro Ile Asp Lys Glu Leu Tyr Pro Leu Ala Ser Leu Lys
485 490 495

Ser Leu Phe Gly Asn Asp Pro Ser Ser Gln
500 505

<210> 779

<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B gag episensus EG-0 Conserved, Tailored

<400> 779

```
Pro Ile Val Gln Asn Leu Gln Gly Gln Met Val His Gln Ala Ile Ser
1               5                   10                  15


Pro Arg Thr Leu Asn Ala Trp Val Lys Val Val Glu Glu Lys Ala Phe
            20                  25                  30


Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ser Glu Gly Ala Thr
        35                  40                  45


Pro Gln Asp Leu Asn Thr Met Leu Asn Thr Val Gly Gly His Gln Ala
    50                  55                  60


Ala Met Gln Met Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp
65                  70                  75                  80


Asp Arg Leu His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln Met
                85                  90                  95


Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Thr Leu Gln
            100                 105                 110


Glu Gln Ile Gly Trp Met Thr Asn Asn Pro Pro Ile Pro Val Gly Glu
        115                 120                 125


Ile Tyr Lys Arg Trp Ile Ile Leu Gly Leu Asn Lys Ile Val Arg Met
    130                 135                 140


Tyr Ser Pro Thr Ser Ile Leu Asp Ile Arg Gln Gly Pro Lys Glu Pro
145                 150                 155                 160
```

```
Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln
                165                 170                 175


Ala Ser Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln
            180                 185                 190


Asn Ala Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Ala
        195                 200                 205


Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
    210                 215                 220


Gly His Lys Ala Arg Val Leu
225                 230


<210>  780
<211>  509
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  HIV B gag CEN-1, Tailored

<400>  780

Met Gly Ser Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Gln Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Arg Tyr Lys Leu Lys
            20                  25                  30


His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Val Asn Pro
        35                  40                  45


Ser Leu Leu Glu Thr Ser Glu Gly Cys Lys Gln Ile Leu Gly Gln Leu
    50                  55                  60


Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
```

65 70 75 80

Thr Ile Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Ser
115 120 125

Asn Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met Gln Gly Gln
130 135 140

Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145 150 155 160

Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr
165 170 175

Ala Leu Ser Glu Gly Ala Thr Pro Ala Asp Leu Asn Thr Met Leu Asn
180 185 190

Thr Ile Gly Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile
195 200 205

Asn Glu Glu Ala Ala Glu Trp Asp Arg Val His Pro Val His Ala Gly
210 215 220

Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile Ala
225 230 235 240

Gly Ser Thr Ser Thr Leu Gln Glu Gln Ile Ala Trp Met Thr Ser Asn
245 250 255

Pro Pro Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Met Gly

260 265 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Thr Ser Ile Leu Asp Ile
275 280 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
290 295 300

Lys Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys Asn Trp Met
305 310 315 320

Thr Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile
325 330 335

Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala
340 345 350

Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu
355 360 365

Ala Met Ser Gln Val Thr Thr Pro Pro Ala Ile Met Met Gln Arg Gly
370 375 380

Asn Phe Lys Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys
385 390 395 400

Glu Gly His Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys
405 410 415

Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Ser Glu Arg
420 425 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro
435 440 445

Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu

450 455 460

Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg Phe Gly Glu Glu Thr Ala
465 470 475 480

Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp Lys Glu Met Tyr Pro Leu
485 490 495

Thr Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Gln
500 505

<210> 781
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B gag CEN-1 Conserved, Tailored

<400> 781

Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His Gln Ala Leu Ser
1 5 10 15

Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala Phe
20 25 30

Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr
35 40 45

Pro Ala Asp Leu Asn Thr Met Leu Asn Thr Ile Gly Gly His Gln Ala
50 55 60

Ala Met Gln Ile Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp
65 70 75 80

Asp Arg Val His Pro Val His Ala Gly Pro Val Ala Pro Gly Gln Met
85 90 95

```
Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Ser Thr Ser Thr Leu Gln
            100                 105                 110


Glu Gln Ile Ala Trp Met Thr Ser Asn Pro Pro Ile Pro Val Gly Asp
        115                 120                 125


Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys Ile Val Arg Met
    130                 135                 140


Tyr Ser Pro Thr Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro
145                 150                 155                 160


Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln
                165                 170                 175


Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln
            180                 185                 190


Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Gly
        195                 200                 205


Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
    210                 215                 220


Ser His Lys Ala Arg Val Leu
225                 230


<210>  782
<211>  513
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  HIV B gag CEN-2, Tailored

<400>  782

Met Gly Ser Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
```

```
1               5                   10                  15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30

His Leu Val Trp Ala Ser Arg Glu Leu Glu Arg Tyr Ala Leu Asn Pro
        35                  40                  45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Gly Gln Leu
    50                  55                  60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Lys Ser Leu Phe Asn
65                  70                  75                  80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Asp Val Lys Asp
                85                  90                  95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Ser Lys
            100                 105                 110

Lys Lys Thr Gln Gln Ala Ala Ala Asp Thr Gly Asn Asn Ser Gln Val
        115                 120                 125

Lys Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln Met
    130                 135                 140

Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys Val
145                 150                 155                 160

Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr Ala
                165                 170                 175

Leu Ser Glu Gly Ala Thr Pro His Asp Leu Asn Thr Met Leu Asn Thr
            180                 185                 190

Ile Gly Gly His Gln Ala Ala Met Gln Ile Leu Lys Glu Thr Ile Asn
```

195 200 205

Asp Glu Ala Ala Glu Trp Asp Arg Thr His Pro Val His Ala Gly Pro
210 215 220

Val Ala Pro Gly Gln Met Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly
225 230 235 240

Thr Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr His Asn Pro
245 250 255

Pro Ile Pro Val Gly Asp Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu
260 265 270

Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys
275 280 285

Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys
290 295 300

Ile Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met Thr
305 310 315 320

Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu
325 330 335

Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala Cys
340 345 350

Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu Ala
355 360 365

Met Ser Gln Met Thr Asn Ser Ala Thr Ile Met Met Gln Lys Gly Asn
370 375 380

Phe Arg Asn Gln Arg Lys Thr Ile Lys Cys Phe Asn Cys Gly Lys Glu

385 390 395 400

Gly His Leu Ala Arg Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys Trp
405 410 415

Lys Cys Gly Gln Glu Gly His Gln Met Lys Asp Cys Asn Glu Arg Gln
420 425 430

Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Ser Lys Gly Arg Pro Gly
435 440 445

Asn Phe Leu Gln Ser Arg Pro Glu Ser Arg Pro Glu Pro Thr Ala Pro
450 455 460

Pro Ala Glu Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg Phe Gly Glu
465 470 475 480

Glu Thr Ala Thr Pro Pro Gln Lys Gln Glu Pro Ile Asp Lys Glu Met
485 490 495

Tyr Pro Leu Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Ser Ser
500 505 510

Lys

<210> 783
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B gag CEN-2 Conserved, Tailored

<400> 783

Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His Gln Ala Leu Ser
1 5 10 15

```
Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala Phe
            20                  25                  30

Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr
        35                  40                  45

Pro His Asp Leu Asn Thr Met Leu Asn Thr Ile Gly Gly His Gln Ala
    50                  55                  60

Ala Met Gln Ile Leu Lys Glu Thr Ile Asn Asp Glu Ala Ala Glu Trp
65                  70                  75                  80

Asp Arg Thr His Pro Val His Ala Gly Pro Val Ala Pro Gly Gln Met
                85                  90                  95

Arg Asp Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu Gln
            100                 105                 110

Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile Pro Val Gly Asp
        115                 120                 125

Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys Ile Val Arg Met
    130                 135                 140

Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro
145                 150                 155                 160

Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Ile Leu Arg Ala Glu Gln
                165                 170                 175

Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln
            180                 185                 190

Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Gly
        195                 200                 205
```

Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
210 215 220

Ser His Lys Ala Arg Val Leu
225 230

<210> 784
<211> 510
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B gag CEN-3, Tailored

<400> 784

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Gln Tyr Lys Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Phe Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ser Gly Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Ala Ala Asp Thr Gly Asn Asn

```
        115                 120                 125

Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Ile Gln Gly Gln
    130                 135                 140

Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala Trp Val Lys
145                 150                 155                 160

Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe Thr
                165                 170                 175

Ala Leu Ser Glu Gly Ala Thr Pro Gly Asp Leu Asn Leu Met Leu Asn
            180                 185                 190

Ala Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr Ile
        195                 200                 205

Asn Glu Glu Ala Ala Asp Trp Asp Arg Leu His Pro Val Gln Ala Gly
    210                 215                 220

Pro Val Ala Pro Gly Gln Leu Arg Glu Pro Arg Gly Ser Asp Ile Ala
225                 230                 235                 240

Gly Thr Thr Ser Asn Leu Gln Glu Gln Ile Ala Trp Met Thr His Asn
                245                 250                 255

Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met Gly
            260                 265                 270

Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp Ile
        275                 280                 285

Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe Tyr
    290                 295                 300

Arg Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp Met
```

```
305                 310                 315                 320

Thr Glu Thr Leu Leu Ile Gln Asn Ala Asn Pro Asp Cys Arg Thr Ile
                325                 330                 335

Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr Ala
            340                 345                 350

Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala Glu
        355                 360                 365

Ala Met Ser Gln Ala Thr Ser Ser Ala Thr Ile Met Met Gln Lys Gly
    370                 375                 380

Asn Phe Arg Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly Lys
385                 390                 395                 400

Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly Cys
                405                 410                 415

Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Asp Cys Ser Glu Arg
            420                 425                 430

Gln Ala Asn Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg Pro
        435                 440                 445

Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala Glu
    450                 455                 460

Pro Thr Ala Pro Pro Ala Glu Ser Phe Arg Phe Gly Glu Glu Thr Thr
465                 470                 475                 480

Thr Pro Pro Gln Lys Gln Glu Pro Thr Asp Lys Glu Leu Tyr Pro Leu
                485                 490                 495

Ala Ser Leu Arg Ser Leu Phe Gly Asn Asp Pro Leu Ser Gln
```

500 505 510

<210> 785
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B gag CEN-3 Conserved, Tailored

<400> 785

Pro Ile Val Gln Asn Ile Gln Gly Gln Met Val His Gln Ala Leu Ser
1 5 10 15

Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala Phe
20 25 30

Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr
35 40 45

Pro Gly Asp Leu Asn Leu Met Leu Asn Ala Val Gly Gly His Gln Ala
50 55 60

Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu Ala Ala Asp Trp
65 70 75 80

Asp Arg Leu His Pro Val Gln Ala Gly Pro Val Ala Pro Gly Gln Leu
85 90 95

Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu Gln
100 105 110

Glu Gln Ile Ala Trp Met Thr His Asn Pro Pro Ile Pro Val Gly Glu
115 120 125

Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys Ile Val Arg Met
130 135 140

```
Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro
145                 150                 155                 160


Phe Arg Asp Tyr Val Asp Arg Phe Tyr Arg Thr Leu Arg Ala Glu Gln
                165                 170                 175


Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr Leu Leu Ile Gln
            180                 185                 190


Asn Ala Asn Pro Asp Cys Arg Thr Ile Leu Lys Ala Leu Gly Pro Gly
        195                 200                 205


Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
    210                 215                 220


Ser His Lys Ala Arg Val Leu
225                 230


<210>  786
<211>  506
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  HIV B gag CEN-4, Tailored

<400>  786

Met Gly Ala Arg Ala Ser Ile Leu Ser Gly Gly Glu Leu Asp Lys Trp
1               5                   10                  15


Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Arg Leu Lys
            20                  25                  30


His Ile Val Trp Ala Ser Asn Glu Leu Glu Arg Phe Ala Leu Asn Pro
        35                  40                  45


Gly Leu Leu Glu Thr Ser Asp Gly Cys Arg Gln Ile Leu Gly Gln Leu
```

50 55 60

His Pro Ser Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Arg Ile Glu Ile Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Ile Glu Glu Glu Gln Asn Lys Cys Lys
100 105 110

Lys Lys Ala Gln Gln Ala Ala Ala Ala Gln Gln Ala Ala Ala Gly Thr
115 120 125

Gly Asn Asn Ser Gln Val Ser Gln Asn Tyr Pro Ile Val Gln Asn Met
130 135 140

Gln Gly Gln Met Val His Gln Ala Leu Ser Pro Arg Thr Leu Asn Ala
145 150 155 160

Trp Val Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro
165 170 175

Met Phe Thr Ala Leu Ser Glu Gly Ala Thr Pro His Asp Leu Asn Thr
180 185 190

Met Leu Asn Thr Ile Gly Gly His Gln Ala Ala Met Gln Ile Leu Lys
195 200 205

Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Val His Pro Val
210 215 220

His Ala Gly Pro Ile Ala Pro Gly Gln Ile Arg Glu Pro Arg Gly Ser
225 230 235 240

Asp Ile Ala Gly Thr Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met

245 250 255

Thr His Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Lys Trp Ile
260 265 270

Ile Met Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile
275 280 285

Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp
290 295 300

Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln Ala Thr Gln Glu Val Lys
305 310 315 320

Asn Trp Met Thr Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys
325 330 335

Lys Thr Ile Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met
340 345 350

Met Thr Ala Cys Gln Gly Val Gly Gly Pro Ala His Lys Ala Arg Val
355 360 365

Leu Ala Glu Ala Met Ser Gln Ala Thr Asn Ser Ala Ala Ile Met Met
370 375 380

Gln Lys Gly Asn Phe Arg Asn Gln Arg Arg Thr Val Lys Cys Phe Asn
385 390 395 400

Cys Gly Lys Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys
405 410 415

Lys Gly Cys Trp Lys Cys Gly Gln Glu Gly His Gln Met Lys Asp Cys
420 425 430

Asn Glu Arg Gln Ala Asn Phe Leu Gly Arg Ser Trp Pro Ser Leu Lys

435 440 445

Gly Arg Pro Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Ser Ala Pro
450 455 460

Pro Glu Glu Ser Phe Lys Phe Gly Glu Glu Thr Thr Thr Pro Pro Gln
465 470 475 480

Lys Gln Glu Pro Ile Asp Lys Asp Leu Tyr Pro Leu Ala Ser Leu Arg
485 490 495

Ser Leu Phe Gly Asn Asp Pro Ser Ser Thr
500 505

<210> 787
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B gag CEN-4 Conserved, Tailored

<400> 787

Pro Ile Val Gln Asn Met Gln Gly Gln Met Val His Gln Ala Leu Ser
1 5 10 15

Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala Phe
20 25 30

Ser Pro Glu Val Ile Pro Met Phe Thr Ala Leu Ser Glu Gly Ala Thr
35 40 45

Pro His Asp Leu Asn Thr Met Leu Asn Thr Ile Gly Gly His Gln Ala
50 55 60

Ala Met Gln Ile Leu Lys Glu Thr Ile Asn Glu Glu Ala Ala Glu Trp
65 70 75 80

```
Asp Arg Val His Pro Val His Ala Gly Pro Ile Ala Pro Gly Gln Ile
                85                  90                  95

Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu Gln
            100                 105                 110

Glu Gln Ile Gly Trp Met Thr His Asn Pro Pro Ile Pro Val Gly Glu
        115                 120                 125

Ile Tyr Lys Lys Trp Ile Ile Met Gly Leu Asn Lys Ile Val Arg Met
    130                 135                 140

Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro
145                 150                 155                 160

Phe Arg Asp Tyr Val Asp Arg Phe Tyr Lys Thr Leu Arg Ala Glu Gln
                165                 170                 175

Ala Thr Gln Glu Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln
            180                 185                 190

Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Gly
        195                 200                 205

Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
    210                 215                 220

Ala His Lys Ala Arg Val Leu
225                 230
```

<210> 788
<211> 505
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B gag CEN-5, Tailored

<400> 788

Met Gly Ser Arg Ala Ser Val Leu Ser Gly Gly Lys Leu Asp Lys Trp
1 5 10 15

Glu Lys Ile Arg Leu Arg Pro Gly Gly Lys Lys Lys Tyr Gln Leu Lys
20 25 30

His Ile Val Trp Ala Ser Arg Glu Leu Glu Arg Tyr Ala Leu Asn Pro
35 40 45

Gly Leu Leu Glu Thr Ala Glu Gly Cys Arg Gln Ile Leu Glu Gln Leu
50 55 60

Gln Pro Ala Leu Gln Thr Gly Ser Glu Glu Leu Arg Ser Leu Tyr Asn
65 70 75 80

Thr Val Ala Val Leu Tyr Cys Val His Gln Lys Ile Glu Val Lys Asp
85 90 95

Thr Lys Glu Ala Leu Glu Lys Val Glu Glu Glu Gln Asn Lys Ser Lys
100 105 110

Lys Arg Ile Gln Gln Ala Gln Gln Ala Ala Ala Ala Asp Thr Gly Asn
115 120 125

Ser Ser Lys Val Ser Gln Asn Tyr Pro Ile Val Arg Asn Leu Gln Gly
130 135 140

Gln Met Val His Gln Pro Ile Ser Pro Arg Thr Leu Asn Ala Trp Val
145 150 155 160

Lys Val Ile Glu Glu Lys Ala Phe Ser Pro Glu Val Ile Pro Met Phe
165 170 175

Ser Ala Leu Ala Glu Gly Ala Thr Pro Gln Asp Leu Asn Leu Met Leu

180 185 190

Asn Ala Val Gly Gly His Gln Ala Ala Met Gln Met Leu Lys Asp Thr
195 200 205

Ile Asn Glu Glu Ala Ala Glu Trp Asp Arg Met His Pro Val His Ala
210 215 220

Gly Pro Val Ala Pro Gly Gln Met Arg Glu Pro Arg Gly Ser Asp Ile
225 230 235 240

Ala Gly Thr Thr Ser Asn Leu Gln Glu Gln Ile Gly Trp Met Thr Ser
245 250 255

Asn Pro Pro Ile Pro Val Gly Glu Ile Tyr Lys Arg Trp Ile Ile Met
260 265 270

Gly Leu Asn Lys Ile Val Arg Met Tyr Ser Pro Val Ser Ile Leu Asp
275 280 285

Ile Lys Gln Gly Pro Lys Glu Pro Phe Arg Asp Tyr Val Asp Arg Phe
290 295 300

Tyr Arg Thr Leu Arg Ala Glu Gln Ala Ser Gln Asp Val Lys Asn Trp
305 310 315 320

Met Thr Glu Thr Leu Leu Val Gln Asn Ser Asn Pro Asp Cys Lys Thr
325 330 335

Ile Leu Lys Ala Leu Gly Pro Gly Ala Thr Leu Glu Glu Met Met Thr
340 345 350

Ala Cys Gln Gly Val Gly Gly Pro Ser His Lys Ala Arg Val Leu Ala
355 360 365

Glu Ala Met Ser Gln Val Thr Asn Ser Thr Ala Ile Met Met Gln Arg

370 375 380

Gly Asn Phe Lys Asn Gln Arg Lys Ile Val Lys Cys Phe Asn Cys Gly
385 390 395 400

Lys Glu Gly His Ile Ala Lys Asn Cys Arg Ala Pro Arg Lys Arg Gly
405 410 415

Cys Trp Lys Cys Gly Arg Glu Gly His Gln Met Lys Glu Cys Thr Glu
420 425 430

Arg Gln Val Asn Phe Leu Gly Lys Ile Trp Pro Ser Tyr Lys Gly Arg
435 440 445

Pro Gly Asn Phe Leu Gln Asn Arg Pro Glu Pro Thr Ala Pro Pro Ala
450 455 460

Pro Pro Glu Glu Ser Phe Arg Phe Gly Glu Gly Thr Thr Thr Pro Ser
465 470 475 480

Gln Lys Gln Gly Thr Ile Asp Lys Glu Leu Tyr Pro Leu Thr Ser Leu
485 490 495

Arg Ser Leu Phe Gly Asn Asp Pro Ser
500 505

<210> 789
<211> 231
<212> PRT
<213> Artificial Sequence

<220>
<223> HIV B gag CEN-5 Conserved, Tailored

<400> 789

Pro Ile Val Arg Asn Leu Gln Gly Gln Met Val His Gln Pro Ile Ser
1 5 10 15

```
Pro Arg Thr Leu Asn Ala Trp Val Lys Val Ile Glu Glu Lys Ala Phe
            20                  25                  30

Ser Pro Glu Val Ile Pro Met Phe Ser Ala Leu Ala Glu Gly Ala Thr
        35                  40                  45

Pro Gln Asp Leu Asn Leu Met Leu Asn Ala Val Gly Gly His Gln Ala
    50                  55                  60

Ala Met Gln Met Leu Lys Asp Thr Ile Asn Glu Glu Ala Ala Glu Trp
65                  70                  75                  80

Asp Arg Met His Pro Val His Ala Gly Pro Val Ala Pro Gly Gln Met
                85                  90                  95

Arg Glu Pro Arg Gly Ser Asp Ile Ala Gly Thr Thr Ser Asn Leu Gln
            100                 105                 110

Glu Gln Ile Gly Trp Met Thr Ser Asn Pro Pro Ile Pro Val Gly Glu
        115                 120                 125

Ile Tyr Lys Arg Trp Ile Ile Met Gly Leu Asn Lys Ile Val Arg Met
    130                 135                 140

Tyr Ser Pro Val Ser Ile Leu Asp Ile Lys Gln Gly Pro Lys Glu Pro
145                 150                 155                 160

Phe Arg Asp Tyr Val Asp Arg Phe Tyr Arg Thr Leu Arg Ala Glu Gln
                165                 170                 175

Ala Ser Gln Asp Val Lys Asn Trp Met Thr Glu Thr Leu Leu Val Gln
            180                 185                 190

Asn Ser Asn Pro Asp Cys Lys Thr Ile Leu Lys Ala Leu Gly Pro Gly
        195                 200                 205
```

Ala Thr Leu Glu Glu Met Met Thr Ala Cys Gln Gly Val Gly Gly Pro
210 215 220

Ser His Lys Ala Arg Val Leu
225 230

<210> 790
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 790

Val Thr Ser Ser Asn Met Asn Asn Ala
1 5

<210> 791
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 791

Thr Ser Ser Asn Met Asn Asn Ala Asp
1 5

<210> 792
<211> 19
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 792

Thr Ser Ser Asn Met Asn Asn Ala Asp Ser Val Trp Leu Arg Ala Gln

1 5 10 15

Glu Glu Glu

<210> 793
<211> 19
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 793

Thr Ser Ser Asn Met Asn Asn Ala Asp Cys Val Trp Leu Arg Ala Gln
1 5 10 15

Glu Glu Glu

<210> 794
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 794

Ala Arg Cys His Ser Leu Met
1 5

<210> 795
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 795

Asp Glu Phe Gly Lys Leu Met
1 5

<210> 796
<211> 12
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 796

Glu Pro Thr Ala Pro Pro Ala Glu Pro Thr Ala Pro
1 5 10

<210> 797
<211> 12
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 797

Pro Thr Ala Pro Pro Ala Glu Pro Thr Ala Pro Pro
1 5 10

<210> 798
<211> 13
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 798

Glu Pro Thr Ala Pro Pro Ala Glu Pro Thr Ala Pro Pro
1 5 10

<210> 799

<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 799

Ala Arg Cys Gly Ser Leu Met
1 5

<210> 800
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 800

Ala Arg Cys Gly Ser Pro Met
1 5

<210> 801
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 801

Ala Arg Tyr Gly Ser Leu Met
1 5

<210> 802
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 802

Ala Tyr Cys His Ser Leu Met
1 5

<210> 803
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 803

Tyr Arg Cys His Ser Leu Met
1 5

<210> 804
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 804

Asp Glu Phe Gly Ser Leu Met
1 5

<210> 805
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 805

Asp Glu Phe Gly Lys Leu Met
1 5

<210> 806
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 806

Ala Arg Cys Cys Asp Glu Gly His
1 5

<210> 807
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 807

Ala Arg Cys Asp Glu Phe Gly His
1 5

<210> 808
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 808

Ala Arg Cys Cys Asp Glu Gly His
1 5

<210> 809
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Toy Sequence

<400> 809

Ala Arg Cys Asp Glu Phe Gly His
1 5