SEQUENCE LISTING

<110> Novavax, Inc.

<120> VACCINE COMPOSITIONS HAVING IMPROVED STABILITY AND IMMUNOGENICITY

<130> SP102091SGM

<150> US 62/350,973
<151> 2016-06-16

<150> US 62/309,216
<151> 2016-03-16

<150> US 62/255,786
<151> 2015-11-16

<150> US 62/213,947
<151> 2015-09-03

<160> 29

<170> PatentIn version 3.5

<210> 1
<211> 1725
<212> DNA
<213> Respiratory syncytial virus

<400> 1
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agcaaaggct atcttagtgc tctgagaact ggttggtata ccagtgttat aactatagaa 180

ttaagtaata tcaaggaaaa taagtgtaat ggaacagatg ctaaggtaaa attgataaaa 240

caagaattag ataaatataa aaatgctgta acagaattgc agttgctcat gcaaagcaca 300

ccaccaacaa acaatcgagc cagaagagaa ctaccaaggt ttatgaatta tacactcaac 360

aatgccaaaa aaaccaatgt aacattaagc aagaaaagga aaagaagatt tcttggtttt 420

ttgttaggtg ttggatctgc aatcgccagt ggcgttgctg tatctaaggt cctgcaccta 480

gaaggggaag tgaacaagat caaaagtgct ctactatcca caaacaaggc tgtagtcagc 540

ttatcaaatg gagttagtgt cttaaccagc aaagtgttag acctcaaaaa ctatatagat 600

aaacaattgt tacctattgt gaacaagcaa agctgcagca tatcaaatat agaaactgtg 660

atagagttcc aacaaaagaa caacagacta ctagagatta ccagggaatt tagtgttaat 720

gcaggtgtaa ctacacctgt aagcacttac atgttaacta atagtgaatt attgtcatta 780

atcaatgata tgcctataac aaatgatcag aaaaagttaa tgtccaacaa tgttcaaata 840

gttagacagc aaagttactc tatcatgtcc ataataaaag aggaagtctt agcatatgta 900

gtacaattac cactatatgg tgttatagat acaccctgtt ggaaactaca cacatcccct 960

ctatgtacaa ccaacacaaa agaagggtcc aacatctgtt taacaagaac tgacagagga 1020

tggtactgtg acaatgcagg atcagtatct ttcttcccac aagctgaaac atgtaaagtt 1080

caatcaaatc gagtattttg tgacacaatg aacagtttaa cattaccaag tgaaataaat 1140

ctctgcaatg ttgacatatt caaccccaaa tatgattgta aaattatgac ttcaaaaaca 1200

gatgtaagca gctccgttat cacatctcta ggagccattg tgtcatgcta tggcaaaact 1260

aaatgtacag catccaataa aaatcgtgga atcataaaga cattttctaa cgggtgcgat 1320

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aagcaagaag gtaaaagtct ctatgtaaaa ggtgaaccaa taataaattt ctatgaccca 1440

ttagtattcc cctctgatga atttgatgca tcaatatctc aagtcaacga gaagattaac 1500

cagagcctag catttattcg taaatccgat gaattattac ataatgtaaa tgctggtaaa 1560

tccaccacaa atatcatgat aactactata attatagtga ttatagtaat attgttatca 1620

ttaattgctg ttggactgct cttatactgt aaggccagaa gcacaccagt cacactaagc 1680

aaagatcaac tgagtggtat aaataatatt gcatttagta actaa 1725

<210> 2
<211> 574
<212> PRT
<213> Respiratory syncytial virus

<400> 2

Met Glu Leu Leu Ile Leu Lys Ala Asn Ala Ile Thr Thr Ile Leu Thr
1 5 10 15

Ala Val Thr Phe Cys Phe Ala Ser Gly Gln Asn Ile Thr Glu Glu Phe

```
            20                  25                  30

Tyr Gln Ser Thr Cys Ser Ala Val Ser Lys Gly Tyr Leu Ser Ala Leu
        35                  40                  45

Arg Thr Gly Trp Tyr Thr Ser Val Ile Thr Ile Glu Leu Ser Asn Ile
    50                  55                  60

Lys Glu Asn Lys Cys Asn Gly Thr Asp Ala Lys Val Lys Leu Ile Lys
65                  70                  75                  80

Gln Glu Leu Asp Lys Tyr Lys Asn Ala Val Thr Glu Leu Gln Leu Leu
                85                  90                  95

Met Gln Ser Thr Pro Pro Thr Asn Asn Arg Ala Arg Arg Glu Leu Pro
            100                 105                 110

Arg Phe Met Asn Tyr Thr Leu Asn Asn Ala Lys Lys Thr Asn Val Thr
        115                 120                 125

Leu Ser Lys Lys Arg Lys Arg Arg Phe Leu Gly Phe Leu Leu Gly Val
    130                 135                 140

Gly Ser Ala Ile Ala Ser Gly Val Ala Val Ser Lys Val Leu His Leu
145                 150                 155                 160

Glu Gly Glu Val Asn Lys Ile Lys Ser Ala Leu Leu Ser Thr Asn Lys
                165                 170                 175

Ala Val Val Ser Leu Ser Asn Gly Val Ser Val Leu Thr Ser Lys Val
            180                 185                 190

Leu Asp Leu Lys Asn Tyr Ile Asp Lys Gln Leu Leu Pro Ile Val Asn
        195                 200                 205

Lys Gln Ser Cys Ser Ile Ser Asn Ile Glu Thr Val Ile Glu Phe Gln
    210                 215                 220

Gln Lys Asn Asn Arg Leu Leu Glu Ile Thr Arg Glu Phe Ser Val Asn
225                 230                 235                 240
```

```
Ala Gly Val Thr Thr Pro Val Ser Thr Tyr Met Leu Thr Asn Ser Glu
                245                 250                 255

Leu Leu Ser Leu Ile Asn Asp Met Pro Ile Thr Asn Asp Gln Lys Lys
            260                 265                 270

Leu Met Ser Asn Asn Val Gln Ile Val Arg Gln Gln Ser Tyr Ser Ile
        275                 280                 285

Met Ser Ile Ile Lys Glu Glu Val Leu Ala Tyr Val Val Gln Leu Pro
    290                 295                 300

Leu Tyr Gly Val Ile Asp Thr Pro Cys Trp Lys Leu His Thr Ser Pro
305                 310                 315                 320

Leu Cys Thr Thr Asn Thr Lys Glu Gly Ser Asn Ile Cys Leu Thr Arg
                325                 330                 335

Thr Asp Arg Gly Trp Tyr Cys Asp Asn Ala Gly Ser Val Ser Phe Phe
            340                 345                 350

Pro Gln Ala Glu Thr Cys Lys Val Gln Ser Asn Arg Val Phe Cys Asp
        355                 360                 365

Thr Met Asn Ser Leu Thr Leu Pro Ser Glu Ile Asn Leu Cys Asn Val
    370                 375                 380

Asp Ile Phe Asn Pro Lys Tyr Asp Cys Lys Ile Met Thr Ser Lys Thr
385                 390                 395                 400

Asp Val Ser Ser Ser Val Ile Thr Ser Leu Gly Ala Ile Val Ser Cys
                405                 410                 415

Tyr Gly Lys Thr Lys Cys Thr Ala Ser Asn Lys Asn Arg Gly Ile Ile
            420                 425                 430

Lys Thr Phe Ser Asn Gly Cys Asp Tyr Val Ser Asn Lys Gly Met Asp
        435                 440                 445

Thr Val Ser Val Gly Asn Thr Leu Tyr Tyr Val Asn Lys Gln Glu Gly
```

```
    450                 455                 460

Lys Ser Leu Tyr Val Lys Gly Glu Pro Ile Ile Asn Phe Tyr Asp Pro
465                 470                 475                 480

Leu Val Phe Pro Ser Asp Glu Phe Asp Ala Ser Ile Ser Gln Val Asn
                485                 490                 495

Glu Lys Ile Asn Gln Ser Leu Ala Phe Ile Arg Lys Ser Asp Glu Leu
            500                 505                 510

Leu His Asn Val Asn Ala Gly Lys Ser Thr Thr Asn Ile Met Ile Thr
        515                 520                 525

Thr Ile Ile Ile Val Ile Ile Val Ile Leu Leu Ser Leu Ile Ala Val
    530                 535                 540

Gly Leu Leu Leu Tyr Cys Lys Ala Arg Ser Thr Pro Val Thr Leu Ser
545                 550                 555                 560

Lys Asp Gln Leu Ser Gly Ile Asn Asn Ile Ala Phe Ser Asn
                565                 570
```

<210> 3
<211> 573
<212> PRT
<213> Artificial Sequence

<220>
<223> Deletion of 137 (delta 1)

<400> 3

```
Met Glu Leu Leu Ile Leu Lys Ala Asn Ala Ile Thr Thr Ile Leu Thr
1               5                   10                  15

Ala Val Thr Phe Cys Phe Ala Ser Gly Gln Asn Ile Thr Glu Glu Phe
            20                  25                  30

Tyr Gln Ser Thr Cys Ser Ala Val Ser Lys Gly Tyr Leu Ser Ala Leu
        35                  40                  45

Arg Thr Gly Trp Tyr Thr Ser Val Ile Thr Ile Glu Leu Ser Asn Ile
```

```
    50                  55                  60

Lys Glu Asn Lys Cys Asn Gly Thr Asp Ala Lys Val Lys Leu Ile Lys
65                  70                  75                  80

Gln Glu Leu Asp Lys Tyr Lys Asn Ala Val Thr Glu Leu Gln Leu Leu
                85                  90                  95

Met Gln Ser Thr Pro Ala Thr Asn Asn Arg Ala Arg Arg Glu Leu Pro
            100                 105                 110

Arg Phe Met Asn Tyr Thr Leu Asn Asn Ala Lys Lys Thr Asn Val Thr
        115                 120                 125

Leu Ser Lys Lys Gln Lys Gln Gln Leu Gly Phe Leu Leu Gly Val Gly
    130                 135                 140

Ser Ala Ile Ala Ser Gly Val Ala Val Ser Lys Val Leu His Leu Glu
145                 150                 155                 160

Gly Glu Val Asn Lys Ile Lys Ser Ala Leu Leu Ser Thr Asn Lys Ala
                165                 170                 175

Val Val Ser Leu Ser Asn Gly Val Ser Val Leu Thr Ser Lys Val Leu
            180                 185                 190

Asp Leu Lys Asn Tyr Ile Asp Lys Gln Leu Leu Pro Ile Val Asn Lys
        195                 200                 205

Gln Ser Cys Ser Ile Ser Asn Ile Glu Thr Val Ile Glu Phe Gln Gln
    210                 215                 220

Lys Asn Asn Arg Leu Leu Glu Ile Thr Arg Glu Phe Ser Val Asn Ala
225                 230                 235                 240

Gly Val Thr Thr Pro Val Ser Thr Tyr Met Leu Thr Asn Ser Glu Leu
                245                 250                 255

Leu Ser Leu Ile Asn Asp Met Pro Ile Thr Asn Asp Gln Lys Lys Leu
            260                 265                 270
```

```
Met Ser Asn Asn Val Gln Ile Val Arg Gln Gln Ser Tyr Ser Ile Met
        275                 280                 285

Ser Ile Ile Lys Glu Glu Val Leu Ala Tyr Val Val Gln Leu Pro Leu
    290                 295                 300

Tyr Gly Val Ile Asp Thr Pro Cys Trp Lys Leu His Thr Ser Pro Leu
305                 310                 315                 320

Cys Thr Thr Asn Thr Lys Glu Gly Ser Asn Ile Cys Leu Thr Arg Thr
                325                 330                 335

Asp Arg Gly Trp Tyr Cys Asp Asn Ala Gly Ser Val Ser Phe Phe Pro
            340                 345                 350

Gln Ala Glu Thr Cys Lys Val Gln Ser Asn Arg Val Phe Cys Asp Thr
        355                 360                 365

Met Asn Ser Leu Thr Leu Pro Ser Glu Val Asn Leu Cys Asn Val Asp
    370                 375                 380

Ile Phe Asn Pro Lys Tyr Asp Cys Lys Ile Met Thr Ser Lys Thr Asp
385                 390                 395                 400

Val Ser Ser Ser Val Ile Thr Ser Leu Gly Ala Ile Val Ser Cys Tyr
                405                 410                 415

Gly Lys Thr Lys Cys Thr Ala Ser Asn Lys Asn Arg Gly Ile Ile Lys
            420                 425                 430

Thr Phe Ser Asn Gly Cys Asp Tyr Val Ser Asn Lys Gly Val Asp Thr
        435                 440                 445

Val Ser Val Gly Asn Thr Leu Tyr Tyr Val Asn Lys Gln Glu Gly Lys
    450                 455                 460

Ser Leu Tyr Val Lys Gly Glu Pro Ile Ile Asn Phe Tyr Asp Pro Leu
465                 470                 475                 480

Val Phe Pro Ser Asp Glu Phe Asp Ala Ser Ile Ser Gln Val Asn Glu
```

485 490 495

Lys Ile Asn Gln Ser Leu Ala Phe Ile Arg Lys Ser Asp Glu Leu Leu
500 505 510

His Asn Val Asn Ala Gly Lys Ser Thr Thr Asn Ile Met Ile Thr Thr
515 520 525

Ile Ile Ile Val Ile Ile Val Ile Leu Leu Ser Leu Ile Ala Val Gly
530 535 540

Leu Leu Leu Tyr Cys Lys Ala Arg Ser Thr Pro Val Thr Leu Ser Lys
545 550 555 560

Asp Gln Leu Ser Gly Ile Asn Asn Ile Ala Phe Ser Asn
565 570

<210> 4
<211> 572
<212> PRT
<213> Artificial Sequence

<220>
<223> Deletion of 137-138 (delta 2)

<400> 4

Met Glu Leu Leu Ile Leu Lys Ala Asn Ala Ile Thr Thr Ile Leu Thr
1 5 10 15

Ala Val Thr Phe Cys Phe Ala Ser Gly Gln Asn Ile Thr Glu Glu Phe
20 25 30

Tyr Gln Ser Thr Cys Ser Ala Val Ser Lys Gly Tyr Leu Ser Ala Leu
35 40 45

Arg Thr Gly Trp Tyr Thr Ser Val Ile Thr Ile Glu Leu Ser Asn Ile
50 55 60

Lys Glu Asn Lys Cys Asn Gly Thr Asp Ala Lys Val Lys Leu Ile Lys
65 70 75 80

Gln Glu Leu Asp Lys Tyr Lys Asn Ala Val Thr Glu Leu Gln Leu Leu

```
                85                  90                  95

Met Gln Ser Thr Pro Ala Thr Asn Asn Arg Ala Arg Arg Glu Leu Pro
            100                 105                 110

Arg Phe Met Asn Tyr Thr Leu Asn Asn Ala Lys Lys Thr Asn Val Thr
        115                 120                 125

Leu Ser Lys Lys Gln Lys Gln Gln Gly Phe Leu Leu Gly Val Gly Ser
    130                 135                 140

Ala Ile Ala Ser Gly Val Ala Val Ser Lys Val Leu His Leu Glu Gly
145                 150                 155                 160

Glu Val Asn Lys Ile Lys Ser Ala Leu Leu Ser Thr Asn Lys Ala Val
                165                 170                 175

Val Ser Leu Ser Asn Gly Val Ser Val Leu Thr Ser Lys Val Leu Asp
            180                 185                 190

Leu Lys Asn Tyr Ile Asp Lys Gln Leu Leu Pro Ile Val Asn Lys Gln
        195                 200                 205

Ser Cys Ser Ile Ser Asn Ile Glu Thr Val Ile Glu Phe Gln Gln Lys
    210                 215                 220

Asn Asn Arg Leu Leu Glu Ile Thr Arg Glu Phe Ser Val Asn Ala Gly
225                 230                 235                 240

Val Thr Thr Pro Val Ser Thr Tyr Met Leu Thr Asn Ser Glu Leu Leu
                245                 250                 255

Ser Leu Ile Asn Asp Met Pro Ile Thr Asn Asp Gln Lys Lys Leu Met
            260                 265                 270

Ser Asn Asn Val Gln Ile Val Arg Gln Gln Ser Tyr Ser Ile Met Ser
        275                 280                 285

Ile Ile Lys Glu Glu Val Leu Ala Tyr Val Val Gln Leu Pro Leu Tyr
    290                 295                 300
```

```
Gly Val Ile Asp Thr Pro Cys Trp Lys Leu His Thr Ser Pro Leu Cys
305                 310                 315                 320

Thr Thr Asn Thr Lys Glu Gly Ser Asn Ile Cys Leu Thr Arg Thr Asp
                325                 330                 335

Arg Gly Trp Tyr Cys Asp Asn Ala Gly Ser Val Ser Phe Phe Pro Gln
            340                 345                 350

Ala Glu Thr Cys Lys Val Gln Ser Asn Arg Val Phe Cys Asp Thr Met
        355                 360                 365

Asn Ser Leu Thr Leu Pro Ser Glu Val Asn Leu Cys Asn Val Asp Ile
    370                 375                 380

Phe Asn Pro Lys Tyr Asp Cys Lys Ile Met Thr Ser Lys Thr Asp Val
385                 390                 395                 400

Ser Ser Ser Val Ile Thr Ser Leu Gly Ala Ile Val Ser Cys Tyr Gly
                405                 410                 415

Lys Thr Lys Cys Thr Ala Ser Asn Lys Asn Arg Gly Ile Ile Lys Thr
            420                 425                 430

Phe Ser Asn Gly Cys Asp Tyr Val Ser Asn Lys Gly Val Asp Thr Val
        435                 440                 445

Ser Val Gly Asn Thr Leu Tyr Tyr Val Asn Lys Gln Glu Gly Lys Ser
    450                 455                 460

Leu Tyr Val Lys Gly Glu Pro Ile Ile Asn Phe Tyr Asp Pro Leu Val
465                 470                 475                 480

Phe Pro Ser Asp Glu Phe Asp Ala Ser Ile Ser Gln Val Asn Glu Lys
                485                 490                 495

Ile Asn Gln Ser Leu Ala Phe Ile Arg Lys Ser Asp Glu Leu Leu His
            500                 505                 510

Asn Val Asn Ala Gly Lys Ser Thr Thr Asn Ile Met Ile Thr Thr Ile
```

```
        515                 520                 525

Ile Ile Val Ile Ile Val Ile Leu Leu Ser Leu Ile Ala Val Gly Leu
    530                 535                 540

Leu Leu Tyr Cys Lys Ala Arg Ser Thr Pro Val Thr Leu Ser Lys Asp
545                 550                 555                 560

Gln Leu Ser Gly Ile Asn Asn Ile Ala Phe Ser Asn
                565                 570
```

<210> 5
<211> 571
<212> PRT
<213> Artificial Sequence

<220>
<223> Deletion of 137-139 (delta 3)

<400> 5

```
Met Glu Leu Leu Ile Leu Lys Ala Asn Ala Ile Thr Thr Ile Leu Thr
1               5                   10                  15

Ala Val Thr Phe Cys Phe Ala Ser Gly Gln Asn Ile Thr Glu Glu Phe
            20                  25                  30

Tyr Gln Ser Thr Cys Ser Ala Val Ser Lys Gly Tyr Leu Ser Ala Leu
        35                  40                  45

Arg Thr Gly Trp Tyr Thr Ser Val Ile Thr Ile Glu Leu Ser Asn Ile
    50                  55                  60

Lys Glu Asn Lys Cys Asn Gly Thr Asp Ala Lys Val Lys Leu Ile Lys
65                  70                  75                  80

Gln Glu Leu Asp Lys Tyr Lys Asn Ala Val Thr Glu Leu Gln Leu Leu
                85                  90                  95

Met Gln Ser Thr Pro Ala Thr Asn Asn Arg Ala Arg Arg Glu Leu Pro
            100                 105                 110

Arg Phe Met Asn Tyr Thr Leu Asn Asn Ala Lys Lys Thr Asn Val Thr
```

```
        115                 120                 125

Leu Ser Lys Lys Gln Lys Gln Gln Phe Leu Leu Gly Val Gly Ser Ala
    130                 135                 140

Ile Ala Ser Gly Val Ala Val Ser Lys Val Leu His Leu Glu Gly Glu
145                 150                 155                 160

Val Asn Lys Ile Lys Ser Ala Leu Leu Ser Thr Asn Lys Ala Val Val
                165                 170                 175

Ser Leu Ser Asn Gly Val Ser Val Leu Thr Ser Lys Val Leu Asp Leu
            180                 185                 190

Lys Asn Tyr Ile Asp Lys Gln Leu Leu Pro Ile Val Asn Lys Gln Ser
        195                 200                 205

Cys Ser Ile Ser Asn Ile Glu Thr Val Ile Glu Phe Gln Gln Lys Asn
    210                 215                 220

Asn Arg Leu Leu Glu Ile Thr Arg Glu Phe Ser Val Asn Ala Gly Val
225                 230                 235                 240

Thr Thr Pro Val Ser Thr Tyr Met Leu Thr Asn Ser Glu Leu Leu Ser
                245                 250                 255

Leu Ile Asn Asp Met Pro Ile Thr Asn Asp Gln Lys Lys Leu Met Ser
            260                 265                 270

Asn Asn Val Gln Ile Val Arg Gln Gln Ser Tyr Ser Ile Met Ser Ile
        275                 280                 285

Ile Lys Glu Glu Val Leu Ala Tyr Val Val Gln Leu Pro Leu Tyr Gly
    290                 295                 300

Val Ile Asp Thr Pro Cys Trp Lys Leu His Thr Ser Pro Leu Cys Thr
305                 310                 315                 320

Thr Asn Thr Lys Glu Gly Ser Asn Ile Cys Leu Thr Arg Thr Asp Arg
                325                 330                 335
```

```
Gly Trp Tyr Cys Asp Asn Ala Gly Ser Val Ser Phe Phe Pro Gln Ala
            340                 345                 350

Glu Thr Cys Lys Val Gln Ser Asn Arg Val Phe Cys Asp Thr Met Asn
        355                 360                 365

Ser Leu Thr Leu Pro Ser Glu Val Asn Leu Cys Asn Val Asp Ile Phe
    370                 375                 380

Asn Pro Lys Tyr Asp Cys Lys Ile Met Thr Ser Lys Thr Asp Val Ser
385                 390                 395                 400

Ser Ser Val Ile Thr Ser Leu Gly Ala Ile Val Ser Cys Tyr Gly Lys
                405                 410                 415

Thr Lys Cys Thr Ala Ser Asn Lys Asn Arg Gly Ile Ile Lys Thr Phe
            420                 425                 430

Ser Asn Gly Cys Asp Tyr Val Ser Asn Lys Gly Val Asp Thr Val Ser
        435                 440                 445

Val Gly Asn Thr Leu Tyr Tyr Val Asn Lys Gln Glu Gly Lys Ser Leu
    450                 455                 460

Tyr Val Lys Gly Glu Pro Ile Ile Asn Phe Tyr Asp Pro Leu Val Phe
465                 470                 475                 480

Pro Ser Asp Glu Phe Asp Ala Ser Ile Ser Gln Val Asn Glu Lys Ile
                485                 490                 495

Asn Gln Ser Leu Ala Phe Ile Arg Lys Ser Asp Glu Leu Leu His Asn
            500                 505                 510

Val Asn Ala Gly Lys Ser Thr Thr Asn Ile Met Ile Thr Thr Ile Ile
        515                 520                 525

Ile Val Ile Ile Val Ile Leu Leu Ser Leu Ile Ala Val Gly Leu Leu
    530                 535                 540

Leu Tyr Cys Lys Ala Arg Ser Thr Pro Val Thr Leu Ser Lys Asp Gln
```

545 550 555 560

Leu Ser Gly Ile Asn Asn Ile Ala Phe Ser Asn
565 570

<210> 6
<211> 570
<212> PRT
<213> Artificial Sequence

<220>
<223> Deletion of 137-140 (delta 4)

<400> 6

Met Glu Leu Leu Ile Leu Lys Ala Asn Ala Ile Thr Thr Ile Leu Thr
1 5 10 15

Ala Val Thr Phe Cys Phe Ala Ser Gly Gln Asn Ile Thr Glu Glu Phe
20 25 30

Tyr Gln Ser Thr Cys Ser Ala Val Ser Lys Gly Tyr Leu Ser Ala Leu
35 40 45

Arg Thr Gly Trp Tyr Thr Ser Val Ile Thr Ile Glu Leu Ser Asn Ile
50 55 60

Lys Glu Asn Lys Cys Asn Gly Thr Asp Ala Lys Val Lys Leu Ile Lys
65 70 75 80

Gln Glu Leu Asp Lys Tyr Lys Asn Ala Val Thr Glu Leu Gln Leu Leu
85 90 95

Met Gln Ser Thr Pro Ala Thr Asn Asn Arg Ala Arg Arg Glu Leu Pro
100 105 110

Arg Phe Met Asn Tyr Thr Leu Asn Asn Ala Lys Lys Thr Asn Val Thr
115 120 125

Leu Ser Lys Lys Gln Lys Gln Gln Leu Leu Gly Val Gly Ser Ala Ile
130 135 140

Ala Ser Gly Val Ala Val Ser Lys Val Leu His Leu Glu Gly Glu Val

```
145                 150                 155                 160

Asn Lys Ile Lys Ser Ala Leu Leu Ser Thr Asn Lys Ala Val Val Ser
                165                 170                 175

Leu Ser Asn Gly Val Ser Val Leu Thr Ser Lys Val Leu Asp Leu Lys
            180                 185                 190

Asn Tyr Ile Asp Lys Gln Leu Leu Pro Ile Val Asn Lys Gln Ser Cys
        195                 200                 205

Ser Ile Ser Asn Ile Glu Thr Val Ile Glu Phe Gln Gln Lys Asn Asn
    210                 215                 220

Arg Leu Leu Glu Ile Thr Arg Glu Phe Ser Val Asn Ala Gly Val Thr
225                 230                 235                 240

Thr Pro Val Ser Thr Tyr Met Leu Thr Asn Ser Glu Leu Leu Ser Leu
                245                 250                 255

Ile Asn Asp Met Pro Ile Thr Asn Asp Gln Lys Lys Leu Met Ser Asn
            260                 265                 270

Asn Val Gln Ile Val Arg Gln Gln Ser Tyr Ser Ile Met Ser Ile Ile
        275                 280                 285

Lys Glu Glu Val Leu Ala Tyr Val Val Gln Leu Pro Leu Tyr Gly Val
    290                 295                 300

Ile Asp Thr Pro Cys Trp Lys Leu His Thr Ser Pro Leu Cys Thr Thr
305                 310                 315                 320

Asn Thr Lys Glu Gly Ser Asn Ile Cys Leu Thr Arg Thr Asp Arg Gly
                325                 330                 335

Trp Tyr Cys Asp Asn Ala Gly Ser Val Ser Phe Phe Pro Gln Ala Glu
            340                 345                 350

Thr Cys Lys Val Gln Ser Asn Arg Val Phe Cys Asp Thr Met Asn Ser
        355                 360                 365
```

```
Leu Thr Leu Pro Ser Glu Val Asn Leu Cys Asn Val Asp Ile Phe Asn
    370                 375                 380

Pro Lys Tyr Asp Cys Lys Ile Met Thr Ser Lys Thr Asp Val Ser Ser
385                 390                 395                 400

Ser Val Ile Thr Ser Leu Gly Ala Ile Val Ser Cys Tyr Gly Lys Thr
                405                 410                 415

Lys Cys Thr Ala Ser Asn Lys Asn Arg Gly Ile Ile Lys Thr Phe Ser
            420                 425                 430

Asn Gly Cys Asp Tyr Val Ser Asn Lys Gly Val Asp Thr Val Ser Val
        435                 440                 445

Gly Asn Thr Leu Tyr Tyr Val Asn Lys Gln Glu Gly Lys Ser Leu Tyr
    450                 455                 460

Val Lys Gly Glu Pro Ile Ile Asn Phe Tyr Asp Pro Leu Val Phe Pro
465                 470                 475                 480

Ser Asp Glu Phe Asp Ala Ser Ile Ser Gln Val Asn Glu Lys Ile Asn
                485                 490                 495

Gln Ser Leu Ala Phe Ile Arg Lys Ser Asp Glu Leu Leu His Asn Val
            500                 505                 510

Asn Ala Gly Lys Ser Thr Thr Asn Ile Met Ile Thr Thr Ile Ile Ile
        515                 520                 525

Val Ile Ile Val Ile Leu Leu Ser Leu Ile Ala Val Gly Leu Leu Leu
    530                 535                 540

Tyr Cys Lys Ala Arg Ser Thr Pro Val Thr Leu Ser Lys Asp Gln Leu
545                 550                 555                 560

Ser Gly Ile Asn Asn Ile Ala Phe Ser Asn
                565                 570
```

<210> 7

<211> 569
<212> PRT
<213> Artificial Sequence

<220>
<223> Deletion of 137-141 (delta 5)

<400> 7

Met Glu Leu Leu Ile Leu Lys Ala Asn Ala Ile Thr Thr Ile Leu Thr
1 5 10 15

Ala Val Thr Phe Cys Phe Ala Ser Gly Gln Asn Ile Thr Glu Glu Phe
20 25 30

Tyr Gln Ser Thr Cys Ser Ala Val Ser Lys Gly Tyr Leu Ser Ala Leu
35 40 45

Arg Thr Gly Trp Tyr Thr Ser Val Ile Thr Ile Glu Leu Ser Asn Ile
50 55 60

Lys Glu Asn Lys Cys Asn Gly Thr Asp Ala Lys Val Lys Leu Ile Lys
65 70 75 80

Gln Glu Leu Asp Lys Tyr Lys Asn Ala Val Thr Glu Leu Gln Leu Leu
85 90 95

Met Gln Ser Thr Pro Ala Thr Asn Asn Arg Ala Arg Arg Glu Leu Pro
100 105 110

Arg Phe Met Asn Tyr Thr Leu Asn Asn Ala Lys Lys Thr Asn Val Thr
115 120 125

Leu Ser Lys Lys Gln Lys Gln Gln Leu Gly Val Gly Ser Ala Ile Ala
130 135 140

Ser Gly Val Ala Val Ser Lys Val Leu His Leu Glu Gly Glu Val Asn
145 150 155 160

Lys Ile Lys Ser Ala Leu Leu Ser Thr Asn Lys Ala Val Val Ser Leu
165 170 175

Ser Asn Gly Val Ser Val Leu Thr Ser Lys Val Leu Asp Leu Lys Asn

```
            180                 185                 190

Tyr Ile Asp Lys Gln Leu Leu Pro Ile Val Asn Lys Gln Ser Cys Ser
        195                 200                 205

Ile Ser Asn Ile Glu Thr Val Ile Glu Phe Gln Gln Lys Asn Asn Arg
    210                 215                 220

Leu Leu Glu Ile Thr Arg Glu Phe Ser Val Asn Ala Gly Val Thr Thr
225                 230                 235                 240

Pro Val Ser Thr Tyr Met Leu Thr Asn Ser Glu Leu Leu Ser Leu Ile
                245                 250                 255

Asn Asp Met Pro Ile Thr Asn Asp Gln Lys Lys Leu Met Ser Asn Asn
            260                 265                 270

Val Gln Ile Val Arg Gln Gln Ser Tyr Ser Ile Met Ser Ile Ile Lys
        275                 280                 285

Glu Glu Val Leu Ala Tyr Val Val Gln Leu Pro Leu Tyr Gly Val Ile
    290                 295                 300

Asp Thr Pro Cys Trp Lys Leu His Thr Ser Pro Leu Cys Thr Thr Asn
305                 310                 315                 320

Thr Lys Glu Gly Ser Asn Ile Cys Leu Thr Arg Thr Asp Arg Gly Trp
                325                 330                 335

Tyr Cys Asp Asn Ala Gly Ser Val Ser Phe Phe Pro Gln Ala Glu Thr
            340                 345                 350

Cys Lys Val Gln Ser Asn Arg Val Phe Cys Asp Thr Met Asn Ser Leu
        355                 360                 365

Thr Leu Pro Ser Glu Val Asn Leu Cys Asn Val Asp Ile Phe Asn Pro
    370                 375                 380

Lys Tyr Asp Cys Lys Ile Met Thr Ser Lys Thr Asp Val Ser Ser Ser
385                 390                 395                 400
```

```
Val Ile Thr Ser Leu Gly Ala Ile Val Ser Cys Tyr Gly Lys Thr Lys
                405                 410                 415

Cys Thr Ala Ser Asn Lys Asn Arg Gly Ile Ile Lys Thr Phe Ser Asn
            420                 425                 430

Gly Cys Asp Tyr Val Ser Asn Lys Gly Val Asp Thr Val Ser Val Gly
        435                 440                 445

Asn Thr Leu Tyr Tyr Val Asn Lys Gln Glu Gly Lys Ser Leu Tyr Val
    450                 455                 460

Lys Gly Glu Pro Ile Ile Asn Phe Tyr Asp Pro Leu Val Phe Pro Ser
465                 470                 475                 480

Asp Glu Phe Asp Ala Ser Ile Ser Gln Val Asn Glu Lys Ile Asn Gln
                485                 490                 495

Ser Leu Ala Phe Ile Arg Lys Ser Asp Glu Leu Leu His Asn Val Asn
            500                 505                 510

Ala Gly Lys Ser Thr Thr Asn Ile Met Ile Thr Thr Ile Ile Ile Val
        515                 520                 525

Ile Ile Val Ile Leu Leu Ser Leu Ile Ala Val Gly Leu Leu Leu Tyr
    530                 535                 540

Cys Lys Ala Arg Ser Thr Pro Val Thr Leu Ser Lys Asp Gln Leu Ser
545                 550                 555                 560

Gly Ile Asn Asn Ile Ala Phe Ser Asn
                565
```

<210> 8
<211> 564
<212> PRT
<213> Artificial Sequence

<220>
<223> Deletion of 137-146 (delta 10)

<400> 8

```
Met Glu Leu Leu Ile Leu Lys Ala Asn Ala Ile Thr Thr Ile Leu Thr
1               5                  10                  15

Ala Val Thr Phe Cys Phe Ala Ser Gly Gln Asn Ile Thr Glu Glu Phe
            20                  25                  30

Tyr Gln Ser Thr Cys Ser Ala Val Ser Lys Gly Tyr Leu Ser Ala Leu
        35                  40                  45

Arg Thr Gly Trp Tyr Thr Ser Val Ile Thr Ile Glu Leu Ser Asn Ile
    50                  55                  60

Lys Glu Asn Lys Cys Asn Gly Thr Asp Ala Lys Val Lys Leu Ile Lys
65                  70                  75                  80

Gln Glu Leu Asp Lys Tyr Lys Asn Ala Val Thr Glu Leu Gln Leu Leu
                85                  90                  95

Met Gln Ser Thr Pro Ala Thr Asn Asn Arg Ala Arg Arg Glu Leu Pro
            100                 105                 110

Arg Phe Met Asn Tyr Thr Leu Asn Asn Ala Lys Lys Thr Asn Val Thr
        115                 120                 125

Leu Ser Lys Lys Gln Lys Gln Gln Ala Ile Ala Ser Gly Val Ala Val
    130                 135                 140

Ser Lys Val Leu His Leu Glu Gly Glu Val Asn Lys Ile Lys Ser Ala
145                 150                 155                 160

Leu Leu Ser Thr Asn Lys Ala Val Val Ser Leu Ser Asn Gly Val Ser
                165                 170                 175

Val Leu Thr Ser Lys Val Leu Asp Leu Lys Asn Tyr Ile Asp Lys Gln
            180                 185                 190

Leu Leu Pro Ile Val Asn Lys Gln Ser Cys Ser Ile Ser Asn Ile Glu
        195                 200                 205

Thr Val Ile Glu Phe Gln Gln Lys Asn Asn Arg Leu Leu Glu Ile Thr
```

```
    210                 215                 220

Arg Glu Phe Ser Val Asn Ala Gly Val Thr Thr Pro Val Ser Thr Tyr
225                 230                 235                 240

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

Thr Asn Asp Gln Lys Lys Leu Met Ser Asn Asn Val Gln Ile Val Arg
            260                 265                 270

Gln Gln Ser Tyr Ser Ile Met Ser Ile Ile Lys Glu Glu Val Leu Ala
        275                 280                 285

Tyr Val Val Gln Leu Pro Leu Tyr Gly Val Ile Asp Thr Pro Cys Trp
    290                 295                 300

Lys Leu His Thr Ser Pro Leu Cys Thr Thr Asn Thr Lys Glu Gly Ser
305                 310                 315                 320

Asn Ile Cys Leu Thr Arg Thr Asp Arg Gly Trp Tyr Cys Asp Asn Ala
                325                 330                 335

Gly Ser Val Ser Phe Phe Pro Gln Ala Glu Thr Cys Lys Val Gln Ser
            340                 345                 350

Asn Arg Val Phe Cys Asp Thr Met Asn Ser Leu Thr Leu Pro Ser Glu
        355                 360                 365

Val Asn Leu Cys Asn Val Asp Ile Phe Asn Pro Lys Tyr Asp Cys Lys
    370                 375                 380

Ile Met Thr Ser Lys Thr Asp Val Ser Ser Ser Val Ile Thr Ser Leu
385                 390                 395                 400

Gly Ala Ile Val Ser Cys Tyr Gly Lys Thr Lys Cys Thr Ala Ser Asn
                405                 410                 415

Lys Asn Arg Gly Ile Ile Lys Thr Phe Ser Asn Gly Cys Asp Tyr Val
            420                 425                 430
```

```
Ser Asn Lys Gly Val Asp Thr Val Ser Val Gly Asn Thr Leu Tyr Tyr
        435                 440                 445

Val Asn Lys Gln Glu Gly Lys Ser Leu Tyr Val Lys Gly Glu Pro Ile
    450                 455                 460

Ile Asn Phe Tyr Asp Pro Leu Val Phe Pro Ser Asp Glu Phe Asp Ala
465                 470                 475                 480

Ser Ile Ser Gln Val Asn Glu Lys Ile Asn Gln Ser Leu Ala Phe Ile
                485                 490                 495

Arg Lys Ser Asp Glu Leu Leu His Asn Val Asn Ala Gly Lys Ser Thr
            500                 505                 510

Thr Asn Ile Met Ile Thr Thr Ile Ile Ile Val Ile Ile Val Ile Leu
        515                 520                 525

Leu Ser Leu Ile Ala Val Gly Leu Leu Leu Tyr Cys Lys Ala Arg Ser
    530                 535                 540

Thr Pro Val Thr Leu Ser Lys Asp Gln Leu Ser Gly Ile Asn Asn Ile
545                 550                 555                 560

Ala Phe Ser Asn
```

<210> 9
<211> 568
<212> PRT
<213> Artificial Sequence

<220>
<223> Deletion of 137-142 (delta 6)

<400> 9

```
Met Glu Leu Leu Ile Leu Lys Ala Asn Ala Ile Thr Thr Ile Leu Thr
1               5                   10                  15

Ala Val Thr Phe Cys Phe Ala Ser Gly Gln Asn Ile Thr Glu Glu Phe
            20                  25                  30
```

```
Tyr Gln Ser Thr Cys Ser Ala Val Ser Lys Gly Tyr Leu Ser Ala Leu
        35                  40                  45

Arg Thr Gly Trp Tyr Thr Ser Val Ile Thr Ile Glu Leu Ser Asn Ile
    50                  55                  60

Lys Glu Asn Lys Cys Asn Gly Thr Asp Ala Lys Val Lys Leu Ile Lys
65                  70                  75                  80

Gln Glu Leu Asp Lys Tyr Lys Asn Ala Val Thr Glu Leu Gln Leu Leu
                85                  90                  95

Met Gln Ser Thr Pro Ala Thr Asn Asn Arg Ala Arg Arg Glu Leu Pro
            100                 105                 110

Arg Phe Met Asn Tyr Thr Leu Asn Asn Ala Lys Lys Thr Asn Val Thr
        115                 120                 125

Leu Ser Lys Lys Gln Lys Gln Gln Gly Val Gly Ser Ala Ile Ala Ser
    130                 135                 140

Gly Val Ala Val Ser Lys Val Leu His Leu Glu Gly Glu Val Asn Lys
145                 150                 155                 160

Ile Lys Ser Ala Leu Leu Ser Thr Asn Lys Ala Val Val Ser Leu Ser
                165                 170                 175

Asn Gly Val Ser Val Leu Thr Ser Lys Val Leu Asp Leu Lys Asn Tyr
            180                 185                 190

Ile Asp Lys Gln Leu Leu Pro Ile Val Asn Lys Gln Ser Cys Ser Ile
        195                 200                 205

Ser Asn Ile Glu Thr Val Ile Glu Phe Gln Gln Lys Asn Asn Arg Leu
    210                 215                 220

Leu Glu Ile Thr Arg Glu Phe Ser Val Asn Ala Gly Val Thr Thr Pro
225                 230                 235                 240

Val Ser Thr Tyr Met Leu Thr Asn Ser Glu Leu Leu Ser Leu Ile Asn
```

```
                245                 250                 255

Asp Met Pro Ile Thr Asn Asp Gln Lys Lys Leu Met Ser Asn Asn Val
            260                 265                 270

Gln Ile Val Arg Gln Gln Ser Tyr Ser Ile Met Ser Ile Ile Lys Glu
        275                 280                 285

Glu Val Leu Ala Tyr Val Val Gln Leu Pro Leu Tyr Gly Val Ile Asp
    290                 295                 300

Thr Pro Cys Trp Lys Leu His Thr Ser Pro Leu Cys Thr Thr Asn Thr
305                 310                 315                 320

Lys Glu Gly Ser Asn Ile Cys Leu Thr Arg Thr Asp Arg Gly Trp Tyr
                325                 330                 335

Cys Asp Asn Ala Gly Ser Val Ser Phe Phe Pro Gln Ala Glu Thr Cys
            340                 345                 350

Lys Val Gln Ser Asn Arg Val Phe Cys Asp Thr Met Asn Ser Leu Thr
        355                 360                 365

Leu Pro Ser Glu Val Asn Leu Cys Asn Val Asp Ile Phe Asn Pro Lys
    370                 375                 380

Tyr Asp Cys Lys Ile Met Thr Ser Lys Thr Asp Val Ser Ser Ser Val
385                 390                 395                 400

Ile Thr Ser Leu Gly Ala Ile Val Ser Cys Tyr Gly Lys Thr Lys Cys
                405                 410                 415

Thr Ala Ser Asn Lys Asn Arg Gly Ile Ile Lys Thr Phe Ser Asn Gly
            420                 425                 430

Cys Asp Tyr Val Ser Asn Lys Gly Val Asp Thr Val Ser Val Gly Asn
        435                 440                 445

Thr Leu Tyr Tyr Val Asn Lys Gln Glu Gly Lys Ser Leu Tyr Val Lys
    450                 455                 460
```

```
Gly Glu Pro Ile Ile Asn Phe Tyr Asp Pro Leu Val Phe Pro Ser Asp
465                 470                 475                 480

Glu Phe Asp Ala Ser Ile Ser Gln Val Asn Glu Lys Ile Asn Gln Ser
                485                 490                 495

Leu Ala Phe Ile Arg Lys Ser Asp Glu Leu Leu His Asn Val Asn Ala
            500                 505                 510

Gly Lys Ser Thr Thr Asn Ile Met Ile Thr Thr Ile Ile Ile Val Ile
        515                 520                 525

Ile Val Ile Leu Leu Ser Leu Ile Ala Val Gly Leu Leu Leu Tyr Cys
    530                 535                 540

Lys Ala Arg Ser Thr Pro Val Thr Leu Ser Lys Asp Gln Leu Ser Gly
545                 550                 555                 560

Ile Asn Asn Ile Ala Phe Ser Asn
                565
```

<210> 10
<211> 567
<212> PRT
<213> Artificial Sequence

<220>
<223> Deletion of 137-143 (delta 7)

<400> 10

```
Met Glu Leu Leu Ile Leu Lys Ala Asn Ala Ile Thr Thr Ile Leu Thr
1               5                   10                  15

Ala Val Thr Phe Cys Phe Ala Ser Gly Gln Asn Ile Thr Glu Glu Phe
            20                  25                  30

Tyr Gln Ser Thr Cys Ser Ala Val Ser Lys Gly Tyr Leu Ser Ala Leu
        35                  40                  45

Arg Thr Gly Trp Tyr Thr Ser Val Ile Thr Ile Glu Leu Ser Asn Ile
    50                  55                  60
```

```
Lys Glu Asn Lys Cys Asn Gly Thr Asp Ala Lys Val Lys Leu Ile Lys
65                  70                  75                  80

Gln Glu Leu Asp Lys Tyr Lys Asn Ala Val Thr Glu Leu Gln Leu Leu
                85                  90                  95

Met Gln Ser Thr Pro Ala Thr Asn Asn Arg Ala Arg Arg Glu Leu Pro
            100                 105                 110

Arg Phe Met Asn Tyr Thr Leu Asn Asn Ala Lys Lys Thr Asn Val Thr
        115                 120                 125

Leu Ser Lys Lys Gln Lys Gln Gln Val Gly Ser Ala Ile Ala Ser Gly
    130                 135                 140

Val Ala Val Ser Lys Val Leu His Leu Glu Gly Glu Val Asn Lys Ile
145                 150                 155                 160

Lys Ser Ala Leu Leu Ser Thr Asn Lys Ala Val Val Ser Leu Ser Asn
                165                 170                 175

Gly Val Ser Val Leu Thr Ser Lys Val Leu Asp Leu Lys Asn Tyr Ile
            180                 185                 190

Asp Lys Gln Leu Leu Pro Ile Val Asn Lys Gln Ser Cys Ser Ile Ser
        195                 200                 205

Asn Ile Glu Thr Val Ile Glu Phe Gln Gln Lys Asn Asn Arg Leu Leu
    210                 215                 220

Glu Ile Thr Arg Glu Phe Ser Val Asn Ala Gly Val Thr Thr Pro Val
225                 230                 235                 240

Ser Thr Tyr Met Leu Thr Asn Ser Glu Leu Leu Ser Leu Ile Asn Asp
                245                 250                 255

Met Pro Ile Thr Asn Asp Gln Lys Lys Leu Met Ser Asn Asn Val Gln
            260                 265                 270

Ile Val Arg Gln Gln Ser Tyr Ser Ile Met Ser Ile Ile Lys Glu Glu
```

```
        275                 280                 285

Val Leu Ala Tyr Val Val Gln Leu Pro Leu Tyr Gly Val Ile Asp Thr
    290                 295                 300

Pro Cys Trp Lys Leu His Thr Ser Pro Leu Cys Thr Thr Asn Thr Lys
305                 310                 315                 320

Glu Gly Ser Asn Ile Cys Leu Thr Arg Thr Asp Arg Gly Trp Tyr Cys
                325                 330                 335

Asp Asn Ala Gly Ser Val Ser Phe Phe Pro Gln Ala Glu Thr Cys Lys
            340                 345                 350

Val Gln Ser Asn Arg Val Phe Cys Asp Thr Met Asn Ser Leu Thr Leu
        355                 360                 365

Pro Ser Glu Val Asn Leu Cys Asn Val Asp Ile Phe Asn Pro Lys Tyr
    370                 375                 380

Asp Cys Lys Ile Met Thr Ser Lys Thr Asp Val Ser Ser Ser Val Ile
385                 390                 395                 400

Thr Ser Leu Gly Ala Ile Val Ser Cys Tyr Gly Lys Thr Lys Cys Thr
                405                 410                 415

Ala Ser Asn Lys Asn Arg Gly Ile Ile Lys Thr Phe Ser Asn Gly Cys
            420                 425                 430

Asp Tyr Val Ser Asn Lys Gly Val Asp Thr Val Ser Val Gly Asn Thr
        435                 440                 445

Leu Tyr Tyr Val Asn Lys Gln Glu Gly Lys Ser Leu Tyr Val Lys Gly
    450                 455                 460

Glu Pro Ile Ile Asn Phe Tyr Asp Pro Leu Val Phe Pro Ser Asp Glu
465                 470                 475                 480

Phe Asp Ala Ser Ile Ser Gln Val Asn Glu Lys Ile Asn Gln Ser Leu
                485                 490                 495
```

```
Ala Phe Ile Arg Lys Ser Asp Glu Leu Leu His Asn Val Asn Ala Gly
            500                 505                 510

Lys Ser Thr Thr Asn Ile Met Ile Thr Thr Ile Ile Ile Val Ile Ile
        515                 520                 525

Val Ile Leu Leu Ser Leu Ile Ala Val Gly Leu Leu Leu Tyr Cys Lys
    530                 535                 540

Ala Arg Ser Thr Pro Val Thr Leu Ser Lys Asp Gln Leu Ser Gly Ile
545                 550                 555                 560

Asn Asn Ile Ala Phe Ser Asn
                565
```

<210> 11
<211> 566
<212> PRT
<213> Artificial Sequence

<220>
<223> Deletion of 137-144 (delta 8)

<400> 11

```
Met Glu Leu Leu Ile Leu Lys Ala Asn Ala Ile Thr Thr Ile Leu Thr
1               5                   10                  15

Ala Val Thr Phe Cys Phe Ala Ser Gly Gln Asn Ile Thr Glu Glu Phe
            20                  25                  30

Tyr Gln Ser Thr Cys Ser Ala Val Ser Lys Gly Tyr Leu Ser Ala Leu
        35                  40                  45

Arg Thr Gly Trp Tyr Thr Ser Val Ile Thr Ile Glu Leu Ser Asn Ile
    50                  55                  60

Lys Glu Asn Lys Cys Asn Gly Thr Asp Ala Lys Val Lys Leu Ile Lys
65                  70                  75                  80

Gln Glu Leu Asp Lys Tyr Lys Asn Ala Val Thr Glu Leu Gln Leu Leu
                85                  90                  95
```

```
Met Gln Ser Thr Pro Ala Thr Asn Asn Arg Ala Arg Arg Glu Leu Pro
            100                 105                 110

Arg Phe Met Asn Tyr Thr Leu Asn Asn Ala Lys Lys Thr Asn Val Thr
        115                 120                 125

Leu Ser Lys Lys Gln Lys Gln Gln Gly Ser Ala Ile Ala Ser Gly Val
    130                 135                 140

Ala Val Ser Lys Val Leu His Leu Glu Gly Glu Val Asn Lys Ile Lys
145                 150                 155                 160

Ser Ala Leu Leu Ser Thr Asn Lys Ala Val Val Ser Leu Ser Asn Gly
                165                 170                 175

Val Ser Val Leu Thr Ser Lys Val Leu Asp Leu Lys Asn Tyr Ile Asp
            180                 185                 190

Lys Gln Leu Leu Pro Ile Val Asn Lys Gln Ser Cys Ser Ile Ser Asn
        195                 200                 205

Ile Glu Thr Val Ile Glu Phe Gln Gln Lys Asn Asn Arg Leu Leu Glu
    210                 215                 220

Ile Thr Arg Glu Phe Ser Val Asn Ala Gly Val Thr Thr Pro Val Ser
225                 230                 235                 240

Thr Tyr Met Leu Thr Asn Ser Glu Leu Leu Ser Leu Ile Asn Asp Met
                245                 250                 255

Pro Ile Thr Asn Asp Gln Lys Lys Leu Met Ser Asn Asn Val Gln Ile
            260                 265                 270

Val Arg Gln Gln Ser Tyr Ser Ile Met Ser Ile Ile Lys Glu Glu Val
        275                 280                 285

Leu Ala Tyr Val Val Gln Leu Pro Leu Tyr Gly Val Ile Asp Thr Pro
    290                 295                 300

Cys Trp Lys Leu His Thr Ser Pro Leu Cys Thr Thr Asn Thr Lys Glu
```

```
305                 310                 315                 320

Gly Ser Asn Ile Cys Leu Thr Arg Thr Asp Arg Gly Trp Tyr Cys Asp
                325                 330                 335

Asn Ala Gly Ser Val Ser Phe Phe Pro Gln Ala Glu Thr Cys Lys Val
            340                 345                 350

Gln Ser Asn Arg Val Phe Cys Asp Thr Met Asn Ser Leu Thr Leu Pro
        355                 360                 365

Ser Glu Val Asn Leu Cys Asn Val Asp Ile Phe Asn Pro Lys Tyr Asp
    370                 375                 380

Cys Lys Ile Met Thr Ser Lys Thr Asp Val Ser Ser Ser Val Ile Thr
385                 390                 395                 400

Ser Leu Gly Ala Ile Val Ser Cys Tyr Gly Lys Thr Lys Cys Thr Ala
                405                 410                 415

Ser Asn Lys Asn Arg Gly Ile Ile Lys Thr Phe Ser Asn Gly Cys Asp
            420                 425                 430

Tyr Val Ser Asn Lys Gly Val Asp Thr Val Ser Val Gly Asn Thr Leu
        435                 440                 445

Tyr Tyr Val Asn Lys Gln Glu Gly Lys Ser Leu Tyr Val Lys Gly Glu
    450                 455                 460

Pro Ile Ile Asn Phe Tyr Asp Pro Leu Val Phe Pro Ser Asp Glu Phe
465                 470                 475                 480

Asp Ala Ser Ile Ser Gln Val Asn Glu Lys Ile Asn Gln Ser Leu Ala
                485                 490                 495

Phe Ile Arg Lys Ser Asp Glu Leu Leu His Asn Val Asn Ala Gly Lys
            500                 505                 510

Ser Thr Thr Asn Ile Met Ile Thr Thr Ile Ile Ile Val Ile Ile Val
        515                 520                 525
```

```
Ile Leu Leu Ser Leu Ile Ala Val Gly Leu Leu Leu Tyr Cys Lys Ala
    530                 535                 540

Arg Ser Thr Pro Val Thr Leu Ser Lys Asp Gln Leu Ser Gly Ile Asn
545                 550                 555                 560

Asn Ile Ala Phe Ser Asn
                565
```

<210> 12
<211> 565
<212> PRT
<213> Artificial Sequence

<220>
<223> Deletion of 137-145 (delta 9)

<400> 12

```
Met Glu Leu Leu Ile Leu Lys Ala Asn Ala Ile Thr Thr Ile Leu Thr
1               5                   10                  15

Ala Val Thr Phe Cys Phe Ala Ser Gly Gln Asn Ile Thr Glu Glu Phe
            20                  25                  30

Tyr Gln Ser Thr Cys Ser Ala Val Ser Lys Gly Tyr Leu Ser Ala Leu
        35                  40                  45

Arg Thr Gly Trp Tyr Thr Ser Val Ile Thr Ile Glu Leu Ser Asn Ile
    50                  55                  60

Lys Glu Asn Lys Cys Asn Gly Thr Asp Ala Lys Val Lys Leu Ile Lys
65                  70                  75                  80

Gln Glu Leu Asp Lys Tyr Lys Asn Ala Val Thr Glu Leu Gln Leu Leu
                85                  90                  95

Met Gln Ser Thr Pro Ala Thr Asn Asn Arg Ala Arg Arg Glu Leu Pro
            100                 105                 110

Arg Phe Met Asn Tyr Thr Leu Asn Asn Ala Lys Lys Thr Asn Val Thr
        115                 120                 125
```

```
Leu Ser Lys Lys Gln Lys Gln Gln Ser Ala Ile Ala Ser Gly Val Ala
    130                 135                 140

Val Ser Lys Val Leu His Leu Glu Gly Glu Val Asn Lys Ile Lys Ser
145                 150                 155                 160

Ala Leu Leu Ser Thr Asn Lys Ala Val Val Ser Leu Ser Asn Gly Val
                165                 170                 175

Ser Val Leu Thr Ser Lys Val Leu Asp Leu Lys Asn Tyr Ile Asp Lys
            180                 185                 190

Gln Leu Leu Pro Ile Val Asn Lys Gln Ser Cys Ser Ile Ser Asn Ile
        195                 200                 205

Glu Thr Val Ile Glu Phe Gln Gln Lys Asn Asn Arg Leu Leu Glu Ile
    210                 215                 220

Thr Arg Glu Phe Ser Val Asn Ala Gly Val Thr Thr Pro Val Ser Thr
225                 230                 235                 240

Tyr Met Leu Thr Asn Ser Glu Leu Leu Ser Leu Ile Asn Asp Met Pro
                245                 250                 255

Ile Thr Asn Asp Gln Lys Lys Leu Met Ser Asn Asn Val Gln Ile Val
            260                 265                 270

Arg Gln Gln Ser Tyr Ser Ile Met Ser Ile Ile Lys Glu Glu Val Leu
        275                 280                 285

Ala Tyr Val Val Gln Leu Pro Leu Tyr Gly Val Ile Asp Thr Pro Cys
    290                 295                 300

Trp Lys Leu His Thr Ser Pro Leu Cys Thr Thr Asn Thr Lys Glu Gly
305                 310                 315                 320

Ser Asn Ile Cys Leu Thr Arg Thr Asp Arg Gly Trp Tyr Cys Asp Asn
                325                 330                 335

Ala Gly Ser Val Ser Phe Phe Pro Gln Ala Glu Thr Cys Lys Val Gln
```

```
            340                 345                 350

Ser Asn Arg Val Phe Cys Asp Thr Met Asn Ser Leu Thr Leu Pro Ser
        355                 360                 365

Glu Val Asn Leu Cys Asn Val Asp Ile Phe Asn Pro Lys Tyr Asp Cys
    370                 375                 380

Lys Ile Met Thr Ser Lys Thr Asp Val Ser Ser Ser Val Ile Thr Ser
385                 390                 395                 400

Leu Gly Ala Ile Val Ser Cys Tyr Gly Lys Thr Lys Cys Thr Ala Ser
                405                 410                 415

Asn Lys Asn Arg Gly Ile Ile Lys Thr Phe Ser Asn Gly Cys Asp Tyr
            420                 425                 430

Val Ser Asn Lys Gly Val Asp Thr Val Ser Val Gly Asn Thr Leu Tyr
        435                 440                 445

Tyr Val Asn Lys Gln Glu Gly Lys Ser Leu Tyr Val Lys Gly Glu Pro
    450                 455                 460

Ile Ile Asn Phe Tyr Asp Pro Leu Val Phe Pro Ser Asp Glu Phe Asp
465                 470                 475                 480

Ala Ser Ile Ser Gln Val Asn Glu Lys Ile Asn Gln Ser Leu Ala Phe
                485                 490                 495

Ile Arg Lys Ser Asp Glu Leu Leu His Asn Val Asn Ala Gly Lys Ser
            500                 505                 510

Thr Thr Asn Ile Met Ile Thr Thr Ile Ile Ile Val Ile Ile Val Ile
        515                 520                 525

Leu Leu Ser Leu Ile Ala Val Gly Leu Leu Leu Tyr Cys Lys Ala Arg
    530                 535                 540

Ser Thr Pro Val Thr Leu Ser Lys Asp Gln Leu Ser Gly Ile Asn Asn
545                 550                 555                 560
```

Ile Ala Phe Ser Asn
565

<210> 13
<211> 565
<212> PRT
<213> Artificial Sequence

<220>
<223> Deletion of 137-145 (delta 9) with wild type fusion cleavage site

<400> 13

Met Glu Leu Leu Ile Leu Lys Ala Asn Ala Ile Thr Thr Ile Leu Thr
1 5 10 15

Ala Val Thr Phe Cys Phe Ala Ser Gly Gln Asn Ile Thr Glu Glu Phe
20 25 30

Tyr Gln Ser Thr Cys Ser Ala Val Ser Lys Gly Tyr Leu Ser Ala Leu
35 40 45

Arg Thr Gly Trp Tyr Thr Ser Val Ile Thr Ile Glu Leu Ser Asn Ile
50 55 60

Lys Glu Asn Lys Cys Asn Gly Thr Asp Ala Lys Val Lys Leu Ile Lys
65 70 75 80

Gln Glu Leu Asp Lys Tyr Lys Asn Ala Val Thr Glu Leu Gln Leu Leu
85 90 95

Met Gln Ser Thr Pro Ala Thr Asn Asn Arg Ala Arg Arg Glu Leu Pro
100 105 110

Arg Phe Met Asn Tyr Thr Leu Asn Asn Ala Lys Lys Thr Asn Val Thr
115 120 125

Leu Ser Lys Lys Arg Lys Arg Arg Ser Ala Ile Ala Ser Gly Val Ala
130 135 140

Val Ser Lys Val Leu His Leu Glu Gly Glu Val Asn Lys Ile Lys Ser
145 150 155 160

```
Ala Leu Leu Ser Thr Asn Lys Ala Val Val Ser Leu Ser Asn Gly Val
                165                 170                 175

Ser Val Leu Thr Ser Lys Val Leu Asp Leu Lys Asn Tyr Ile Asp Lys
            180                 185                 190

Gln Leu Leu Pro Ile Val Asn Lys Gln Ser Cys Ser Ile Ser Asn Ile
        195                 200                 205

Glu Thr Val Ile Glu Phe Gln Gln Lys Asn Asn Arg Leu Leu Glu Ile
    210                 215                 220

Thr Arg Glu Phe Ser Val Asn Ala Gly Val Thr Thr Pro Val Ser Thr
225                 230                 235                 240

Tyr Met Leu Thr Asn Ser Glu Leu Leu Ser Leu Ile Asn Asp Met Pro
                245                 250                 255

Ile Thr Asn Asp Gln Lys Lys Leu Met Ser Asn Asn Val Gln Ile Val
            260                 265                 270

Arg Gln Gln Ser Tyr Ser Ile Met Ser Ile Ile Lys Glu Glu Val Leu
        275                 280                 285

Ala Tyr Val Val Gln Leu Pro Leu Tyr Gly Val Ile Asp Thr Pro Cys
    290                 295                 300

Trp Lys Leu His Thr Ser Pro Leu Cys Thr Thr Asn Thr Lys Glu Gly
305                 310                 315                 320

Ser Asn Ile Cys Leu Thr Arg Thr Asp Arg Gly Trp Tyr Cys Asp Asn
                325                 330                 335

Ala Gly Ser Val Ser Phe Phe Pro Gln Ala Glu Thr Cys Lys Val Gln
            340                 345                 350

Ser Asn Arg Val Phe Cys Asp Thr Met Asn Ser Leu Thr Leu Pro Ser
        355                 360                 365

Glu Val Asn Leu Cys Asn Val Asp Ile Phe Asn Pro Lys Tyr Asp Cys
```

370 375 380

Lys Ile Met Thr Ser Lys Thr Asp Val Ser Ser Ser Val Ile Thr Ser
385 390 395 400

Leu Gly Ala Ile Val Ser Cys Tyr Gly Lys Thr Lys Cys Thr Ala Ser
405 410 415

Asn Lys Asn Arg Gly Ile Ile Lys Thr Phe Ser Asn Gly Cys Asp Tyr
420 425 430

Val Ser Asn Lys Gly Val Asp Thr Val Ser Val Gly Asn Thr Leu Tyr
435 440 445

Tyr Val Asn Lys Gln Glu Gly Lys Ser Leu Tyr Val Lys Gly Glu Pro
450 455 460

Ile Ile Asn Phe Tyr Asp Pro Leu Val Phe Pro Ser Asp Glu Phe Asp
465 470 475 480

Ala Ser Ile Ser Gln Val Asn Glu Lys Ile Asn Gln Ser Leu Ala Phe
485 490 495

Ile Arg Lys Ser Asp Glu Leu Leu His Asn Val Asn Ala Gly Lys Ser
500 505 510

Thr Thr Asn Ile Met Ile Thr Thr Ile Ile Ile Val Ile Ile Val Ile
515 520 525

Leu Leu Ser Leu Ile Ala Val Gly Leu Leu Leu Tyr Cys Lys Ala Arg
530 535 540

Ser Thr Pro Val Thr Leu Ser Lys Asp Gln Leu Ser Gly Ile Asn Asn
545 550 555 560

Ile Ala Phe Ser Asn
565

<210> 14
<211> 6
<212> PRT

<213> Artificial Sequence

<220>
<223> mutated furin cleavage site

<400> 14

Lys Lys Gln Lys Gln Gln
1 5

<210> 15
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> mutated furin cleavage site

<400> 15

Gln Lys Gln Lys Gln Gln
1 5

<210> 16
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> mutated furin cleavage site

<400> 16

Lys Lys Gln Lys Arg Gln
1 5

<210> 17
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> mutated furin cleavage site

<400> 17

Gly Arg Arg Gln Gln Arg
1 5

<210> 18

<211> 6
<212> PRT
<213> Unknown

<220>
<223> furin cleavage site

<400> 18

Lys Lys Arg Lys Arg Arg
1 5

<210> 19
<211> 539
<212> PRT
<213> Artificial Sequence

<220>
<223> modified RSV F protein

<400> 19

Gln Asn Ile Thr Glu Glu Phe Tyr Gln Ser Thr Cys Ser Ala Val Ser
1 5 10 15

Lys Gly Tyr Leu Ser Ala Leu Arg Thr Gly Trp Tyr Thr Ser Val Ile
20 25 30

Thr Ile Glu Leu Ser Asn Ile Lys Glu Asn Lys Cys Asn Gly Thr Asp
35 40 45

Ala Lys Val Lys Leu Ile Lys Gln Glu Leu Asp Lys Tyr Lys Asn Ala
50 55 60

Val Thr Glu Leu Gln Leu Leu Met Gln Ser Thr Pro Ala Thr Asn Asn
65 70 75 80

Arg Ala Arg Arg Glu Leu Pro Arg Phe Met Asn Tyr Thr Leu Asn Asn
85 90 95

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

Ile Ala Ser Gly Val Ala Val Ser Lys Val Leu His Leu Glu Gly Glu
115 120 125

```
Val Asn Lys Ile Lys Ser Ala Leu Leu Ser Thr Asn Lys Ala Val Val
    130                 135                 140

Ser Leu Ser Asn Gly Val Ser Val Leu Thr Ser Lys Val Leu Asp Leu
145                 150                 155                 160

Lys Asn Tyr Ile Asp Lys Gln Leu Leu Pro Ile Val Asn Lys Gln Ser
                165                 170                 175

Cys Ser Ile Ser Asn Ile Glu Thr Val Ile Glu Phe Gln Gln Lys Asn
            180                 185                 190

Asn Arg Leu Leu Glu Ile Thr Arg Glu Phe Ser Val Asn Ala Gly Val
        195                 200                 205

Thr Thr Pro Val Ser Thr Tyr Met Leu Thr Asn Ser Glu Leu Leu Ser
    210                 215                 220

Leu Ile Asn Asp Met Pro Ile Thr Asn Asp Gln Lys Lys Leu Met Ser
225                 230                 235                 240

Asn Asn Val Gln Ile Val Arg Gln Gln Ser Tyr Ser Ile Met Ser Ile
                245                 250                 255

Ile Lys Glu Glu Val Leu Ala Tyr Val Val Gln Leu Pro Leu Tyr Gly
            260                 265                 270

Val Ile Asp Thr Pro Cys Trp Lys Leu His Thr Ser Pro Leu Cys Thr
        275                 280                 285

Thr Asn Thr Lys Glu Gly Ser Asn Ile Cys Leu Thr Arg Thr Asp Arg
    290                 295                 300

Gly Trp Tyr Cys Asp Asn Ala Gly Ser Val Ser Phe Phe Pro Gln Ala
305                 310                 315                 320

Glu Thr Cys Lys Val Gln Ser Asn Arg Val Phe Cys Asp Thr Met Asn
                325                 330                 335

Ser Leu Thr Leu Pro Ser Glu Val Asn Leu Cys Asn Val Asp Ile Phe
```

340 345 350

Asn Pro Lys Tyr Asp Cys Lys Ile Met Thr Ser Lys Thr Asp Val Ser
355 360 365

Ser Ser Val Ile Thr Ser Leu Gly Ala Ile Val Ser Cys Tyr Gly Lys
370 375 380

Thr Lys Cys Thr Ala Ser Asn Lys Asn Arg Gly Ile Ile Lys Thr Phe
385 390 395 400

Ser Asn Gly Cys Asp Tyr Val Ser Asn Lys Gly Val Asp Thr Val Ser
405 410 415

Val Gly Asn Thr Leu Tyr Tyr Val Asn Lys Gln Glu Gly Lys Ser Leu
420 425 430

Tyr Val Lys Gly Glu Pro Ile Ile Asn Phe Tyr Asp Pro Leu Val Phe
435 440 445

Pro Ser Asp Glu Phe Asp Ala Ser Ile Ser Gln Val Asn Glu Lys Ile
450 455 460

Asn Gln Ser Leu Ala Phe Ile Arg Lys Ser Asp Glu Leu Leu His Asn
465 470 475 480

Val Asn Ala Gly Lys Ser Thr Thr Asn Ile Met Ile Thr Thr Ile Ile
485 490 495

Ile Val Ile Ile Val Ile Leu Leu Ser Leu Ile Ala Val Gly Leu Leu
500 505 510

Leu Tyr Cys Lys Ala Arg Ser Thr Pro Val Thr Leu Ser Lys Asp Gln
515 520 525

Leu Ser Gly Ile Asn Asn Ile Ala Phe Ser Asn
530 535

<210> 20
<211> 19
<212> PRT

<213> Artificial Sequence

<220>
<223> portions of antigenic site II

<400> 20

Asn Ser Glu Leu Leu Ser Leu Ile Asn Asp Met Pro Ile Thr Asn Asp
1 5 10 15

Gln Lys Lys

<210> 21
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> portions of antigenic site II

<400> 21

Leu Met Ser Asn Asn
1 5

<210> 22
<211> 676
<212> PRT
<213> Ebola virus

<400> 22

Met Gly Val Thr Gly Ile Leu Gln Leu Pro Arg Asp Arg Phe Lys Arg
1 5 10 15

Thr Ser Phe Phe Leu Trp Val Ile Ile Leu Phe Gln Arg Thr Phe Ser
20 25 30

Ile Pro Leu Gly Val Ile His Asn Ser Thr Leu Gln Val Ser Asp Val
35 40 45

Asp Lys Leu Val Cys Arg Asp Lys Leu Ser Ser Thr Asn Gln Leu Arg
50 55 60

Ser Val Gly Leu Asn Leu Glu Gly Asn Gly Val Ala Thr Asp Val Pro
65 70 75 80

```
Ser Val Thr Lys Arg Trp Gly Phe Arg Ser Gly Val Pro Pro Lys Val
                85                  90                  95

Val Asn Tyr Glu Ala Gly Glu Trp Ala Glu Asn Cys Tyr Asn Leu Glu
            100                 105                 110

Ile Lys Lys Pro Asp Gly Ser Glu Cys Leu Pro Ala Ala Pro Asp Gly
        115                 120                 125

Ile Arg Gly Phe Pro Arg Cys Arg Tyr Val His Lys Val Ser Gly Thr
    130                 135                 140

Gly Pro Cys Ala Gly Asp Phe Ala Phe His Lys Glu Gly Ala Phe Phe
145                 150                 155                 160

Leu Tyr Asp Arg Leu Ala Ser Thr Val Ile Tyr Arg Gly Thr Thr Phe
                165                 170                 175

Ala Glu Gly Val Val Ala Phe Leu Ile Leu Pro Gln Ala Lys Lys Asp
            180                 185                 190

Phe Phe Ser Ser His Pro Leu Arg Glu Pro Val Asn Ala Thr Glu Asp
        195                 200                 205

Pro Ser Ser Gly Tyr Tyr Ser Thr Thr Ile Arg Tyr Gln Ala Thr Gly
    210                 215                 220

Phe Gly Thr Asn Glu Thr Glu Tyr Leu Phe Glu Val Asp Asn Leu Thr
225                 230                 235                 240

Tyr Val Gln Leu Glu Ser Arg Phe Thr Pro Gln Phe Leu Leu Gln Leu
                245                 250                 255

Asn Glu Thr Ile Tyr Ala Ser Gly Lys Arg Ser Asn Thr Thr Gly Lys
            260                 265                 270

Leu Ile Trp Lys Val Asn Pro Glu Ile Asp Thr Thr Ile Gly Glu Trp
        275                 280                 285
```

```
Ala Phe Trp Glu Thr Lys Lys Asn Leu Thr Arg Lys Ile Arg Ser Glu
    290                 295                 300

Glu Leu Ser Phe Thr Ala Val Ser Asn Gly Pro Lys Asn Ile Ser Gly
305                 310                 315                 320

Gln Ser Pro Ala Arg Thr Ser Ser Asp Pro Glu Thr Asn Thr Thr Asn
                325                 330                 335

Glu Asp His Lys Ile Met Ala Ser Glu Asn Ser Ser Ala Met Val Gln
            340                 345                 350

Val His Ser Gln Gly Arg Lys Ala Ala Val Ser His Leu Thr Thr Leu
        355                 360                 365

Ala Thr Ile Ser Thr Ser Pro Gln Pro Pro Thr Thr Lys Thr Gly Pro
    370                 375                 380

Asp Asn Ser Thr His Asn Thr Pro Val Tyr Lys Leu Asp Ile Ser Glu
385                 390                 395                 400

Ala Thr Gln Val Gly Gln His His Arg Arg Ala Asp Asn Asp Ser Thr
                405                 410                 415

Ala Ser Asp Thr Pro Pro Ala Thr Thr Ala Ala Gly Pro Leu Lys Ala
            420                 425                 430

Glu Asn Thr Asn Thr Ser Lys Ser Ala Asp Ser Leu Asp Leu Ala Thr
        435                 440                 445

Thr Thr Ser Pro Gln Asn Tyr Ser Glu Thr Ala Gly Asn Asn Asn Thr
    450                 455                 460

His His Gln Asp Thr Gly Glu Glu Ser Ala Ser Ser Gly Lys Leu Gly
465                 470                 475                 480

Leu Ile Thr Asn Thr Ile Ala Gly Val Ala Gly Leu Ile Thr Gly Gly
                485                 490                 495

Arg Arg Thr Arg Arg Glu Val Ile Val Asn Ala Gln Pro Lys Cys Asn
            500                 505                 510
```

```
Pro Asn Leu His Tyr Trp Thr Thr Gln Asp Glu Gly Ala Ala Ile Gly
        515                 520                 525

Leu Ala Trp Ile Pro Tyr Phe Gly Pro Ala Ala Glu Gly Ile Tyr Thr
    530                 535                 540

Glu Gly Leu Met His Asn Gln Asp Gly Leu Ile Cys Gly Leu Arg Gln
545                 550                 555                 560

Leu Ala Asn Glu Thr Thr Gln Ala Leu Gln Leu Phe Leu Arg Ala Thr
                565                 570                 575

Thr Glu Leu Arg Thr Phe Ser Ile Leu Asn Arg Lys Ala Ile Asp Phe
            580                 585                 590

Leu Leu Gln Arg Trp Gly Gly Thr Cys His Ile Leu Gly Pro Asp Cys
        595                 600                 605

Cys Ile Glu Pro His Asp Trp Thr Lys Asn Ile Thr Asp Lys Ile Asp
    610                 615                 620

Gln Ile Ile His Asp Phe Val Asp Lys Thr Leu Pro Asp Gln Gly Asp
625                 630                 635                 640

Asn Asp Asn Trp Trp Thr Gly Trp Arg Gln Trp Ile Pro Ala Gly Ile
                645                 650                 655

Gly Val Thr Gly Val Ile Ile Ala Val Ile Ala Leu Phe Cys Ile Cys
            660                 665                 670

Lys Phe Val Phe
        675


<210>  23
<211>  17
<212>  PRT
<213>  Ebola virus

<400>  23

His Asn Thr Pro Val Tyr Lys Leu Asp Ile Ser Glu Ala Thr Gln Val
```

1 5 10 15

Glu

<210> 24
<211> 17
<212> PRT
<213> Ebola virus

<400> 24

Ala Thr Gln Val Glu Gln His His Arg Arg Thr Asp Asn Asp Ser Thr
1 5 10 15

Ala

<210> 25
<211> 17
<212> PRT
<213> Ebola virus

<400> 25

Ala Thr Gln Val Gly Gln His His Arg Arg Ala Asp Asn Asp Ser Thr
1 5 10 15

Ala

<210> 26
<211> 25
<212> PRT
<213> Respiratory syncytial virus

<400> 26

Met Glu Leu Leu Ile Leu Lys Ala Asn Ala Ile Thr Thr Ile Leu Thr
1 5 10 15

Ala Val Thr Phe Cys Phe Ala Ser Gly
20 25

<210> 27
<211> 676

<212> PRT
<213> Ebola virus

<400> 27

Met Gly Val Thr Gly Ile Leu Gln Leu Pro Arg Asp Arg Phe Lys Arg
1 5 10 15

Thr Ser Phe Phe Leu Trp Val Ile Ile Leu Phe Gln Arg Thr Phe Ser
20 25 30

Ile Pro Leu Gly Val Ile His Asn Ser Thr Leu Gln Val Ser Asp Val
35 40 45

Asp Lys Leu Val Cys Arg Asp Lys Leu Ser Ser Thr Asn Gln Leu Arg
50 55 60

Ser Val Gly Leu Asn Leu Glu Gly Asn Gly Val Ala Thr Asp Val Pro
65 70 75 80

Ser Ala Thr Lys Arg Trp Gly Phe Arg Ser Gly Val Pro Pro Lys Val
85 90 95

Val Asn Tyr Glu Ala Gly Glu Trp Ala Glu Asn Cys Tyr Asn Leu Glu
100 105 110

Ile Lys Lys Pro Asp Gly Ser Glu Cys Leu Pro Ala Ala Pro Asp Gly
115 120 125

Ile Arg Gly Phe Pro Arg Cys Arg Tyr Val His Lys Val Ser Gly Thr
130 135 140

Gly Pro Cys Ala Gly Asp Phe Ala Phe His Lys Glu Gly Ala Phe Phe
145 150 155 160

Leu Tyr Asp Arg Leu Ala Ser Thr Val Ile Tyr Arg Gly Thr Thr Phe
165 170 175

Ala Glu Gly Val Val Ala Phe Leu Ile Leu Pro Gln Ala Lys Lys Asp
180 185 190

Phe Phe Ser Ser His Pro Leu Arg Glu Pro Val Asn Ala Thr Glu Asp

```
        195                 200                 205

Pro Ser Ser Gly Tyr Tyr Ser Thr Thr Ile Arg Tyr Gln Ala Thr Gly
    210                 215                 220

Phe Gly Thr Asn Glu Thr Glu Tyr Leu Phe Glu Val Asp Asn Leu Thr
225                 230                 235                 240

Tyr Val Gln Leu Glu Ser Arg Phe Thr Pro Gln Phe Leu Leu Gln Leu
                245                 250                 255

Asn Glu Thr Ile Tyr Thr Ser Gly Lys Arg Ser Asn Thr Thr Gly Lys
            260                 265                 270

Leu Ile Trp Lys Val Asn Pro Glu Ile Asp Thr Thr Ile Gly Glu Trp
        275                 280                 285

Ala Phe Trp Glu Thr Lys Lys Asn Leu Thr Arg Lys Ile Arg Ser Glu
    290                 295                 300

Glu Leu Ser Phe Thr Val Val Ser Asn Gly Ala Lys Asn Ile Ser Gly
305                 310                 315                 320

Gln Ser Pro Ala Arg Thr Ser Ser Asp Pro Gly Thr Asn Thr Thr Thr
                325                 330                 335

Glu Asp His Lys Ile Met Ala Ser Glu Asn Ser Ser Ala Met Val Gln
            340                 345                 350

Val His Ser Gln Gly Arg Glu Ala Ala Val Ser His Leu Thr Thr Leu
        355                 360                 365

Ala Thr Ile Ser Thr Ser Pro Gln Ser Leu Thr Thr Lys Pro Gly Pro
    370                 375                 380

Asp Asn Ser Thr His Asn Thr Pro Val Tyr Lys Leu Asp Ile Ser Glu
385                 390                 395                 400

Ala Thr Gln Val Glu Gln His His Arg Arg Thr Asp Asn Asp Ser Thr
                405                 410                 415
```

```
Ala Ser Asp Thr Pro Ser Ala Thr Thr Ala Ala Gly Pro Pro Lys Ala
            420                 425                 430

Glu Asn Thr Asn Thr Ser Lys Ser Thr Asp Phe Leu Asp Pro Ala Thr
        435                 440                 445

Thr Thr Ser Pro Gln Asn His Ser Glu Thr Ala Gly Asn Asn Asn Thr
    450                 455                 460

His His Gln Asp Thr Gly Glu Glu Ser Ala Ser Ser Gly Lys Leu Gly
465                 470                 475                 480

Leu Ile Thr Asn Thr Ile Ala Gly Val Ala Gly Leu Ile Thr Gly Gly
                485                 490                 495

Arg Arg Thr Arg Arg Glu Ala Ile Val Asn Ala Gln Pro Lys Cys Asn
            500                 505                 510

Pro Asn Leu His Tyr Trp Thr Thr Gln Asp Glu Gly Ala Ala Ile Gly
        515                 520                 525

Leu Ala Trp Ile Pro Tyr Phe Gly Pro Ala Ala Glu Gly Ile Tyr Ile
    530                 535                 540

Glu Gly Leu Met His Asn Gln Asp Gly Leu Ile Cys Gly Leu Arg Gln
545                 550                 555                 560

Leu Ala Asn Glu Thr Thr Gln Ala Leu Gln Leu Phe Leu Arg Ala Thr
                565                 570                 575

Thr Glu Leu Arg Thr Phe Ser Ile Leu Asn Arg Lys Ala Ile Asp Phe
            580                 585                 590

Leu Leu Gln Arg Trp Gly Gly Thr Cys His Ile Leu Gly Pro Asp Cys
        595                 600                 605

Cys Ile Glu Pro His Asp Trp Thr Lys Asn Ile Thr Asp Lys Ile Asp
    610                 615                 620

Gln Ile Ile His Asp Phe Val Asp Lys Thr Leu Pro Asp Gln Gly Asp
```

625 630 635 640

Asn Asp Asn Trp Trp Thr Gly Trp Arg Gln Trp Ile Pro Ala Gly Ile
645 650 655

Gly Val Thr Gly Val Ile Ile Ala Val Ile Ala Leu Phe Cys Ile Cys
660 665 670

Lys Phe Val Phe
675

<210> 28
<211> 676
<212> PRT
<213> Ebola virus

<400> 28

Met Gly Val Thr Gly Ile Leu Gln Leu Pro Arg Asp Arg Phe Lys Arg
1 5 10 15

Thr Ser Phe Phe Leu Trp Val Ile Ile Leu Phe Gln Arg Thr Phe Ser
20 25 30

Ile Pro Leu Gly Val Ile His Asn Ser Thr Leu Gln Val Ser Asp Val
35 40 45

Asp Lys Leu Val Cys Arg Asp Lys Leu Ser Ser Thr Asn Gln Leu Arg
50 55 60

Ser Val Gly Leu Asn Leu Glu Gly Asn Gly Val Ala Thr Asp Val Pro
65 70 75 80

Ser Val Thr Lys Arg Trp Gly Phe Arg Ser Gly Val Pro Pro Lys Val
85 90 95

Val Asn Tyr Glu Ala Gly Glu Trp Ala Glu Asn Cys Tyr Asn Leu Glu
100 105 110

Ile Lys Lys Pro Asp Gly Ser Glu Cys Leu Pro Ala Ala Pro Asp Gly
115 120 125

```
Ile Arg Gly Phe Pro Arg Cys Arg Tyr Val His Lys Val Ser Gly Thr
    130                 135                 140

Gly Pro Cys Ala Gly Asp Phe Ala Phe His Lys Glu Gly Ala Phe Phe
145                 150                 155                 160

Leu Tyr Asp Arg Leu Ala Ser Thr Val Ile Tyr Arg Gly Thr Thr Phe
                165                 170                 175

Ala Glu Gly Val Val Ala Phe Leu Ile Leu Pro Gln Ala Lys Lys Asp
            180                 185                 190

Phe Phe Ser Ser His Pro Leu Arg Glu Pro Val Asn Ala Thr Glu Asp
        195                 200                 205

Pro Ser Ser Gly Tyr Tyr Ser Thr Thr Ile Arg Tyr Gln Ala Thr Gly
    210                 215                 220

Phe Gly Thr Asn Glu Thr Glu Tyr Leu Phe Glu Val Asp Asn Leu Thr
225                 230                 235                 240

Tyr Val Gln Leu Glu Ser Arg Phe Thr Pro Gln Phe Leu Leu Gln Leu
                245                 250                 255

Asn Glu Thr Ile Tyr Ala Ser Gly Lys Arg Ser Asn Thr Thr Gly Lys
            260                 265                 270

Leu Ile Trp Lys Val Asn Pro Glu Ile Asp Thr Thr Ile Gly Glu Trp
        275                 280                 285

Ala Phe Trp Glu Thr Lys Lys Asn Leu Thr Arg Lys Ile Arg Ser Glu
    290                 295                 300

Glu Leu Ser Phe Thr Ala Val Ser Asn Gly Pro Lys Asn Ile Ser Gly
305                 310                 315                 320

Gln Ser Pro Ala Arg Thr Ser Ser Asp Pro Glu Thr Asn Thr Thr Asn
                325                 330                 335

Glu Asp His Lys Ile Met Ala Ser Glu Asn Ser Ser Ala Met Val Gln
            340                 345                 350
```

```
Val His Ser Gln Gly Arg Lys Ala Ala Val Ser His Leu Thr Thr Leu
        355                 360                 365

Ala Thr Ile Ser Thr Ser Pro Gln Pro Pro Thr Thr Lys Thr Gly Pro
    370                 375                 380

Asp Asn Ser Thr His Asn Thr Pro Val Tyr Lys Leu Asp Ile Ser Glu
385                 390                 395                 400

Ala Thr Gln Val Gly Gln His His Arg Arg Ala Asp Asn Asp Ser Thr
                405                 410                 415

Ala Ser Asp Thr Pro Pro Ala Thr Thr Ala Ala Gly Pro Leu Lys Ala
            420                 425                 430

Glu Asn Thr Asn Thr Ser Lys Ser Ala Asp Ser Leu Asp Leu Ala Thr
        435                 440                 445

Thr Thr Ser Pro Gln Asn Tyr Ser Glu Thr Ala Gly Asn Asn Asn Thr
    450                 455                 460

His His Gln Asp Thr Gly Glu Glu Ser Ala Ser Ser Gly Lys Leu Gly
465                 470                 475                 480

Leu Ile Thr Asn Thr Ile Ala Gly Val Ala Gly Leu Ile Thr Gly Gly
                485                 490                 495

Arg Arg Thr Arg Arg Glu Val Ile Val Asn Ala Gln Pro Lys Cys Asn
            500                 505                 510

Pro Asn Leu His Tyr Trp Thr Thr Gln Asp Glu Gly Ala Ala Ile Gly
        515                 520                 525

Leu Ala Trp Ile Pro Tyr Phe Gly Pro Ala Ala Glu Gly Ile Tyr Thr
    530                 535                 540

Glu Gly Leu Met His Asn Gln Asp Gly Leu Ile Cys Gly Leu Arg Gln
545                 550                 555                 560
```

```
Leu Ala Asn Glu Thr Thr Gln Ala Leu Gln Leu Phe Leu Arg Ala Thr
                565                 570                 575

Thr Glu Leu Arg Thr Phe Ser Ile Leu Asn Arg Lys Ala Ile Asp Phe
            580                 585                 590

Leu Leu Gln Arg Trp Gly Gly Thr Cys His Ile Leu Gly Pro Asp Cys
        595                 600                 605

Cys Ile Glu Pro His Asp Trp Thr Lys Asn Ile Thr Asp Lys Ile Asp
    610                 615                 620

Gln Ile Ile His Asp Phe Val Asp Lys Thr Leu Pro Asp Gln Gly Asp
625                 630                 635                 640

Asn Asp Asn Trp Trp Thr Gly Trp Arg Gln Trp Ile Pro Ala Gly Ile
                645                 650                 655

Gly Val Thr Gly Val Ile Ile Ala Val Ile Ala Leu Phe Cys Ile Cys
            660                 665                 670

Lys Phe Val Phe
        675
```

<210> 29
<211> 644
<212> PRT
<213> Ebola virus

<400> 29

```
Ile Pro Leu Gly Val Ile His Asn Ser Thr Leu Gln Val Ser Asp Val
1               5                   10                  15

Asp Lys Leu Val Cys Arg Asp Lys Leu Ser Ser Thr Asn Gln Leu Arg
            20                  25                  30

Ser Val Gly Leu Asn Leu Glu Gly Asn Gly Val Ala Thr Asp Val Pro
        35                  40                  45

Ser Val Thr Lys Arg Trp Gly Phe Arg Ser Gly Val Pro Pro Lys Val
    50                  55                  60
```

```
Val Asn Tyr Glu Ala Gly Glu Trp Ala Glu Asn Cys Tyr Asn Leu Glu
65                  70                  75                  80

Ile Lys Lys Pro Asp Gly Ser Glu Cys Leu Pro Ala Ala Pro Asp Gly
                85                  90                  95

Ile Arg Gly Phe Pro Arg Cys Arg Tyr Val His Lys Val Ser Gly Thr
            100                 105                 110

Gly Pro Cys Ala Gly Asp Phe Ala Phe His Lys Glu Gly Ala Phe Phe
        115                 120                 125

Leu Tyr Asp Arg Leu Ala Ser Thr Val Ile Tyr Arg Gly Thr Thr Phe
    130                 135                 140

Ala Glu Gly Val Val Ala Phe Leu Ile Leu Pro Gln Ala Lys Lys Asp
145                 150                 155                 160

Phe Phe Ser Ser His Pro Leu Arg Glu Pro Val Asn Ala Thr Glu Asp
                165                 170                 175

Pro Ser Ser Gly Tyr Tyr Ser Thr Thr Ile Arg Tyr Gln Ala Thr Gly
            180                 185                 190

Phe Gly Thr Asn Glu Thr Glu Tyr Leu Phe Glu Val Asp Asn Leu Thr
        195                 200                 205

Tyr Val Gln Leu Glu Ser Arg Phe Thr Pro Gln Phe Leu Leu Gln Leu
    210                 215                 220

Asn Glu Thr Ile Tyr Ala Ser Gly Lys Arg Ser Asn Thr Thr Gly Lys
225                 230                 235                 240

Leu Ile Trp Lys Val Asn Pro Glu Ile Asp Thr Thr Ile Gly Glu Trp
                245                 250                 255

Ala Phe Trp Glu Thr Lys Lys Asn Leu Thr Arg Lys Ile Arg Ser Glu
            260                 265                 270

Glu Leu Ser Phe Thr Ala Val Ser Asn Gly Pro Lys Asn Ile Ser Gly
```

```
        275                 280                 285

Gln Ser Pro Ala Arg Thr Ser Ser Asp Pro Glu Thr Asn Thr Thr Asn
    290                 295                 300

Glu Asp His Lys Ile Met Ala Ser Glu Asn Ser Ser Ala Met Val Gln
305                 310                 315                 320

Val His Ser Gln Gly Arg Lys Ala Ala Val Ser His Leu Thr Thr Leu
                325                 330                 335

Ala Thr Ile Ser Thr Ser Pro Gln Pro Pro Thr Thr Lys Thr Gly Pro
            340                 345                 350

Asp Asn Ser Thr His Asn Thr Pro Val Tyr Lys Leu Asp Ile Ser Glu
        355                 360                 365

Ala Thr Gln Val Gly Gln His His Arg Arg Ala Asp Asn Asp Ser Thr
    370                 375                 380

Ala Ser Asp Thr Pro Pro Ala Thr Thr Ala Ala Gly Pro Leu Lys Ala
385                 390                 395                 400

Glu Asn Thr Asn Thr Ser Lys Ser Ala Asp Ser Leu Asp Leu Ala Thr
                405                 410                 415

Thr Thr Ser Pro Gln Asn Tyr Ser Glu Thr Ala Gly Asn Asn Asn Thr
            420                 425                 430

His His Gln Asp Thr Gly Glu Glu Ser Ala Ser Ser Gly Lys Leu Gly
        435                 440                 445

Leu Ile Thr Asn Thr Ile Ala Gly Val Ala Gly Leu Ile Thr Gly Gly
    450                 455                 460

Arg Arg Thr Arg Arg Glu Val Ile Val Asn Ala Gln Pro Lys Cys Asn
465                 470                 475                 480

Pro Asn Leu His Tyr Trp Thr Thr Gln Asp Glu Gly Ala Ala Ile Gly
                485                 490                 495
```

```
Leu Ala Trp Ile Pro Tyr Phe Gly Pro Ala Ala Glu Gly Ile Tyr Thr
            500                 505                 510

Glu Gly Leu Met His Asn Gln Asp Gly Leu Ile Cys Gly Leu Arg Gln
        515                 520                 525

Leu Ala Asn Glu Thr Thr Gln Ala Leu Gln Leu Phe Leu Arg Ala Thr
    530                 535                 540

Thr Glu Leu Arg Thr Phe Ser Ile Leu Asn Arg Lys Ala Ile Asp Phe
545                 550                 555                 560

Leu Leu Gln Arg Trp Gly Gly Thr Cys His Ile Leu Gly Pro Asp Cys
                565                 570                 575

Cys Ile Glu Pro His Asp Trp Thr Lys Asn Ile Thr Asp Lys Ile Asp
            580                 585                 590

Gln Ile Ile His Asp Phe Val Asp Lys Thr Leu Pro Asp Gln Gly Asp
        595                 600                 605

Asn Asp Asn Trp Trp Thr Gly Trp Arg Gln Trp Ile Pro Ala Gly Ile
    610                 615                 620

Gly Val Thr Gly Val Ile Ile Ala Val Ile Ala Leu Phe Cys Ile Cys
625                 630                 635                 640

Lys Phe Val Phe
```