SEQUENCE LISTING

<110> VLP THERAPEUTICS, LLC

<120> VIRUS LIKE PARTICLE COMPOSITION

<130> SG4877A

<150> US61/599,746
<151> 2012-02-16

<160> 50

<170> PatentIn version 3.5

<210> 1
<211> 1248
<212> PRT
<213> virus

<400> 1

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

Asn Lys Leu Thr Met Arg Ala Val Pro Gln Gln Lys Pro Arg Arg Asn
50 55 60

Arg Lys Asn Lys Lys Gln Lys Gln Lys Gln Gln Ala Pro Gln Asn Asn
65 70 75 80

Thr Asn Gln Lys Lys Gln Pro Pro Lys Lys Lys Pro Ala Gln Lys Lys
85 90 95

Lys Lys Pro Gly Arg Arg Glu Arg Met Cys Met Lys Ile Glu Asn Asp
100 105 110

Cys Ile Phe Glu Val Lys His Glu Gly Lys Val Thr Gly Tyr Ala Cys
115 120 125

Leu Val Gly Asp Lys Val Met Lys Pro Ala His Val Lys Gly Thr Ile
130 135 140

Asp Asn Ala Asp Leu Ala Lys Leu Ala Phe Lys Arg Ser Ser Lys Tyr
145 150 155 160

Asp Leu Glu Cys Ala Gln Ile Pro Val His Met Lys Ser Asp Ala Ser
165 170 175

```
Lys Phe Thr His Glu Lys Pro Glu Gly Tyr Tyr Asn Trp His His Gly
            180                 185                 190

Ala Val Gln Tyr Ser Gly Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly
        195                 200                 205

Lys Pro Gly Asp Ser Gly Arg Pro Ile Phe Asp Asn Lys Gly Arg Val
    210                 215                 220

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

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

Gly Ala Glu Glu Trp Ser Leu Ala Ile Pro Val Met Cys Leu Leu Ala
            260                 265                 270

Asn Thr Thr Phe Pro Cys Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr
        275                 280                 285

Glu Lys Glu Pro Glu Glu Thr Leu Arg Met Leu Glu Asp Asn Val Met
    290                 295                 300

Arg Pro Gly Tyr Tyr Gln Leu Leu Gln Ala Ser Leu Thr Cys Ser Pro
305                 310                 315                 320

His Arg Gln Arg Arg Ser Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala
                325                 330                 335

Thr Arg Pro Tyr Leu Ala His Cys Pro Asp Cys Gly Glu Gly His Ser
            340                 345                 350

Cys His Ser Pro Val Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp
        355                 360                 365

Gly Thr Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp
    370                 375                 380

Asp Ser His Asp Trp Thr Lys Leu Arg Tyr Met Asp Asn His Met Pro
385                 390                 395                 400

Ala Asp Ala Glu Arg Ala Gly Leu Phe Val Arg Thr Ser Ala Pro Cys
                405                 410                 415

Thr Ile Thr Gly Thr Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys
            420                 425                 430

Gly Glu Thr Leu Thr Val Gly Phe Thr Asp Ser Arg Lys Ile Ser His
        435                 440                 445

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

Tyr Val Gln Ser Thr Ala Ala Thr Thr Glu Glu Ile Glu Val His Met
                485                 490                 495

Pro Pro Asp Thr Pro Asp Arg Thr Leu Met Ser Gln Gln Ser Gly Asn
            500                 505                 510

Val Lys Ile Thr Val Asn Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys
        515                 520                 525

Gly Gly Ser Asn Glu Gly Leu Thr Thr Thr Asp Lys Val Ile Asn Asn
    530                 535                 540

Cys Lys Val Asp Gln Cys His Ala Ala Val Thr Asn His Lys Lys Trp
545                 550                 555                 560

Gln Tyr Asn Ser Pro Leu Val Pro Arg Asn Ala Glu Leu Gly Asp Arg
                565                 570                 575

Lys Gly Lys Ile His Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Arg
            580                 585                 590

Val Pro Lys Ala Arg Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val
        595                 600                 605

Ile Met Leu Leu Tyr Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Asn
    610                 615                 620

Met Gly Glu Glu Pro Asn Tyr Gln Glu Glu Trp Val Met His Lys Lys
625                 630                 635                 640

Glu Val Val Leu Thr Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly
                645                 650                 655

Asn Asn Glu Pro Tyr Lys Tyr Trp Pro Gln Leu Ser Thr Asn Gly Thr
            660                 665                 670

Ala His Gly His Pro His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr
        675                 680                 685

Pro Thr Met Thr Val Val Val Val Ser Val Ala Thr Phe Ile Leu Leu
    690                 695                 700

Ser Met Val Gly Met Ala Ala Gly Met Cys Met Cys Ala Arg Arg Arg
705                 710                 715                 720

Cys Ile Thr Pro Tyr Glu Leu Thr Pro Gly Ala Thr Val Pro Phe Leu
                725                 730                 735

Leu Ser Leu Ile Cys Cys Ile Arg Thr Ala Lys Ala Ala Thr Tyr Gln
            740                 745                 750
```

```
Glu Ala Ala Ile Tyr Leu Trp Asn Glu Gln Gln Pro Leu Phe Trp Leu
        755                 760                 765

Gln Ala Leu Ile Pro Leu Ala Ala Leu Ile Val Leu Cys Asn Cys Leu
    770                 775                 780

Arg Leu Leu Pro Cys Cys Cys Lys Thr Leu Ala Phe Leu Ala Val Met
785                 790                 795                 800

Ser Val Gly Ala His Thr Val Ser Ala Tyr Glu His Val Thr Val Ile
                805                 810                 815

Pro Asn Thr Val Gly Val Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly
            820                 825                 830

Tyr Ser Pro Met Val Leu Glu Met Glu Leu Leu Ser Val Thr Leu Glu
        835                 840                 845

Pro Thr Leu Ser Leu Asp Tyr Ile Thr Cys Glu Tyr Lys Thr Val Ile
    850                 855                 860

Pro Ser Pro Tyr Val Lys Cys Cys Gly Thr Ala Glu Cys Lys Asp Lys
865                 870                 875                 880

Asn Leu Pro Asp Tyr Ser Cys Lys Val Phe Thr Gly Val Tyr Pro Phe
                885                 890                 895

Met Trp Gly Gly Ala Tyr Cys Phe Cys Asp Ala Glu Asn Thr Gln Leu
            900                 905                 910

Ser Glu Ala His Val Glu Lys Ser Glu Ser Cys Lys Thr Glu Phe Ala
        915                 920                 925

Ser Ala Tyr Arg Ala His Thr Ala Ser Ala Ser Ala Lys Leu Arg Val
    930                 935                 940

Leu Tyr Gln Gly Asn Asn Ile Thr Val Thr Ala Tyr Ala Asn Gly Asp
945                 950                 955                 960

His Ala Val Thr Val Lys Asp Ala Lys Phe Ile Val Gly Pro Met Ser
                965                 970                 975

Ser Ala Trp Thr Pro Phe Asp Asn Lys Ile Val Val Tyr Lys Gly Asp
            980                 985                 990

Val Tyr Asn Met Asp Tyr Pro Pro  Phe Gly Ala Gly Arg  Pro Gly Gln
        995                 1000                1005

Phe Gly  Asp Ile Gln Ser Arg  Thr Pro Glu Ser Lys  Asp Val Tyr
    1010                1015                1020

Ala Asn  Thr Gln Leu Val Leu  Gln Arg Pro Ala Val  Gly Thr Val
    1025                1030                1035
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```
His Val  Pro Tyr Ser Gln Ala  Pro Ser Gly Phe Lys  Tyr Trp Leu
    1040                1045                1050

Lys Glu  Arg Gly Ala Ser Leu  Gln His Thr Ala Pro  Phe Gly Cys
    1055                1060                1065

Gln Ile  Ala Thr Asn Pro Val  Arg Ala Val Asn Cys  Ala Val Gly
    1070                1075                1080

Asn Met  Pro Ile Ser Ile Asp  Ile Pro Glu Ala Ala  Phe Thr Arg
    1085                1090                1095

Val Val  Asp Ala Pro Ser Leu  Thr Asp Met Ser Cys  Glu Val Pro
    1100                1105                1110

Ala Cys  Thr His Ser Ser Asp  Phe Gly Gly Val Ala  Ile Ile Lys
    1115                1120                1125

Tyr Ala  Ala Ser Lys Lys Gly  Lys Cys Ala Val His  Ser Met Thr
    1130                1135                1140

Asn Ala  Val Thr Ile Arg Glu  Ala Glu Ile Glu Val  Glu Gly Asn
    1145                1150                1155

Ser Gln  Leu Gln Ile Ser Phe  Ser Thr Ala Leu Ala  Ser Ala Glu
    1160                1165                1170

Phe Arg  Val Gln Val Cys Ser  Thr Gln Val His Cys  Ala Ala Glu
    1175                1180                1185

Cys His  Pro Pro Lys Asp His  Ile Val Asn Tyr Pro  Ala Ser His
    1190                1195                1200

Thr Thr  Leu Gly Val Gln Asp  Ile Ser Ala Thr Ala  Met Ser Trp
    1205                1210                1215

Val Gln  Lys Ile Thr Gly Gly  Val Gly Leu Val Val  Ala Val Ala
    1220                1225                1230

Ala Leu  Ile Leu Ile Val Val  Leu Cys Val Ser Phe  Ser Arg His
    1235                1240                1245
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<211> 1248
<212> PRT
<213> virus

<400> 2

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Met Glu Phe Ile Pro Thr Gln Thr Phe Tyr Asn Arg Arg Tyr Gln Pro
1               5                  10                  15

Arg Pro Trp Ala Pro Arg Pro Thr Ile Gln Val Ile Arg Pro Arg Pro
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```
          20                  25                  30

Arg Pro Gln Arg Gln Ala Gly Gln Leu Ala Gln Leu Ile Ser Ala Val
        35                  40                  45

Asn Lys Leu Thr Met Arg Ala Val Pro Gln Gln Lys Pro Arg Arg Asn
    50                  55                  60

Arg Lys Asn Lys Lys Gln Arg Gln Lys Lys Gln Ala Pro Gln Asn Asp
65                  70                  75                  80

Pro Lys Gln Lys Lys Gln Pro Pro Gln Lys Lys Pro Ala Gln Lys Lys
                85                  90                  95

Lys Lys Pro Gly Arg Arg Glu Arg Met Cys Met Lys Ile Glu Asn Asp
            100                 105                 110

Cys Ile Phe Glu Val Lys His Glu Gly Lys Val Met Gly Tyr Ala Cys
        115                 120                 125

Leu Val Gly Asp Lys Val Met Lys Pro Ala His Val Lys Gly Thr Ile
    130                 135                 140

Asp Asn Ala Asp Leu Ala Lys Leu Ala Phe Lys Arg Ser Ser Lys Tyr
145                 150                 155                 160

Asp Leu Glu Cys Ala Gln Ile Pro Val His Met Lys Ser Asp Ala Ser
                165                 170                 175

Lys Phe Thr His Glu Lys Pro Glu Gly Tyr Tyr Asn Trp His His Gly
            180                 185                 190

Ala Val Gln Tyr Ser Gly Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly
        195                 200                 205

Lys Pro Gly Asp Ser Gly Arg Pro Ile Phe Asp Asn Lys Gly Arg Val
    210                 215                 220

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

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

Gly Ala Glu Glu Trp Ser Leu Ala Leu Pro Val Leu Cys Leu Leu Ala
            260                 265                 270

Asn Thr Thr Phe Pro Cys Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr
        275                 280                 285

Glu Lys Glu Pro Glu Ser Thr Leu Arg Met Leu Glu Asp Asn Val Met
    290                 295                 300

Arg Pro Gly Tyr Tyr Gln Leu Leu Lys Ala Ser Leu Thr Cys Ser Pro
```

305 310 315 320

His Arg Gln Arg Arg Ser Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala
325 330 335

Thr Arg Pro Tyr Leu Ala His Cys Pro Asp Cys Gly Glu Gly His Ser
340 345 350

Cys His Ser Pro Ile Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp
355 360 365

Gly Thr Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp
370 375 380

Asp Ser His Asp Trp Thr Lys Leu Arg Tyr Met Asp Ser His Thr Pro
385 390 395 400

Ala Asp Ala Glu Arg Ala Gly Leu Leu Val Arg Thr Ser Ala Pro Cys
405 410 415

Thr Ile Thr Gly Thr Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys
420 425 430

Gly Glu Thr Leu Thr Val Gly Phe Thr Asp Ser Arg Lys Ile Ser His
435 440 445

Thr Cys Thr His Pro Phe His His Glu Pro Pro Val Ile Gly Arg Glu
450 455 460

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

Tyr Val Gln Ser Thr Ala Ala Thr Ala Glu Glu Ile Glu Val His Met
485 490 495

Pro Pro Asp Thr Pro Asp Arg Thr Leu Met Thr Gln Gln Ser Gly Asn
500 505 510

Val Lys Ile Thr Val Asn Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys
515 520 525

Gly Gly Ser Asn Glu Gly Leu Thr Thr Thr Asp Lys Val Ile Asn Asn
530 535 540

Cys Lys Ile Asp Gln Cys His Ala Ala Val Thr Asn His Lys Asn Trp
545 550 555 560

Gln Tyr Asn Ser Pro Leu Val Pro Arg Asn Ala Glu Leu Gly Asp Arg
565 570 575

Lys Gly Lys Ile His Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Arg
580 585 590

Val Pro Lys Ala Arg Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val

595 600 605

Thr Met Leu Leu Tyr Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Asn
610 615 620

Met Gly Gln Glu Pro Asn Tyr His Glu Glu Trp Val Thr His Lys Lys
625 630 635 640

Glu Val Thr Leu Thr Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly
645 650 655

Asn Asn Glu Pro Tyr Lys Tyr Trp Pro Gln Met Ser Thr Asn Gly Thr
660 665 670

Ala His Gly His Pro His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr
675 680 685

Pro Thr Met Thr Val Val Ile Val Ser Val Ala Ser Phe Val Leu Leu
690 695 700

Ser Met Val Gly Thr Ala Val Gly Met Cys Val Cys Ala Arg Arg Arg
705 710 715 720

Cys Ile Thr Pro Tyr Glu Leu Thr Pro Gly Ala Thr Val Pro Phe Leu
725 730 735

Leu Ser Leu Leu Cys Cys Val Arg Thr Thr Lys Ala Ala Thr Tyr Tyr
740 745 750

Glu Ala Ala Ala Tyr Leu Trp Asn Glu Gln Gln Pro Leu Phe Trp Leu
755 760 765

Gln Ala Leu Ile Pro Leu Ala Ala Leu Ile Val Leu Cys Asn Cys Leu
770 775 780

Lys Leu Leu Pro Cys Cys Cys Lys Thr Leu Ala Phe Leu Ala Val Met
785 790 795 800

Ser Ile Gly Ala His Thr Val Ser Ala Tyr Glu His Val Thr Val Ile
805 810 815

Pro Asn Thr Val Gly Val Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly
820 825 830

Tyr Ser Pro Met Val Leu Glu Met Glu Leu Gln Ser Val Thr Leu Glu
835 840 845

Pro Thr Leu Ser Leu Asp Tyr Ile Thr Cys Glu Tyr Lys Thr Val Ile
850 855 860

Pro Ser Pro Tyr Val Lys Cys Cys Gly Thr Ala Glu Cys Lys Asp Lys
865 870 875 880

Ser Leu Pro Asp Tyr Ser Cys Lys Val Phe Thr Gly Val Tyr Pro Phe

885 890 895

Met Trp Gly Gly Ala Tyr Cys Phe Cys Asp Ala Glu Asn Thr Gln Leu
900 905 910

Ser Glu Ala His Val Glu Lys Ser Glu Ser Cys Lys Thr Glu Phe Ala
915 920 925

Ser Ala Tyr Arg Ala His Thr Ala Ser Ala Ser Ala Lys Leu Arg Val
930 935 940

Leu Tyr Gln Gly Asn Asn Ile Thr Val Ala Ala Tyr Ala Asn Gly Asp
945 950 955 960

His Ala Val Thr Val Lys Asp Ala Lys Phe Val Val Gly Pro Met Ser
965 970 975

Ser Ala Trp Thr Pro Phe Asp Asn Lys Ile Val Val Tyr Lys Gly Asp
980 985 990

Val Tyr Asn Met Asp Tyr Pro Pro Phe Gly Ala Gly Arg Pro Gly Gln
995 1000 1005

Phe Gly Asp Ile Gln Ser Arg Thr Pro Glu Ser Lys Asp Val Tyr
1010 1015 1020

Ala Asn Thr Gln Leu Val Leu Gln Arg Pro Ala Ala Gly Thr Val
1025 1030 1035

His Val Pro Tyr Ser Gln Ala Pro Ser Gly Phe Lys Tyr Trp Leu
1040 1045 1050

Lys Glu Arg Gly Ala Ser Leu Gln His Thr Ala Pro Phe Gly Cys
1055 1060 1065

Gln Ile Ala Thr Asn Pro Val Arg Ala Val Asn Cys Ala Val Gly
1070 1075 1080

Asn Ile Pro Ile Ser Ile Asp Ile Pro Asp Ala Ala Phe Thr Arg
1085 1090 1095

Val Val Asp Ala Pro Ser Val Thr Asp Met Ser Cys Glu Val Pro
1100 1105 1110

Ala Cys Thr His Ser Ser Asp Phe Gly Gly Val Ala Ile Ile Lys
1115 1120 1125

Tyr Thr Ala Ser Lys Lys Gly Lys Cys Ala Val His Ser Met Thr
1130 1135 1140

Asn Ala Val Thr Ile Arg Glu Ala Asp Val Glu Val Glu Gly Asn
1145 1150 1155

Ser Gln Leu Gln Ile Ser Phe Ser Thr Ala Leu Ala Ser Ala Glu

1160 1165 1170

Phe Arg Val Gln Val Cys Ser Thr Gln Val His Cys Ala Ala Ala
1175 1180 1185

Cys His Pro Pro Lys Asp His Ile Val Asn Tyr Pro Ala Ser His
1190 1195 1200

Thr Thr Leu Gly Val Gln Asp Ile Ser Thr Thr Ala Met Ser Trp
1205 1210 1215

Val Gln Lys Ile Thr Gly Gly Val Gly Leu Ile Val Ala Val Ala
1220 1225 1230

Ala Leu Ile Leu Ile Val Val Leu Cys Val Ser Phe Ser Arg His
1235 1240 1245

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<212> PRT
<213> virus

<400> 3

Met Phe Pro Phe Gln Pro Met Tyr Pro Met Gln Pro Met Pro Tyr Arg
1 5 10 15

Asn Pro Phe Ala Ala Pro Arg Arg Pro Trp Phe Pro Arg Thr Asp Pro
20 25 30

Phe Leu Ala Met Gln Val Gln Glu Leu Thr Arg Ser Met Ala Asn Leu
35 40 45

Thr Phe Lys Gln Arg Arg Asp Ala Pro Pro Glu Gly Pro Ser Ala Ala
50 55 60

Lys Pro Lys Lys Glu Ala Ser Gln Lys Gln Lys Gly Gly Gly Gln Gly
65 70 75 80

Lys Lys Lys Lys Asn Gln Gly Lys Lys Lys Ala Lys Thr Gly Pro Pro
85 90 95

Asn Pro Lys Ala Gln Asn Gly Asn Lys Lys Lys Thr Asn Lys Lys Pro
100 105 110

Gly Lys Arg Gln Arg Met Val Met Lys Leu Glu Ser Asp Lys Thr Phe
115 120 125

Pro Ile Met Leu Glu Gly Lys Ile Asn Gly Tyr Ala Cys Val Val Gly
130 135 140

Gly Lys Leu Phe Arg Pro Met His Val Glu Gly Lys Ile Asp Asn Asp
145 150 155 160

```
Val Leu Ala Ala Leu Lys Thr Lys Lys Ala Ser Lys Tyr Asp Leu Glu
                165                 170                 175

Tyr Ala Asp Val Pro Gln Asn Met Arg Ala Asp Thr Phe Lys Tyr Thr
            180                 185                 190

His Glu Lys Pro Gln Gly Tyr Tyr Ser Trp His His Gly Ala Val Gln
        195                 200                 205

Tyr Glu Asn Gly Arg Phe Thr Val Pro Lys Gly Val Gly Ala Lys Gly
    210                 215                 220

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

Val Leu Gly Gly Val Asn Glu Gly Ser Arg Thr Ala Leu Ser Val Val
                245                 250                 255

Met Trp Asn Glu Lys Gly Val Thr Val Lys Tyr Thr Pro Glu Asn Cys
            260                 265                 270

Glu Gln Trp Ser Leu Val Thr Thr Met Cys Leu Leu Ala Asn Val Thr
        275                 280                 285

Phe Pro Cys Ala Gln Pro Pro Ile Cys Tyr Asp Arg Lys Pro Ala Glu
    290                 295                 300

Thr Leu Ala Met Leu Ser Val Asn Val Asp Asn Pro Gly Tyr Asp Glu
305                 310                 315                 320

Leu Leu Glu Ala Ala Val Lys Cys Pro Gly Arg Lys Arg Arg Ser Thr
                325                 330                 335

Glu Glu Leu Phe Asn Glu Tyr Lys Leu Thr Arg Pro Tyr Met Ala Arg
            340                 345                 350

Cys Ile Arg Cys Ala Val Gly Ser Cys His Ser Pro Ile Ala Ile Glu
        355                 360                 365

Ala Val Lys Ser Asp Gly His Asp Gly Tyr Val Arg Leu Gln Thr Ser
    370                 375                 380

Ser Gln Tyr Gly Leu Asp Ser Ser Gly Asn Leu Lys Gly Arg Thr Met
385                 390                 395                 400

Arg Tyr Asp Met His Gly Thr Ile Lys Glu Ile Pro Leu His Gln Val
                405                 410                 415

Ser Leu Tyr Thr Ser Arg Pro Cys His Ile Val Asp Gly His Gly Tyr
            420                 425                 430

Phe Leu Leu Ala Arg Cys Pro Ala Gly Asp Ser Ile Thr Met Glu Phe
        435                 440                 445
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Lys Lys Asp Ser Val Arg His Ser Cys Ser Val Pro Tyr Glu Val Lys
450 455 460

Phe Asn Pro Val Gly Arg Glu Leu Tyr Thr His Pro Pro Glu His Gly
465 470 475 480

Val Glu Gln Ala Cys Gln Val Tyr Ala His Asp Ala Gln Asn Arg Gly
485 490 495

Ala Tyr Val Glu Met His Leu Pro Gly Ser Glu Val Asp Ser Ser Leu
500 505 510

Val Ser Leu Ser Gly Ser Ser Val Thr Val Thr Pro Pro Asp Gly Thr
515 520 525

Ser Ala Leu Val Glu Cys Glu Cys Gly Gly Thr Lys Ile Ser Glu Thr
530 535 540

Ile Asn Lys Thr Lys Gln Phe Ser Gln Cys Thr Lys Lys Glu Gln Cys
545 550 555 560

Arg Ala Tyr Arg Leu Gln Asn Asp Lys Trp Val Tyr Asn Ser Asp Lys
565 570 575

Leu Pro Lys Ala Ala Gly Ala Thr Leu Lys Gly Lys Leu His Val Pro
580 585 590

Phe Leu Leu Ala Asp Gly Lys Cys Thr Val Pro Leu Ala Pro Glu Pro
595 600 605

Met Ile Thr Phe Gly Phe Arg Ser Val Ser Leu Lys Leu His Pro Lys
610 615 620

Asn Pro Thr Tyr Leu Ile Thr Arg Gln Leu Ala Asp Glu Pro His Tyr
625 630 635 640

Thr His Glu Leu Ile Ser Glu Pro Ala Val Arg Asn Phe Thr Val Thr
645 650 655

Glu Lys Gly Trp Glu Phe Val Trp Gly Asn His Pro Pro Lys Arg Phe
660 665 670

Trp Ala Gln Glu Thr Ala Pro Gly Asn Pro His Gly Leu Pro His Glu
675 680 685

Val Ile Thr His Tyr Tyr His Arg Tyr Pro Met Ser Thr Ile Leu Gly
690 695 700

Leu Ser Ile Cys Ala Ala Ile Ala Thr Val Ser Val Ala Ala Ser Thr
705 710 715 720

Trp Leu Phe Cys Arg Ser Arg Val Ala Cys Leu Thr Pro Tyr Arg Leu
725 730 735

Thr Pro Asn Ala Arg Ile Pro Phe Cys Leu Ala Val Leu Cys Cys Ala
740 745 750

Arg Thr Ala Arg Ala Glu Thr Thr Trp Glu Ser Leu Asp His Leu Trp
755 760 765

Asn Asn Asn Gln Gln Met Phe Trp Ile Gln Leu Leu Ile Pro Leu Ala
770 775 780

Ala Leu Ile Val Val Thr Arg Leu Leu Arg Cys Val Cys Cys Val Val
785 790 795 800

Pro Phe Leu Val Met Ala Gly Ala Ala Gly Ala Gly Ala Tyr Glu His
805 810 815

Ala Thr Thr Met Pro Ser Gln Ala Gly Ile Ser Tyr Asn Thr Ile Val
820 825 830

Asn Arg Ala Gly Tyr Ala Pro Leu Pro Ile Ser Ile Thr Pro Thr Lys
835 840 845

Ile Lys Leu Ile Pro Thr Val Asn Leu Glu Tyr Val Thr Cys His Tyr
850 855 860

Lys Thr Gly Met Asp Ser Pro Ala Ile Lys Cys Cys Gly Ser Gln Glu
865 870 875 880

Cys Thr Pro Thr Tyr Arg Pro Asp Glu Gln Cys Lys Val Phe Thr Gly
885 890 895

Val Tyr Pro Phe Met Trp Gly Gly Ala Tyr Cys Phe Cys Asp Thr Glu
900 905 910

Asn Thr Gln Val Ser Lys Ala Tyr Val Met Lys Ser Asp Asp Cys Leu
915 920 925

Ala Asp His Ala Glu Ala Tyr Lys Ala His Thr Ala Ser Val Gln Ala
930 935 940

Phe Leu Asn Ile Thr Val Gly Glu His Ser Ile Val Thr Thr Val Tyr
945 950 955 960

Val Asn Gly Glu Thr Pro Val Asn Phe Asn Gly Val Lys Ile Thr Ala
965 970 975

Gly Pro Leu Ser Thr Ala Trp Thr Pro Phe Asp Arg Lys Ile Val Gln
980 985 990

Tyr Ala Gly Glu Ile Tyr Asn Tyr Asp Phe Pro Glu Tyr Gly Ala Gly
995 1000 1005

Gln Pro Gly Ala Phe Gly Asp Ile Gln Ser Arg Thr Val Ser Ser
1010 1015 1020

Ser Asp Leu Tyr Ala Asn Thr Asn Leu Val Leu Gln Arg Pro Lys
1025 1030 1035

Ala Gly Ala Ile His Val Pro Tyr Thr Gln Ala Pro Ser Gly Phe
1040 1045 1050

Glu Gln Trp Lys Lys Asp Lys Ala Pro Ser Leu Lys Phe Thr Ala
1055 1060 1065

Pro Phe Gly Cys Glu Ile Tyr Thr Asn Pro Ile Arg Ala Glu Asn
1070 1075 1080

Cys Ala Val Gly Ser Ile Pro Leu Ala Phe Asp Ile Pro Asp Ala
1085 1090 1095

Leu Phe Thr Arg Val Ser Glu Thr Pro Thr Leu Ser Ala Ala Glu
1100 1105 1110

Cys Thr Leu Asn Glu Cys Val Tyr Ser Ser Asp Phe Gly Gly Ile
1115 1120 1125

Ala Thr Val Lys Tyr Ser Ala Ser Lys Ser Gly Lys Cys Ala Val
1130 1135 1140

His Val Pro Ser Gly Thr Ala Thr Leu Lys Glu Ala Ala Val Glu
1145 1150 1155

Leu Thr Glu Gln Gly Ser Ala Thr Ile His Phe Ser Thr Ala Asn
1160 1165 1170

Ile His Pro Glu Phe Arg Leu Gln Ile Cys Thr Ser Tyr Val Thr
1175 1180 1185

Cys Lys Gly Asp Cys His Pro Pro Lys Asp His Ile Val Thr His
1190 1195 1200

Pro Gln Tyr His Ala Gln Thr Phe Thr Ala Ala Val Ser Lys Thr
1205 1210 1215

Ala Trp Thr Trp Leu Thr Ser Leu Leu Gly Gly Ser Ala Val Ile
1220 1225 1230

Ile Ile Ile Gly Leu Val Leu Ala Thr Ile Val Ala Met Tyr Val
1235 1240 1245

Leu Thr Asn Gln Lys His Asn
1250 1255

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<211> 1405
<212> PRT
<213> Artificial

<220>

<223> CHIKV+TNFalpha

<400> 4

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Met Glu Phe Ile Pro Thr Gln Thr Phe Tyr Asn Arg Arg Tyr Gln Pro
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Arg Pro Trp Ala Pro Arg Pro Thr Ile Gln Val Ile Arg Pro Arg Pro
            20                  25                  30

Arg Pro Gln Arg Gln Ala Gly Gln Leu Ala Gln Leu Ile Ser Ala Val
        35                  40                  45

Asn Lys Leu Thr Met Arg Ala Val Pro Gln Gln Lys Pro Arg Arg Asn
    50                  55                  60

Arg Lys Asn Lys Lys Gln Arg Gln Lys Lys Gln Ala Pro Gln Asn Asp
65                  70                  75                  80

Pro Lys Gln Lys Lys Gln Pro Pro Gln Lys Lys Pro Ala Gln Lys Lys
                85                  90                  95

Lys Lys Pro Gly Arg Arg Glu Arg Met Cys Met Lys Ile Glu Asn Asp
            100                 105                 110

Cys Ile Phe Glu Val Lys His Glu Gly Lys Val Met Gly Tyr Ala Cys
        115                 120                 125

Leu Val Gly Asp Lys Val Met Lys Pro Ala His Val Lys Gly Thr Ile
    130                 135                 140

Asp Asn Ala Asp Leu Ala Lys Leu Ala Phe Lys Arg Ser Ser Lys Tyr
145                 150                 155                 160

Asp Leu Glu Cys Ala Gln Ile Pro Val His Met Lys Ser Asp Ala Ser
                165                 170                 175

Lys Phe Thr His Glu Lys Pro Glu Gly Tyr Tyr Asn Trp His His Gly
            180                 185                 190

Ala Val Gln Tyr Ser Gly Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly
        195                 200                 205

Lys Pro Gly Asp Ser Gly Arg Pro Ile Phe Asp Asn Lys Gly Arg Val
    210                 215                 220

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

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

Gly Ala Glu Glu Trp Ser Leu Ala Leu Pro Val Leu Cys Leu Leu Ala
            260                 265                 270
```

```
Asn Thr Thr Phe Pro Cys Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr
        275                 280                 285

Glu Lys Glu Pro Glu Ser Thr Leu Arg Met Leu Glu Asp Asn Val Met
    290                 295                 300

Arg Pro Gly Tyr Tyr Gln Leu Leu Lys Ala Ser Leu Thr Cys Ser Pro
305                 310                 315                 320

His Arg Gln Arg Arg Ser Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala
                325                 330                 335

Thr Arg Pro Tyr Leu Ala His Cys Pro Asp Cys Gly Glu Gly His Ser
            340                 345                 350

Cys His Ser Pro Ile Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp
        355                 360                 365

Gly Thr Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp
    370                 375                 380

Asp Ser His Asp Trp Thr Lys Leu Arg Tyr Met Asp Ser His Thr Pro
385                 390                 395                 400

Ala Asp Ala Glu Arg Ala Gly Leu Leu Val Arg Thr Ser Ala Pro Cys
                405                 410                 415

Thr Ile Thr Gly Thr Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys
            420                 425                 430

Gly Glu Thr Leu Thr Val Gly Phe Thr Asp Ser Arg Lys Ile Ser His
        435                 440                 445

Thr Cys Thr His Pro Phe His His Glu Pro Pro Val Ile Gly Arg Glu
    450                 455                 460

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

Tyr Val Gln Ser Thr Ala Ala Thr Ala Glu Glu Ile Glu Val His Met
                485                 490                 495

Pro Pro Asp Thr Pro Asp Arg Thr Leu Met Thr Gln Gln Ser Gly Asn
            500                 505                 510

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

Val Ala Asn Pro Gln Ala Glu Gly Gln Leu Gln Trp Leu Asn Arg Arg
    530                 535                 540

Ala Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu
545                 550                 555                 560
```

```
Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe
                565                 570                 575

Lys Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile
            580                 585                 590

Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala
        595                 600                 605

Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Lys
    610                 615                 620

Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys
625                 630                 635                 640

Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Asp Phe
                645                 650                 655

Ala Glu Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu Thr Arg Gly
            660                 665                 670

Gly Ser Gly Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys Gly Gly Ser
        675                 680                 685

Asn Glu Gly Leu Thr Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Ile
    690                 695                 700

Asp Gln Cys His Ala Ala Val Thr Asn His Lys Asn Trp Gln Tyr Asn
705                 710                 715                 720

Ser Pro Leu Val Pro Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly Lys
                725                 730                 735

Ile His Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys
            740                 745                 750

Ala Arg Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val Thr Met Leu
        755                 760                 765

Leu Tyr Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Gln
    770                 775                 780

Glu Pro Asn Tyr His Glu Glu Trp Val Thr His Lys Lys Glu Val Thr
785                 790                 795                 800

Leu Thr Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu
                805                 810                 815

Pro Tyr Lys Tyr Trp Pro Gln Met Ser Thr Asn Gly Thr Ala His Gly
            820                 825                 830

His Pro His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met
        835                 840                 845
```

```
Thr Val Val Ile Val Ser Val Ala Ser Phe Val Leu Leu Ser Met Val
    850                 855                 860

Gly Thr Ala Val Gly Met Cys Val Cys Ala Arg Arg Arg Cys Ile Thr
865                 870                 875                 880

Pro Tyr Glu Leu Thr Pro Gly Ala Thr Val Pro Phe Leu Leu Ser Leu
                885                 890                 895

Leu Cys Cys Val Arg Thr Thr Lys Ala Ala Thr Tyr Tyr Glu Ala Ala
            900                 905                 910

Ala Tyr Leu Trp Asn Glu Gln Gln Pro Leu Phe Trp Leu Gln Ala Leu
        915                 920                 925

Ile Pro Leu Ala Ala Leu Ile Val Leu Cys Asn Cys Leu Lys Leu Leu
    930                 935                 940

Pro Cys Cys Cys Lys Thr Leu Ala Phe Leu Ala Val Met Ser Ile Gly
945                 950                 955                 960

Ala His Thr Val Ser Ala Tyr Glu His Val Thr Val Ile Pro Asn Thr
                965                 970                 975

Val Gly Val Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly Tyr Ser Pro
            980                 985                 990

Met Val Leu Glu Met Glu Leu Gln  Ser Val Thr Leu Glu  Pro Thr Leu
        995                 1000                1005

Ser Leu  Asp Tyr Ile Thr Cys  Glu Tyr Lys Thr Val  Ile Pro Ser
    1010                1015                1020

Pro Tyr  Val Lys Cys Cys Gly  Thr Ala Glu Cys Lys  Asp Lys Ser
    1025                1030                1035

Leu Pro  Asp Tyr Ser Cys Lys  Val Phe Thr Gly Val  Tyr Pro Phe
    1040                1045                1050

Met Trp  Gly Gly Ala Tyr Cys  Phe Cys Asp Ala Glu  Asn Thr Gln
    1055                1060                1065

Leu Ser  Glu Ala His Val Glu  Lys Ser Glu Ser Cys  Lys Thr Glu
    1070                1075                1080

Phe Ala  Ser Ala Tyr Arg Ala  His Thr Ala Ser Ala  Ser Ala Lys
    1085                1090                1095

Leu Arg  Val Leu Tyr Gln Gly  Asn Asn Ile Thr Val  Ala Ala Tyr
    1100                1105                1110

Ala Asn  Gly Asp His Ala Val  Thr Val Lys Asp Ala  Lys Phe Val
    1115                1120                1125
```

```
Val Gly  Pro Met Ser Ser Ala  Trp Thr Pro Phe Asp  Asn Lys Ile
    1130                 1135                 1140

Val Val  Tyr Lys Gly Asp Val  Tyr Asn Met Asp Tyr  Pro Pro Phe
    1145                 1150                 1155

Gly Ala  Gly Arg Pro Gly Gln  Phe Gly Asp Ile Gln  Ser Arg Thr
    1160                 1165                 1170

Pro Glu  Ser Lys Asp Val Tyr  Ala Asn Thr Gln Leu  Val Leu Gln
    1175                 1180                 1185

Arg Pro  Ala Ala Gly Thr Val  His Val Pro Tyr Ser  Gln Ala Pro
    1190                 1195                 1200

Ser Gly  Phe Lys Tyr Trp Leu  Lys Glu Arg Gly Ala  Ser Leu Gln
    1205                 1210                 1215

His Thr  Ala Pro Phe Gly Cys  Gln Ile Ala Thr Asn  Pro Val Arg
    1220                 1225                 1230

Ala Val  Asn Cys Ala Val Gly  Asn Ile Pro Ile Ser  Ile Asp Ile
    1235                 1240                 1245

Pro Asp  Ala Ala Phe Thr Arg  Val Val Asp Ala Pro  Ser Val Thr
    1250                 1255                 1260

Asp Met  Ser Cys Glu Val Pro  Ala Cys Thr His Ser  Ser Asp Phe
    1265                 1270                 1275

Gly Gly  Val Ala Ile Ile Lys  Tyr Thr Ala Ser Lys  Lys Gly Lys
    1280                 1285                 1290

Cys Ala  Val His Ser Met Thr  Asn Ala Val Thr Ile  Arg Glu Ala
    1295                 1300                 1305

Asp Val  Glu Val Glu Gly Asn  Ser Gln Leu Gln Ile  Ser Phe Ser
    1310                 1315                 1320

Thr Ala  Leu Ala Ser Ala Glu  Phe Arg Val Gln Val  Cys Ser Thr
    1325                 1330                 1335

Gln Val  His Cys Ala Ala Ala  Cys His Pro Pro Lys  Asp His Ile
    1340                 1345                 1350

Val Asn  Tyr Pro Ala Ser His  Thr Thr Leu Gly Val  Gln Asp Ile
    1355                 1360                 1365

Ser Thr  Thr Ala Met Ser Trp  Val Gln Lys Ile Thr  Gly Gly Val
    1370                 1375                 1380

Gly Leu  Ile Val Ala Val Ala  Ala Leu Ile Leu Ile  Val Val Leu
    1385                 1390                 1395
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Cys Val Ser Phe Ser Arg His
1400 1405

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Met Glu Phe Ile Pro Thr Gln Thr Phe Tyr Asn Arg Arg Tyr Gln Pro
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Arg Pro Trp Ala Pro Arg Pro Thr Ile Gln Val Ile Arg Pro Arg Pro
20 25 30

Arg Pro Gln Arg Gln Ala Gly Gln Leu Ala Gln Leu Ile Ser Ala Val
35 40 45

Asn Lys Leu Thr Met Arg Ala Val Pro Gln Gln Lys Pro Arg Arg Asn
50 55 60

Arg Lys Asn Lys Lys Gln Arg Gln Lys Lys Gln Ala Pro Gln Asn Asp
65 70 75 80

Pro Lys Gln Lys Lys Gln Pro Pro Gln Lys Lys Pro Ala Gln Lys Lys
85 90 95

Lys Lys Pro Gly Arg Arg Glu Arg Met Cys Met Lys Ile Glu Asn Asp
100 105 110

Cys Ile Phe Glu Val Lys His Glu Gly Lys Val Met Gly Tyr Ala Cys
115 120 125

Leu Val Gly Asp Lys Val Met Lys Pro Ala His Val Lys Gly Thr Ile
130 135 140

Asp Asn Ala Asp Leu Ala Lys Leu Ala Phe Lys Arg Ser Ser Lys Tyr
145 150 155 160

Asp Leu Glu Cys Ala Gln Ile Pro Val His Met Lys Ser Asp Ala Ser
165 170 175

Lys Phe Thr His Glu Lys Pro Glu Gly Tyr Tyr Asn Trp His His Gly
180 185 190

Ala Val Gln Tyr Ser Gly Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly
195 200 205

Lys Pro Gly Asp Ser Gly Arg Pro Ile Phe Asp Asn Lys Gly Arg Val

```
    210                 215                 220

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

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

Gly Ala Glu Glu Trp Ser Leu Ala Leu Pro Val Leu Cys Leu Leu Ala
            260                 265                 270

Asn Thr Thr Phe Pro Cys Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr
        275                 280                 285

Glu Lys Glu Pro Glu Ser Thr Leu Arg Met Leu Glu Asp Asn Val Met
    290                 295                 300

Arg Pro Gly Tyr Tyr Gln Leu Leu Lys Ala Ser Leu Thr Cys Ser Pro
305                 310                 315                 320

His Arg Gln Arg Arg Ser Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala
                325                 330                 335

Thr Arg Pro Tyr Leu Ala His Cys Pro Asp Cys Gly Glu Gly His Ser
            340                 345                 350

Cys His Ser Pro Ile Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp
        355                 360                 365

Gly Thr Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp
    370                 375                 380

Asp Ser His Asp Trp Thr Lys Leu Arg Tyr Met Asp Ser His Thr Pro
385                 390                 395                 400

Ala Asp Ala Glu Arg Ala Gly Leu Leu Val Arg Thr Ser Ala Pro Cys
                405                 410                 415

Thr Ile Thr Gly Thr Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys
            420                 425                 430

Gly Glu Thr Leu Thr Val Gly Phe Thr Asp Ser Arg Lys Ile Ser His
        435                 440                 445

Thr Cys Thr His Pro Phe His His Glu Pro Pro Val Ile Gly Arg Glu
    450                 455                 460

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

Tyr Val Gln Ser Thr Ala Ala Thr Ala Glu Glu Ile Glu Val His Met
                485                 490                 495

Pro Pro Asp Thr Pro Asp Arg Thr Leu Met Thr Gln Gln Ser Gly Asn
```

```
            500                 505                 510

Val Lys Ile Thr Val Asn Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys
        515                 520                 525

Gly Gly Ser Gly Gly Ile Tyr Asn Cys Glu Pro Ala Asn Pro Ser Glu
    530                 535                 540

Lys Asn Ser Pro Ser Thr Gln Tyr Cys Tyr Ser Ile Gln Gly Ser Asn
545                 550                 555                 560

Glu Gly Leu Thr Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Ile Asp
                565                 570                 575

Gln Cys His Ala Ala Val Thr Asn His Lys Asn Trp Gln Tyr Asn Ser
            580                 585                 590

Pro Leu Val Pro Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly Lys Ile
        595                 600                 605

His Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala
    610                 615                 620

Arg Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val Thr Met Leu Leu
625                 630                 635                 640

Tyr Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Gln Glu
                645                 650                 655

Pro Asn Tyr His Glu Glu Trp Val Thr His Lys Lys Glu Val Thr Leu
            660                 665                 670

Thr Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro
        675                 680                 685

Tyr Lys Tyr Trp Pro Gln Met Ser Thr Asn Gly Thr Ala His Gly His
    690                 695                 700

Pro His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr
705                 710                 715                 720

Val Val Ile Val Ser Val Ala Ser Phe Val Leu Leu Ser Met Val Gly
                725                 730                 735

Thr Ala Val Gly Met Cys Val Cys Ala Arg Arg Arg Cys Ile Thr Pro
            740                 745                 750

Tyr Glu Leu Thr Pro Gly Ala Thr Val Pro Phe Leu Leu Ser Leu Leu
        755                 760                 765

Cys Cys Val Arg Thr Thr Lys Ala Ala Thr Tyr Tyr Glu Ala Ala Ala
    770                 775                 780

Tyr Leu Trp Asn Glu Gln Gln Pro Leu Phe Trp Leu Gln Ala Leu Ile
```

785 790 795 800

Pro Leu Ala Ala Leu Ile Val Leu Cys Asn Cys Leu Lys Leu Leu Pro
805 810 815

Cys Cys Cys Lys Thr Leu Ala Phe Leu Ala Val Met Ser Ile Gly Ala
820 825 830

His Thr Val Ser Ala Tyr Glu His Val Thr Val Ile Pro Asn Thr Val
835 840 845

Gly Val Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly Tyr Ser Pro Met
850 855 860

Val Leu Glu Met Glu Leu Gln Ser Val Thr Leu Glu Pro Thr Leu Ser
865 870 875 880

Leu Asp Tyr Ile Thr Cys Glu Tyr Lys Thr Val Ile Pro Ser Pro Tyr
885 890 895

Val Lys Cys Cys Gly Thr Ala Glu Cys Lys Asp Lys Ser Leu Pro Asp
900 905 910

Tyr Ser Cys Lys Val Phe Thr Gly Val Tyr Pro Phe Met Trp Gly Gly
915 920 925

Ala Tyr Cys Phe Cys Asp Ala Glu Asn Thr Gln Leu Ser Glu Ala His
930 935 940

Val Glu Lys Ser Glu Ser Cys Lys Thr Glu Phe Ala Ser Ala Tyr Arg
945 950 955 960

Ala His Thr Ala Ser Ala Ser Ala Lys Leu Arg Val Leu Tyr Gln Gly
965 970 975

Asn Asn Ile Thr Val Ala Ala Tyr Ala Asn Gly Asp His Ala Val Thr
980 985 990

Val Lys Asp Ala Lys Phe Val Val Gly Pro Met Ser Ser Ala Trp Thr
995 1000 1005

Pro Phe Asp Asn Lys Ile Val Val Tyr Lys Gly Asp Val Tyr Asn
1010 1015 1020

Met Asp Tyr Pro Pro Phe Gly Ala Gly Arg Pro Gly Gln Phe Gly
1025 1030 1035

Asp Ile Gln Ser Arg Thr Pro Glu Ser Lys Asp Val Tyr Ala Asn
1040 1045 1050

Thr Gln Leu Val Leu Gln Arg Pro Ala Ala Gly Thr Val His Val
1055 1060 1065

Pro Tyr Ser Gln Ala Pro Ser Gly Phe Lys Tyr Trp Leu Lys Glu

```
    1070                1075                1080

Arg Gly  Ala Ser Leu Gln His  Thr Ala Pro Phe Gly  Cys Gln Ile
    1085                1090                1095

Ala Thr  Asn Pro Val Arg Ala  Val Asn Cys Ala Val  Gly Asn Ile
    1100                1105                1110

Pro Ile  Ser Ile Asp Ile Pro  Asp Ala Ala Phe Thr  Arg Val Val
    1115                1120                1125

Asp Ala  Pro Ser Val Thr Asp  Met Ser Cys Glu Val  Pro Ala Cys
    1130                1135                1140

Thr His  Ser Ser Asp Phe Gly  Gly Val Ala Ile Ile  Lys Tyr Thr
    1145                1150                1155

Ala Ser  Lys Lys Gly Lys Cys  Ala Val His Ser Met  Thr Asn Ala
    1160                1165                1170

Val Thr  Ile Arg Glu Ala Asp  Val Glu Val Glu Gly  Asn Ser Gln
    1175                1180                1185

Leu Gln  Ile Ser Phe Ser Thr  Ala Leu Ala Ser Ala  Glu Phe Arg
    1190                1195                1200

Val Gln  Val Cys Ser Thr Gln  Val His Cys Ala Ala  Ala Cys His
    1205                1210                1215

Pro Pro  Lys Asp His Ile Val  Asn Tyr Pro Ala Ser  His Thr Thr
    1220                1225                1230

Leu Gly  Val Gln Asp Ile Ser  Thr Thr Ala Met Ser  Trp Val Gln
    1235                1240                1245

Lys Ile  Thr Gly Gly Val Gly  Leu Ile Val Ala Val  Ala Ala Leu
    1250                1255                1260

Ile Leu  Ile Val Val Leu Cys  Val Ser Phe Ser Arg  His
    1265                1270                1275

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<223>  VEEV+TNFalpha

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Met Phe Pro Phe Gln Pro Met Tyr Pro Met Gln Pro Met Pro Tyr Arg
1               5                  10                  15
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Asn Pro Phe Ala Ala Pro Arg Arg Pro Trp Phe Pro Arg Thr Asp Pro
20 25 30

Phe Leu Ala Met Gln Val Gln Glu Leu Thr Arg Ser Met Ala Asn Leu
35 40 45

Thr Phe Lys Gln Arg Arg Asp Ala Pro Pro Glu Gly Pro Ser Ala Asn
50 55 60

Lys Pro Lys Lys Glu Ala Ser Gln Lys Gln Lys Gly Gly Gly Gln Gly
65 70 75 80

Lys Lys Lys Lys Asn Gln Gly Lys Lys Lys Ala Lys Thr Gly Pro Pro
85 90 95

Asn Pro Lys Ala Gln Asn Gly Asn Lys Lys Lys Thr Asn Lys Lys Pro
100 105 110

Gly Lys Arg Gln Arg Met Val Met Lys Leu Glu Ser Asp Lys Thr Phe
115 120 125

Pro Ile Met Leu Glu Gly Lys Ile Asn Gly Tyr Ala Cys Val Val Gly
130 135 140

Gly Lys Leu Phe Arg Pro Met His Val Glu Gly Lys Ile Asp Asn Asp
145 150 155 160

Val Leu Ala Ala Leu Lys Thr Lys Lys Ala Ser Lys Tyr Asp Leu Glu
165 170 175

Tyr Ala Asp Val Pro Gln Asn Met Arg Ala Asp Thr Phe Lys Tyr Thr
180 185 190

His Glu Lys Pro Gln Gly Tyr Tyr Ser Trp His His Gly Ala Val Gln
195 200 205

Tyr Glu Asn Gly Arg Phe Thr Val Pro Lys Gly Val Gly Ala Lys Gly
210 215 220

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

Val Leu Gly Gly Val Asn Glu Gly Ser Arg Thr Ala Leu Ser Val Val
245 250 255

Met Trp Asn Glu Lys Gly Val Thr Val Lys Tyr Thr Pro Glu Asn Cys
260 265 270

Glu Gln Trp Ser Leu Val Thr Thr Met Cys Leu Leu Ala Asn Val Thr
275 280 285

Phe Pro Cys Ala Gln Pro Pro Ile Cys Tyr Asp Arg Lys Pro Ala Glu
290 295 300

```
Thr Leu Ala Met Leu Ser Val Asn Val Asp Asn Pro Gly Tyr Asp Glu
305                 310                 315                 320

Leu Leu Glu Ala Ala Val Lys Cys Pro Gly Arg Lys Arg Arg Ser Thr
                325                 330                 335

Glu Glu Leu Phe Asn Glu Tyr Lys Leu Thr Arg Pro Tyr Met Ala Arg
            340                 345                 350

Cys Ile Arg Cys Ala Val Gly Ser Cys His Ser Pro Ile Ala Ile Glu
        355                 360                 365

Ala Val Lys Ser Asp Gly His Asp Gly Tyr Val Arg Leu Gln Thr Ser
    370                 375                 380

Ser Gln Tyr Gly Leu Asp Ser Ser Gly Asn Leu Lys Gly Arg Thr Met
385                 390                 395                 400

Arg Tyr Asp Met His Gly Thr Ile Lys Glu Ile Pro Leu His Gln Val
                405                 410                 415

Ser Leu Tyr Thr Ser Arg Pro Cys His Ile Val Asp Gly His Gly Tyr
            420                 425                 430

Phe Leu Leu Ala Arg Cys Pro Ala Gly Asp Ser Ile Thr Met Glu Phe
        435                 440                 445

Lys Lys Asp Ser Val Arg His Ser Cys Ser Val Pro Tyr Glu Val Lys
    450                 455                 460

Phe Asn Pro Val Gly Arg Glu Leu Tyr Thr His Pro Pro Glu His Gly
465                 470                 475                 480

Val Glu Gln Ala Cys Gln Val Tyr Ala His Asp Ala Gln Asn Arg Gly
                485                 490                 495

Ala Tyr Val Glu Met His Leu Pro Gly Ser Glu Val Asp Ser Ser Leu
            500                 505                 510

Val Ser Leu Ser Gly Ser Ser Gly Gly Lys Pro Val Ala His Val Val
        515                 520                 525

Ala Asn Pro Gln Ala Glu Gly Gln Leu Gln Trp Leu Asn Arg Arg Ala
    530                 535                 540

Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu Val
545                 550                 555                 560

Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe Lys
                565                 570                 575

Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile Ser
            580                 585                 590
```

```
Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala Ile
        595                 600                 605

Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Lys Pro
    610                 615                 620

Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys Gly
625                 630                 635                 640

Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Asp Phe Ala
                645                 650                 655

Glu Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu Thr Arg Gly Gly
            660                 665                 670

Ser Ser Val Thr Val Thr Pro Pro Asp Gly Thr Ser Ala Leu Val Glu
        675                 680                 685

Cys Glu Cys Gly Gly Thr Lys Ile Ser Glu Thr Ile Asn Lys Thr Lys
    690                 695                 700

Gln Phe Ser Gln Cys Thr Lys Lys Glu Gln Cys Arg Ala Tyr Arg Leu
705                 710                 715                 720

Gln Asn Asp Lys Trp Val Tyr Asn Ser Asp Lys Leu Pro Lys Ala Ala
                725                 730                 735

Gly Ala Thr Leu Lys Gly Lys Leu His Val Pro Phe Leu Leu Ala Asp
            740                 745                 750

Gly Lys Cys Thr Val Pro Leu Ala Pro Glu Pro Met Ile Thr Phe Gly
        755                 760                 765

Phe Arg Ser Val Ser Leu Lys Leu His Pro Lys Asn Pro Thr Tyr Leu
    770                 775                 780

Ile Thr Arg Gln Leu Ala Asp Glu Pro His Tyr Thr His Glu Leu Ile
785                 790                 795                 800

Ser Glu Pro Ala Val Arg Asn Phe Thr Val Thr Glu Lys Gly Trp Glu
                805                 810                 815

Phe Val Trp Gly Asn His Pro Pro Lys Arg Phe Trp Ala Gln Glu Thr
            820                 825                 830

Ala Pro Gly Asn Pro His Gly Leu Pro His Glu Val Ile Thr His Tyr
        835                 840                 845

Tyr His Arg Tyr Pro Met Ser Thr Ile Leu Gly Leu Ser Ile Cys Ala
    850                 855                 860

Ala Ile Ala Thr Val Ser Val Ala Ala Ser Thr Trp Leu Phe Cys Arg
865                 870                 875                 880
```

```
Ser Arg Val Ala Cys Leu Thr Pro Tyr Arg Leu Thr Pro Asn Ala Arg
                885                 890                 895

Ile Pro Phe Cys Leu Ala Val Leu Cys Cys Ala Arg Thr Ala Arg Ala
            900                 905                 910

Glu Thr Thr Trp Glu Ser Leu Asp His Leu Trp Asn Asn Asn Gln Gln
        915                 920                 925

Met Phe Trp Ile Gln Leu Leu Ile Pro Leu Ala Ala Leu Ile Val Val
    930                 935                 940

Thr Arg Leu Leu Arg Cys Val Cys Cys Val Val Pro Phe Leu Val Met
945                 950                 955                 960

Ala Gly Ala Ala Gly Ala Gly Ala Tyr Glu His Ala Thr Thr Met Pro
                965                 970                 975

Ser Gln Ala Gly Ile Ser Tyr Asn Thr Ile Val Asn Arg Ala Gly Tyr
            980                 985                 990

Ala Pro Leu Pro Ile Ser Ile Thr  Pro Thr Lys Ile Lys  Leu Ile Pro
        995                 1000                1005

Thr Val  Asn Leu Glu Tyr Val  Thr Cys His Tyr Lys  Thr Gly Met
    1010                1015                1020

Asp Ser  Pro Ala Ile Lys Cys  Cys Gly Ser Gln Glu  Cys Thr Pro
    1025                1030                1035

Thr Tyr  Arg Pro Asp Glu Gln  Cys Lys Val Phe Thr  Gly Val Tyr
    1040                1045                1050

Pro Phe  Met Trp Gly Gly Ala  Tyr Cys Phe Cys Asp  Thr Glu Asn
    1055                1060                1065

Thr Gln  Val Ser Lys Ala Tyr  Val Met Lys Ser Asp  Asp Cys Leu
    1070                1075                1080

Ala Asp  His Ala Glu Ala Tyr  Lys Ala His Thr Ala  Ser Val Gln
    1085                1090                1095

Ala Phe  Leu Asn Ile Thr Val  Gly Glu His Ser Ile  Val Thr Thr
    1100                1105                1110

Val Tyr  Val Asn Gly Glu Thr  Pro Val Asn Phe Asn  Gly Val Lys
    1115                1120                1125

Ile Thr  Ala Gly Pro Leu Ser  Thr Ala Trp Thr Pro  Phe Asp Arg
    1130                1135                1140

Lys Ile  Val Gln Tyr Ala Gly  Glu Ile Tyr Asn Tyr  Asp Phe Pro
    1145                1150                1155
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Glu Tyr Gly Ala Gly Gln Pro Gly Ala Phe Gly Asp Ile Gln Ser
1160 1165 1170

Arg Thr Val Ser Ser Ser Asp Leu Tyr Ala Asn Thr Asn Leu Val
1175 1180 1185

Leu Gln Arg Pro Lys Ala Gly Ala Ile His Val Pro Tyr Thr Gln
1190 1195 1200

Ala Pro Ser Gly Phe Glu Gln Trp Lys Lys Asp Lys Ala Pro Ser
1205 1210 1215

Leu Lys Phe Thr Ala Pro Phe Gly Cys Glu Ile Tyr Thr Asn Pro
1220 1225 1230

Ile Arg Ala Glu Asn Cys Ala Val Gly Ser Ile Pro Leu Ala Phe
1235 1240 1245

Asp Ile Pro Asp Ala Leu Phe Thr Arg Val Ser Glu Thr Pro Thr
1250 1255 1260

Leu Ser Ala Ala Glu Cys Thr Leu Asn Glu Cys Val Tyr Ser Ser
1265 1270 1275

Asp Phe Gly Gly Ile Ala Thr Val Lys Tyr Ser Ala Ser Lys Ser
1280 1285 1290

Gly Lys Cys Ala Val His Val Pro Ser Gly Thr Ala Thr Leu Lys
1295 1300 1305

Glu Ala Ala Val Glu Leu Thr Glu Gln Gly Ser Ala Thr Ile His
1310 1315 1320

Phe Ser Thr Ala Asn Ile His Pro Glu Phe Arg Leu Gln Ile Cys
1325 1330 1335

Thr Ser Tyr Val Thr Cys Lys Gly Asp Cys His Pro Pro Lys Asp
1340 1345 1350

His Ile Val Thr His Pro Gln Tyr His Ala Gln Thr Phe Thr Ala
1355 1360 1365

Ala Val Ser Lys Thr Ala Trp Thr Trp Leu Thr Ser Leu Leu Gly
1370 1375 1380

Gly Ser Ala Val Ile Ile Ile Ile Gly Leu Val Leu Ala Thr Ile
1385 1390 1395

Val Ala Met Tyr Val Leu Thr Asn Gln Lys His Asn
1400 1405 1410

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<400> 7

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Asn Pro Phe Ala Ala Pro Arg Arg Pro Trp Phe Pro Arg Thr Asp Pro
            20                  25                  30

Phe Leu Ala Met Gln Val Gln Glu Leu Thr Arg Ser Met Ala Asn Leu
        35                  40                  45

Thr Phe Lys Gln Arg Arg Asp Ala Pro Pro Glu Gly Pro Ser Ala Asn
    50                  55                  60

Lys Pro Lys Lys Glu Ala Ser Gln Lys Gln Lys Gly Gly Gly Gln Gly
65                  70                  75                  80

Lys Lys Lys Lys Asn Gln Gly Lys Lys Lys Ala Lys Thr Gly Pro Pro
                85                  90                  95

Asn Pro Lys Ala Gln Asn Gly Asn Lys Lys Lys Thr Asn Lys Lys Pro
            100                 105                 110

Gly Lys Arg Gln Arg Met Val Met Lys Leu Glu Ser Asp Lys Thr Phe
        115                 120                 125

Pro Ile Met Leu Glu Gly Lys Ile Asn Gly Tyr Ala Cys Val Val Gly
    130                 135                 140

Gly Lys Leu Phe Arg Pro Met His Val Glu Gly Lys Ile Asp Asn Asp
145                 150                 155                 160

Val Leu Ala Ala Leu Lys Thr Lys Lys Ala Ser Lys Tyr Asp Leu Glu
                165                 170                 175

Tyr Ala Asp Val Pro Gln Asn Met Arg Ala Asp Thr Phe Lys Tyr Thr
            180                 185                 190

His Glu Lys Pro Gln Gly Tyr Tyr Ser Trp His His Gly Ala Val Gln
        195                 200                 205

Tyr Glu Asn Gly Arg Phe Thr Val Pro Lys Gly Val Gly Ala Lys Gly
    210                 215                 220

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

Val Leu Gly Gly Val Asn Glu Gly Ser Arg Thr Ala Leu Ser Val Val
                245                 250                 255
```

Met Trp Asn Glu Lys Gly Val Thr Val Lys Tyr Thr Pro Glu Asn Cys
260 265 270

Glu Gln Trp Ser Leu Val Thr Thr Met Cys Leu Leu Ala Asn Val Thr
275 280 285

Phe Pro Cys Ala Gln Pro Pro Ile Cys Tyr Asp Arg Lys Pro Ala Glu
290 295 300

Thr Leu Ala Met Leu Ser Val Asn Val Asp Asn Pro Gly Tyr Asp Glu
305 310 315 320

Leu Leu Glu Ala Ala Val Lys Cys Pro Gly Arg Lys Arg Arg Ser Thr
325 330 335

Glu Glu Leu Phe Asn Glu Tyr Lys Leu Thr Arg Pro Tyr Met Ala Arg
340 345 350

Cys Ile Arg Cys Ala Val Gly Ser Cys His Ser Pro Ile Ala Ile Glu
355 360 365

Ala Val Lys Ser Asp Gly His Asp Gly Tyr Val Arg Leu Gln Thr Ser
370 375 380

Ser Gln Tyr Gly Leu Asp Ser Ser Gly Asn Leu Lys Gly Arg Thr Met
385 390 395 400

Arg Tyr Asp Met His Gly Thr Ile Lys Glu Ile Pro Leu His Gln Val
405 410 415

Ser Leu Tyr Thr Ser Arg Pro Cys His Ile Val Asp Gly His Gly Tyr
420 425 430

Phe Leu Leu Ala Arg Cys Pro Ala Gly Asp Ser Ile Thr Met Glu Phe
435 440 445

Lys Lys Asp Ser Val Arg His Ser Cys Ser Val Pro Tyr Glu Val Lys
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Phe Asn Pro Val Gly Arg Glu Leu Tyr Thr His Pro Pro Glu His Gly
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Val Glu Gln Ala Cys Gln Val Tyr Ala His Asp Ala Gln Asn Arg Gly
485 490 495

Ala Tyr Val Glu Met His Leu Pro Gly Ser Glu Val Asp Ser Ser Leu
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Val Ser Leu Ser Gly Ser Ser Gly Gly Ile Tyr Asn Cys Glu Pro Ala
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Asn Pro Ser Glu Lys Asn Ser Pro Ser Thr Gln Tyr Cys Tyr Ser Ile
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Gln Gly Ser Ser Val Thr Val Thr Pro Pro Asp Gly Thr Ser Ala Leu
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Val Glu Cys Glu Cys Gly Gly Thr Lys Ile Ser Glu Thr Ile Asn Lys
565 570 575

Thr Lys Gln Phe Ser Gln Cys Thr Lys Lys Glu Gln Cys Arg Ala Tyr
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Arg Leu Gln Asn Asp Lys Trp Val Tyr Asn Ser Asp Lys Leu Pro Lys
595 600 605

Ala Ala Gly Ala Thr Leu Lys Gly Lys Leu His Val Pro Phe Leu Leu
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Ala Asp Gly Lys Cys Thr Val Pro Leu Ala Pro Glu Pro Met Ile Thr
625 630 635 640

Phe Gly Phe Arg Ser Val Ser Leu Lys Leu His Pro Lys Asn Pro Thr
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Tyr Leu Ile Thr Arg Gln Leu Ala Asp Glu Pro His Tyr Thr His Glu
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Leu Ile Ser Glu Pro Ala Val Arg Asn Phe Thr Val Thr Glu Lys Gly
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Trp Glu Phe Val Trp Gly Asn His Pro Pro Lys Arg Phe Trp Ala Gln
690 695 700

Glu Thr Ala Pro Gly Asn Pro His Gly Leu Pro His Glu Val Ile Thr
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His Tyr Tyr His Arg Tyr Pro Met Ser Thr Ile Leu Gly Leu Ser Ile
725 730 735

Cys Ala Ala Ile Ala Thr Val Ser Val Ala Ala Ser Thr Trp Leu Phe
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Cys Arg Ser Arg Val Ala Cys Leu Thr Pro Tyr Arg Leu Thr Pro Asn
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Ala Arg Ile Pro Phe Cys Leu Ala Val Leu Cys Cys Ala Arg Thr Ala
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Arg Ala Glu Thr Thr Trp Glu Ser Leu Asp His Leu Trp Asn Asn Asn
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Gln Gln Met Phe Trp Ile Gln Leu Leu Ile Pro Leu Ala Ala Leu Ile
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Val Val Thr Arg Leu Leu Arg Cys Val Cys Cys Val Val Pro Phe Leu
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Gly Tyr Ala Pro Leu Pro Ile Ser Ile Thr Pro Thr Lys Ile Lys Leu
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Ile Pro Thr Val Asn Leu Glu Tyr Val Thr Cys His Tyr Lys Thr Gly
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Met Asp Ser Pro Ala Ile Lys Cys Cys Gly Ser Gln Glu Cys Thr Pro
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Thr Tyr Arg Pro Asp Glu Gln Cys Lys Val Phe Thr Gly Val Tyr Pro
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Phe Met Trp Gly Gly Ala Tyr Cys Phe Cys Asp Thr Glu Asn Thr Gln
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Val Ser Lys Ala Tyr Val Met Lys Ser Asp Asp Cys Leu Ala Asp His
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Ala Glu Ala Tyr Lys Ala His Thr Ala Ser Val Gln Ala Phe Leu Asn
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Ile Thr Val Gly Glu His Ser Ile Val Thr Thr Val Tyr Val Asn Gly
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Glu Thr Pro Val Asn Phe Asn Gly  Val Lys Ile Thr Ala  Gly Pro Leu
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Ser Thr  Ala Trp Thr Pro Phe  Asp Arg Lys Ile Val  Gln Tyr Ala
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Gly Glu  Ile Tyr Asn Tyr Asp  Phe Pro Glu Tyr Gly  Ala Gly Gln
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Pro Gly  Ala Phe Gly Asp Ile  Gln Ser Arg Thr Val  Ser Ser Ser
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Asp Leu  Tyr Ala Asn Thr Asn  Leu Val Leu Gln Arg  Pro Lys Ala
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Gly Ala  Ile His Val Pro Tyr  Thr Gln Ala Pro Ser  Gly Phe Glu
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Gln Trp  Lys Lys Asp Lys Ala  Pro Ser Leu Lys Phe  Thr Ala Pro
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Phe Gly  Cys Glu Ile Tyr Thr  Asn Pro Ile Arg Ala  Glu Asn Cys
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Ala Val  Gly Ser Ile Pro Leu  Ala Phe Asp Ile Pro  Asp Ala Leu
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Thr Leu  Asn Glu Cys Val Tyr  Ser Ser Asp Phe Gly  Gly Ile Ala
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Thr Val  Lys Tyr Ser Ala Ser  Lys Ser Gly Lys Cys  Ala Val His
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Val Pro  Ser Gly Thr Ala Thr  Leu Lys Glu Ala Ala  Val Glu Leu
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Thr Glu  Gln Gly Ser Ala Thr  Ile His Phe Ser Thr  Ala Asn Ile
    1190                 1195                 1200

His Pro  Glu Phe Arg Leu Gln  Ile Cys Thr Ser Tyr  Val Thr Cys
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Lys Gly  Asp Cys His Pro Pro  Lys Asp His Ile Val  Thr His Pro
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Gln Tyr  His Ala Gln Thr Phe  Thr Ala Ala Val Ser  Lys Thr Ala
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Trp Thr  Trp Leu Thr Ser Leu  Leu Gly Gly Ser Ala  Val Ile Ile
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Phe Leu Ala Met Gln Val Gln Glu Leu Thr Arg Ser Met Ala Asn Leu
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Thr Phe Lys Gln Arg Arg Asp Ala Pro Pro Glu Gly Pro Ser Ala Asn
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Lys Lys Lys Lys Asn Gln Gly Lys Lys Lys Ala Lys Thr Gly Pro Pro
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Asn Pro Lys Ala Gln Asn Gly Asn Lys Lys Lys Thr Asn Lys Lys Pro
            100                 105                 110

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

Val Leu Gly Gly Val Asn Glu Gly Ser Arg Thr Ala Leu Ser Val Val
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Met Trp Asn Glu Lys Gly Val Thr Val Lys Tyr Thr Pro Glu Asn Cys
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Glu Gln Trp Ser Leu Val Thr Thr Met Cys Leu Leu Ala Asn Val Thr
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Phe Pro Cys Ala Gln Pro Pro Ile Cys Tyr Asp Arg Lys Pro Ala Glu
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Thr Leu Ala Met Leu Ser Val Asn Val Asp Asn Pro Gly Tyr Asp Glu
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Leu Leu Glu Ala Ala Val Lys Cys Pro Gly Arg Lys Arg Arg Ser Thr
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Glu Glu Leu Phe Asn Glu Tyr Lys Leu Thr Arg Pro Tyr Met Ala Arg
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Cys Ile Arg Cys Ala Val Gly Ser Cys His Ser Pro Ile Ala Ile Glu
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Ala Val Lys Ser Asp Gly His Asp Gly Tyr Val Arg Leu Gln Thr Ser
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Ser Gln Tyr Gly Leu Asp Ser Ser Gly Asn Leu Lys Gly Arg Thr Met
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Arg Tyr Asp Met His Gly Thr Ile Lys Glu Ile Pro Leu His Gln Val
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Ser Leu Tyr Thr Ser Arg Pro Cys His Ile Val Asp Gly His Gly Tyr
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Phe Leu Leu Ala Arg Cys Pro Ala Gly Asp Ser Ile Thr Met Glu Phe
435 440 445

Lys Lys Asp Ser Val Arg His Ser Cys Ser Val Pro Tyr Glu Val Lys
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Phe Asn Pro Val Gly Arg Glu Leu Tyr Thr His Pro Pro Glu His Gly
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Val Glu Gln Ala Cys Gln Val Tyr Ala His Asp Ala Gln Asn Arg Gly
485 490 495

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

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Thr Val Pro Leu Ala Pro Glu Pro Met Ile Thr Phe Gly Phe Arg Ser
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Val Ser Leu Lys Leu His Pro Lys Asn Pro Thr Tyr Leu Ile Thr Arg
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Gln Leu Ala Asp Glu Pro His Tyr Thr His Glu Leu Ile Ser Glu Pro
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Ala Val Arg Asn Phe Thr Val Thr Glu Lys Gly Trp Glu Phe Val Trp
675 680 685

Gly Asn His Pro Pro Lys Arg Phe Trp Ala Gln Glu Thr Ala Pro Gly
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Asn Pro His Gly Leu Pro His Glu Val Ile Thr His Tyr Tyr His Arg
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Tyr Pro Met Ser Thr Ile Leu Gly Leu Ser Ile Cys Ala Ala Ile Ala
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Thr Val Ser Val Ala Ala Ser Thr Trp Leu Phe Cys Arg Ser Arg Val
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Ala Cys Leu Thr Pro Tyr Arg Leu Thr Pro Asn Ala Arg Ile Pro Phe
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Cys Leu Ala Val Leu Cys Cys Ala Arg Thr Ala Arg Ala Glu Thr Thr
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Trp Glu Ser Leu Asp His Leu Trp Asn Asn Asn Gln Gln Met Phe Trp
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Ile Gln Leu Leu Ile Pro Leu Ala Ala Leu Ile Val Val Thr Arg Leu
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Gly Ile Ser Tyr Asn Thr Ile Val Asn Arg Ala Gly Tyr Ala Pro Leu
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Pro Ile Ser Ile Thr Pro Thr Lys Ile Lys Leu Ile Pro Thr Val Asn
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Leu Glu Tyr Val Thr Cys His Tyr Lys Thr Gly Met Asp Ser Pro Ala
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Glu Gln Cys Lys Val Phe Thr Gly Val Tyr Pro Phe Met Trp Gly Gly
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Ala Tyr Cys Phe Cys Asp Thr Glu Asn Thr Gln Val Ser Lys Ala Tyr
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Val Met Lys Ser Asp Asp Cys Leu Ala Asp His Ala Glu Ala Tyr Lys
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Ala His Thr Ala Ser Val Gln Ala Phe Leu Asn Ile Thr Val Gly Glu
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His Ser Ile Val Thr Thr Val Tyr Val Asn Gly Glu Thr Pro Val Asn
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Phe Asn Gly Val Lys Ile Thr Ala Gly Pro Leu Ser Thr Ala Trp Thr
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Pro Phe Asp Arg Lys Ile Val Gln Tyr Ala Gly Glu Ile Tyr Asn
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Tyr Asp Phe Pro Glu Tyr Gly Ala Gly Gln Pro Gly Ala Phe Gly
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Asp Ile Gln Ser Arg Thr Val Ser Ser Ser Asp Leu Tyr Ala Asn
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Thr Asn Leu Val Leu Gln Arg Pro Lys Ala Gly Ala Ile His Val
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Pro Tyr Thr Gln Ala Pro Ser Gly Phe Glu Gln Trp Lys Lys Asp
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Lys Ala Pro Ser Leu Lys Phe Thr Ala Pro Phe Gly Cys Glu Ile
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Tyr Thr Asn Pro Ile Arg Ala Glu Asn Cys Ala Val Gly Ser Ile
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Pro Leu Ala Phe Asp Ile Pro Asp Ala Leu Phe Thr Arg Val Ser
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Glu Thr Pro Thr Leu Ser Ala Ala Glu Cys Thr Leu Asn Glu Cys
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Val Tyr Ser Ser Asp Phe Gly Gly Ile Ala Thr Val Lys Tyr Ser
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1160 1165 1170

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Ala Thr Ile His Phe Ser Thr Ala Asn Ile His Pro Glu Phe Arg
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Leu Gln Ile Cys Thr Ser Tyr Val Thr Cys Lys Gly Asp Cys His
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Pro Pro Lys Asp His Ile Val Thr His Pro Gln Tyr His Ala Gln
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Ser Leu Leu Gly Gly Ser Ala Val Ile Ile Ile Ile Gly Leu Val
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gctgtaaatt gcgctgtggg gaacatacca atttccatcg acataccgga tgcggccttt 3300

actagggttg tcgatgcacc ctctgtaacg gacatgtcat gcgaagtacc agcctgcact 3360

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20 25 30

Arg Pro Gln Arg Gln Ala Gly Gln Leu Ala Gln Leu Ile Ser Ala Val
35 40 45

Asn Lys Leu Thr Met Arg Ala Val Pro Gln Gln Lys Pro Arg Arg Asn
50 55 60

Arg Lys Asn Lys Lys Gln Arg Gln Lys Lys Gln Ala Pro Gln Asn Asp
65 70 75 80

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Pro Lys Gln Lys Lys Gln Pro Pro Gln Lys Lys Pro Ala Gln Lys Lys
                85                  90                  95

Lys Lys Pro Gly Arg Arg Glu Arg Met Cys Met Lys Ile Glu Asn Asp
            100                 105                 110

Cys Ile Phe Glu Val Lys His Glu Gly Lys Val Met Gly Tyr Ala Cys
        115                 120                 125

Leu Val Gly Asp Lys Val Met Lys Pro Ala His Val Lys Gly Thr Ile
    130                 135                 140

Asp Asn Ala Asp Leu Ala Lys Leu Ala Phe Lys Arg Ser Ser Lys Tyr
145                 150                 155                 160

Asp Leu Glu Cys Ala Gln Ile Pro Val His Met Lys Ser Asp Ala Ser
                165                 170                 175

Lys Phe Thr His Glu Lys Pro Glu Gly Tyr Tyr Asn Trp His His Gly
            180                 185                 190

Ala Val Gln Tyr Ser Gly Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly
        195                 200                 205

Lys Pro Gly Asp Ser Gly Arg Pro Ile Phe Asp Asn Lys Gly Arg Val
    210                 215                 220

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

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

Gly Ala Glu Glu Trp Ser Leu Ala Leu Pro Val Leu Cys Leu Leu Ala
            260                 265                 270

Asn Thr Thr Phe Pro Cys Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr
        275                 280                 285

Glu Lys Glu Pro Glu Ser Thr Leu Arg Met Leu Glu Asp Asn Val Met
    290                 295                 300

Arg Pro Gly Tyr Tyr Gln Leu Leu Lys Ala Ser Leu Thr Cys Ser Pro
305                 310                 315                 320

His Arg Gln Arg Arg Ser Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala
                325                 330                 335

Thr Arg Pro Tyr Leu Ala His Cys Pro Asp Cys Gly Glu Gly His Ser
            340                 345                 350

Cys His Ser Pro Ile Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp
        355                 360                 365
```

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Gly Thr Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp
    370                 375                 380

Asp Ser His Asp Trp Thr Lys Leu Arg Tyr Met Asp Ser His Thr Pro
385                 390                 395                 400

Ala Asp Ala Glu Arg Ala Gly Leu Leu Val Arg Thr Ser Ala Pro Cys
                405                 410                 415

Thr Ile Thr Gly Thr Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys
            420                 425                 430

Gly Glu Thr Leu Thr Val Gly Phe Thr Asp Ser Arg Lys Ile Ser His
        435                 440                 445

Thr Cys Thr His Pro Phe His His Glu Pro Pro Val Ile Gly Arg Glu
    450                 455                 460

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

Tyr Val Gln Ser Thr Ala Ala Thr Ala Glu Glu Ile Glu Val His Met
                485                 490                 495

Pro Pro Asp Thr Pro Asp Arg Thr Leu Met Thr Gln Gln Ser Gly Asn
            500                 505                 510

Val Lys Ile Thr Val Asn Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys
        515                 520                 525

Gly Gly Ser Gly Ser Gly Ser Asn Glu Gly Leu Thr Thr Thr Asp Lys
    530                 535                 540

Val Ile Asn Asn Cys Lys Ile Asp Gln Cys His Ala Ala Val Thr Asn
545                 550                 555                 560

His Lys Asn Trp Gln Tyr Asn Ser Pro Leu Val Pro Arg Asn Ala Glu
                565                 570                 575

Leu Gly Asp Arg Lys Gly Lys Ile His Ile Pro Phe Pro Leu Ala Asn
            580                 585                 590

Val Thr Cys Arg Val Pro Lys Ala Arg Asn Pro Thr Val Thr Tyr Gly
        595                 600                 605

Lys Asn Gln Val Thr Met Leu Leu Tyr Pro Asp His Pro Thr Leu Leu
    610                 615                 620

Ser Tyr Arg Asn Met Gly Gln Glu Pro Asn Tyr His Glu Glu Trp Val
625                 630                 635                 640

Thr His Lys Lys Glu Val Thr Leu Thr Val Pro Thr Glu Gly Leu Glu
                645                 650                 655
```

Val Thr Trp Gly Asn Asn Glu Pro Tyr Lys Tyr Trp Pro Gln Met Ser
660 665 670

Thr Asn Gly Thr Ala His Gly His Pro His Glu Ile Ile Leu Tyr Tyr
675 680 685

Tyr Glu Leu Tyr Pro Thr Met Thr Val Val Ile Val Ser Val Ala Ser
690 695 700

Phe Val Leu Leu Ser Met Val Gly Thr Ala Val Gly Met Cys Val Cys
705 710 715 720

Ala Arg Arg Arg Cys Ile Thr Pro Tyr Glu Leu Thr Pro Gly Ala Thr
725 730 735

Val Pro Phe Leu Leu Ser Leu Leu Cys Cys Val Arg Thr Thr Lys Ala
740 745 750

Ala Thr Tyr Tyr Glu Ala Ala Ala Tyr Leu Trp Asn Glu Gln Gln Pro
755 760 765

Leu Phe Trp Leu Gln Ala Leu Ile Pro Leu Ala Ala Leu Ile Val Leu
770 775 780

Cys Asn Cys Leu Lys Leu Leu Pro Cys Cys Cys Lys Thr Leu Ala Phe
785 790 795 800

Leu Ala Val Met Ser Ile Gly Ala His Thr Val Ser Ala Tyr Glu His
805 810 815

Val Thr Val Ile Pro Asn Thr Val Gly Val Pro Tyr Lys Thr Leu Val
820 825 830

Asn Arg Pro Gly Tyr Ser Pro Met Val Leu Glu Met Glu Leu Gln Ser
835 840 845

Val Thr Leu Glu Pro Thr Leu Ser Leu Asp Tyr Ile Thr Cys Glu Tyr
850 855 860

Lys Thr Val Ile Pro Ser Pro Tyr Val Lys Cys Cys Gly Thr Ala Glu
865 870 875 880

Cys Lys Asp Lys Ser Leu Pro Asp Tyr Ser Cys Lys Val Phe Thr Gly
885 890 895

Val Tyr Pro Phe Met Trp Gly Gly Ala Tyr Cys Phe Cys Asp Ala Glu
900 905 910

Asn Thr Gln Leu Ser Glu Ala His Val Glu Lys Ser Glu Ser Cys Lys
915 920 925

Thr Glu Phe Ala Ser Ala Tyr Arg Ala His Thr Ala Ser Ala Ser Ala
930 935 940

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Lys Leu Arg Val Leu Tyr Gln Gly Asn Asn Ile Thr Val Ala Ala Tyr
945                 950                 955                 960

Ala Asn Gly Asp His Ala Val Thr Val Lys Asp Ala Lys Phe Val Val
                965                 970                 975

Gly Pro Met Ser Ser Ala Trp Thr Pro Phe Asp Asn Lys Ile Val Val
            980                 985                 990

Tyr Lys Gly Asp Val Tyr Asn Met  Asp Tyr Pro Pro Phe  Gly Ala Gl
        995                 1000                1005

Arg Pro  Gly Gln Phe Gly Asp  Ile Gln Ser Arg Thr  Pro Glu Ser
    1010                1015                1020

Lys Asp  Val Tyr Ala Asn Thr  Gln Leu Val Leu Gln  Arg Pro Ala
    1025                1030                1035

Ala Gly  Thr Val His Val Pro  Tyr Ser Gln Ala Pro  Ser Gly Phe
    1040                1045                1050

Lys Tyr  Trp Leu Lys Glu Arg  Gly Ala Ser Leu Gln  His Thr Ala
    1055                1060                1065

Pro Phe  Gly Cys Gln Ile Ala  Thr Asn Pro Val Arg  Ala Val Asn
    1070                1075                1080

Cys Ala  Val Gly Asn Ile Pro  Ile Ser Ile Asp Ile  Pro Asp Ala
    1085                1090                1095

Ala Phe  Thr Arg Val Val Asp  Ala Pro Ser Val Thr  Asp Met Ser
    1100                1105                1110

Cys Glu  Val Pro Ala Cys Thr  His Ser Ser Asp Phe  Gly Gly Val
    1115                1120                1125

Ala Ile  Ile Lys Tyr Thr Ala  Ser Lys Lys Gly Lys  Cys Ala Val
    1130                1135                1140

His Ser  Met Thr Asn Ala Val  Thr Ile Arg Glu Ala  Asp Val Glu
    1145                1150                1155

Val Glu  Gly Asn Ser Gln Leu  Gln Ile Ser Phe Ser  Thr Ala Leu
    1160                1165                1170

Ala Ser  Ala Glu Phe Arg Val  Gln Val Cys Ser Thr  Gln Val His
    1175                1180                1185

Cys Ala  Ala Ala Cys His Pro  Pro Lys Asp His Ile  Val Asn Tyr
    1190                1195                1200

Pro Ala  Ser His Thr Thr Leu  Gly Val Gln Asp Ile  Ser Thr Thr
    1205                1210                1215
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Ala Met Ser Trp Val Gln Lys Ile Thr Gly Gly Val Gly Leu Ile
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Val Ala Val Ala Ala Leu Ile Leu Ile Val Val Leu Cys Val Ser
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Phe Ser Arg His
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20 25 30

Phe Leu Ala Met Gln Val Gln Glu Leu Thr Arg Ser Met Ala Asn Leu
35 40 45

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Thr Phe Lys Gln Arg Arg Asp Ala Pro Pro Glu Gly Pro Ser Ala Asn
    50                  55                  60

Lys Pro Lys Lys Glu Ala Ser Gln Lys Gln Lys Gly Gly Gly Gln Gly
65                  70                  75                  80

Lys Lys Lys Lys Asn Gln Gly Lys Lys Lys Ala Lys Thr Gly Pro Pro
                85                  90                  95

Asn Pro Lys Ala Gln Asn Gly Asn Lys Lys Lys Thr Asn Lys Lys Pro
            100                 105                 110

Gly Lys Arg Gln Arg Met Val Met Lys Leu Glu Ser Asp Lys Thr Phe
        115                 120                 125

Pro Ile Met Leu Glu Gly Lys Ile Asn Gly Tyr Ala Cys Val Val Gly
    130                 135                 140

Gly Lys Leu Phe Arg Pro Met His Val Glu Gly Lys Ile Asp Asn Asp
145                 150                 155                 160

Val Leu Ala Ala Leu Lys Thr Lys Lys Ala Ser Lys Tyr Asp Leu Glu
                165                 170                 175

Tyr Ala Asp Val Pro Gln Asn Met Arg Ala Asp Thr Phe Lys Tyr Thr
            180                 185                 190

His Glu Lys Pro Gln Gly Tyr Tyr Ser Trp His His Gly Ala Val Gln
        195                 200                 205

Tyr Glu Asn Gly Arg Phe Thr Val Pro Lys Gly Val Gly Ala Lys Gly
    210                 215                 220

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

Val Leu Gly Gly Val Asn Glu Gly Ser Arg Thr Ala Leu Ser Val Val
                245                 250                 255

Met Trp Asn Glu Lys Gly Val Thr Val Lys Tyr Thr Pro Glu Asn Cys
            260                 265                 270

Glu Gln Trp Ser Leu Val Thr Thr Met Cys Leu Leu Ala Asn Val Thr
        275                 280                 285

Phe Pro Cys Ala Gln Pro Pro Ile Cys Tyr Asp Arg Lys Pro Ala Glu
    290                 295                 300

Thr Leu Ala Met Leu Ser Val Asn Val Asp Asn Pro Gly Tyr Asp Glu
305                 310                 315                 320

Leu Leu Glu Ala Ala Val Lys Cys Pro Gly Arg Lys Arg Arg Ser Thr
                325                 330                 335
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Glu Glu Leu Phe Asn Glu Tyr Lys Leu Thr Arg Pro Tyr Met Ala Arg
            340                 345                 350

Cys Ile Arg Cys Ala Val Gly Ser Cys His Ser Pro Ile Ala Ile Glu
        355                 360                 365

Ala Val Lys Ser Asp Gly His Asp Gly Tyr Val Arg Leu Gln Thr Ser
    370                 375                 380

Ser Gln Tyr Gly Leu Asp Ser Ser Gly Asn Leu Lys Gly Arg Thr Met
385                 390                 395                 400

Arg Tyr Asp Met His Gly Thr Ile Lys Glu Ile Pro Leu His Gln Val
                405                 410                 415

Ser Leu Tyr Thr Ser Arg Pro Cys His Ile Val Asp Gly His Gly Tyr
            420                 425                 430

Phe Leu Leu Ala Arg Cys Pro Ala Gly Asp Ser Ile Thr Met Glu Phe
        435                 440                 445

Lys Lys Asp Ser Val Arg His Ser Cys Ser Val Pro Tyr Glu Val Lys
    450                 455                 460

Phe Asn Pro Val Gly Arg Glu Leu Tyr Thr His Pro Pro Glu His Gly
465                 470                 475                 480

Val Glu Gln Ala Cys Gln Val Tyr Ala His Asp Ala Gln Asn Arg Gly
                485                 490                 495

Ala Tyr Val Glu Met His Leu Pro Gly Ser Glu Val Asp Ser Ser Leu
            500                 505                 510

Val Ser Leu Ser Gly Ser Gly Gly Ser Ser Ser Val Thr Val Thr Pro
        515                 520                 525

Pro Asp Gly Thr Ser Ala Leu Val Glu Cys Glu Cys Gly Gly Thr Lys
    530                 535                 540

Ile Ser Glu Thr Ile Asn Lys Thr Lys Gln Phe Ser Gln Cys Thr Lys
545                 550                 555                 560

Lys Glu Gln Cys Arg Ala Tyr Arg Leu Gln Asn Asp Lys Trp Val Tyr
                565                 570                 575

Asn Ser Asp Lys Leu Pro Lys Ala Ala Gly Ala Thr Leu Lys Gly Lys
            580                 585                 590

Leu His Val Pro Phe Leu Leu Ala Asp Gly Lys Cys Thr Val Pro Leu
        595                 600                 605

Ala Pro Glu Pro Met Ile Thr Phe Gly Phe Arg Ser Val Ser Leu Lys
    610                 615                 620
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Leu His Pro Lys Asn Pro Thr Tyr Leu Ile Thr Arg Gln Leu Ala Asp
625                 630                 635                 640

Glu Pro His Tyr Thr His Glu Leu Ile Ser Glu Pro Ala Val Arg Asn
                645                 650                 655

Phe Thr Val Thr Glu Lys Gly Trp Glu Phe Val Trp Gly Asn His Pro
            660                 665                 670

Pro Lys Arg Phe Trp Ala Gln Glu Thr Ala Pro Gly Asn Pro His Gly
        675                 680                 685

Leu Pro His Glu Val Ile Thr His Tyr Tyr His Arg Tyr Pro Met Ser
    690                 695                 700

Thr Ile Leu Gly Leu Ser Ile Cys Ala Ala Ile Ala Thr Val Ser Val
705                 710                 715                 720

Ala Ala Ser Thr Trp Leu Phe Cys Arg Ser Arg Val Ala Cys Leu Thr
                725                 730                 735

Pro Tyr Arg Leu Thr Pro Asn Ala Arg Ile Pro Phe Cys Leu Ala Val
            740                 745                 750

Leu Cys Cys Ala Arg Thr Ala Arg Ala Glu Thr Thr Trp Glu Ser Leu
        755                 760                 765

Asp His Leu Trp Asn Asn Asn Gln Gln Met Phe Trp Ile Gln Leu Leu
    770                 775                 780

Ile Pro Leu Ala Ala Leu Ile Val Val Thr Arg Leu Leu Arg Cys Val
785                 790                 795                 800

Cys Cys Val Val Pro Phe Leu Val Met Ala Gly Ala Ala Gly Ala Gly
                805                 810                 815

Ala Tyr Glu His Ala Thr Thr Met Pro Ser Gln Ala Gly Ile Ser Tyr
            820                 825                 830

Asn Thr Ile Val Asn Arg Ala Gly Tyr Ala Pro Leu Pro Ile Ser Ile
        835                 840                 845

Thr Pro Thr Lys Ile Lys Leu Ile Pro Thr Val Asn Leu Glu Tyr Val
    850                 855                 860

Thr Cys His Tyr Lys Thr Gly Met Asp Ser Pro Ala Ile Lys Cys Cys
865                 870                 875                 880

Gly Ser Gln Glu Cys Thr Pro Thr Tyr Arg Pro Asp Glu Gln Cys Lys
                885                 890                 895

Val Phe Thr Gly Val Tyr Pro Phe Met Trp Gly Gly Ala Tyr Cys Phe
            900                 905                 910
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```
Cys Asp Thr Glu Asn Thr Gln Val Ser Lys Ala Tyr Val Met Lys Ser
        915                 920                 925

Asp Asp Cys Leu Ala Asp His Ala Glu Ala Tyr Lys Ala His Thr Ala
    930                 935                 940

Ser Val Gln Ala Phe Leu Asn Ile Thr Val Gly Glu His Ser Ile Val
945                 950                 955                 960

Thr Thr Val Tyr Val Asn Gly Glu Thr Pro Val Asn Phe Asn Gly Val
                965                 970                 975

Lys Ile Thr Ala Gly Pro Leu Ser Thr Ala Trp Thr Pro Phe Asp Arg
            980                 985                 990

Lys Ile Val Gln Tyr Ala Gly Glu  Ile Tyr Asn Tyr Asp  Phe Pro Glu
        995                 1000                1005

Tyr Gly  Ala Gly Gln Pro Gly  Ala Phe Gly Asp Ile  Gln Ser Arg
    1010                1015                1020

Thr Val  Ser Ser Ser Asp Leu  Tyr Ala Asn Thr Asn  Leu Val Leu
    1025                1030                1035

Gln Arg  Pro Lys Ala Gly Ala  Ile His Val Pro Tyr  Thr Gln Ala
    1040                1045                1050

Pro Ser  Gly Phe Glu Gln Trp  Lys Lys Asp Lys Ala  Pro Ser Leu
    1055                1060                1065

Lys Phe  Thr Ala Pro Phe Gly  Cys Glu Ile Tyr Thr  Asn Pro Ile
    1070                1075                1080

Arg Ala  Glu Asn Cys Ala Val  Gly Ser Ile Pro Leu  Ala Phe Asp
    1085                1090                1095

Ile Pro  Asp Ala Leu Phe Thr  Arg Val Ser Glu Thr  Pro Thr Leu
    1100                1105                1110

Ser Ala  Ala Glu Cys Thr Leu  Asn Glu Cys Val Tyr  Ser Ser Asp
    1115                1120                1125

Phe Gly  Gly Ile Ala Thr Val  Lys Tyr Ser Ala Ser  Lys Ser Gly
    1130                1135                1140

Lys Cys  Ala Val His Val Pro  Ser Gly Thr Ala Thr  Leu Lys Glu
    1145                1150                1155

Ala Ala  Val Glu Leu Thr Glu  Gln Gly Ser Ala Thr  Ile His Phe
    1160                1165                1170

Ser Thr  Ala Asn Ile His Pro  Glu Phe Arg Leu Gln  Ile Cys Thr
    1175                1180                1185
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Ser Tyr Val Thr Cys Lys Gly Asp Cys His Pro Pro Lys Asp His
1190 1195 1200

Ile Val Thr His Pro Gln Tyr His Ala Gln Thr Phe Thr Ala Ala
1205 1210 1215

Val Ser Lys Thr Ala Trp Thr Trp Leu Thr Ser Leu Leu Gly Gly
1220 1225 1230

Ser Ala Val Ile Ile Ile Ile Gly Leu Val Leu Ala Thr Ile Val
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Ala Met Tyr Val Leu Thr Asn Gln Lys His Asn
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Thr Phe Lys Gln Arg Arg Asp Ala Pro Pro Glu Gly Pro Ser Ala Asn
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Lys Pro Lys Lys Glu Ala Ser Gln Lys Gln Lys Gly Gly Gly Gln Gly
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Lys Lys Lys Lys Asn Gln Gly Lys Lys Lys Ala Lys Thr Gly Pro Pro
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Asn Pro Lys Ala Gln Asn Gly Asn Lys Lys Lys Thr Asn Lys Lys Pro
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Gly Lys Arg Gln Arg Met Val Met Lys Leu Glu Ser Asp Lys Thr Phe
        115                 120                 125

Pro Ile Met Leu Glu Gly Lys Ile Asn Gly Tyr Ala Cys Val Val Gly
    130                 135                 140

Gly Lys Leu Phe Arg Pro Met His Val Glu Gly Lys Ile Asp Asn Asp
145                 150                 155                 160

Val Leu Ala Ala Leu Lys Thr Lys Lys Ala Ser Lys Tyr Asp Leu Glu
                165                 170                 175

Tyr Ala Asp Val Pro Gln Asn Met Arg Ala Asp Thr Phe Lys Tyr Thr
            180                 185                 190

His Glu Lys Pro Gln Gly Tyr Tyr Ser Trp His His Gly Ala Val Gln
        195                 200                 205

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

Val Leu Gly Gly Val Asn Glu Gly Ser Arg Thr Ala Leu Ser Val Val
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Met Trp Asn Glu Lys Gly Val Thr Val Lys Tyr Thr Pro Glu Asn Cys
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Glu Gln Trp Ser Leu Val Thr Thr Met Cys Leu Leu Ala Asn Val Thr
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Phe Pro Cys Ala Gln Pro Pro Ile Cys Tyr Asp Arg Lys Pro Ala Glu
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Thr Leu Ala Met Leu Ser Val Asn Val Asp Asn Pro Gly Tyr Asp Glu
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Leu Leu Glu Ala Ala Val Lys Cys Pro Gly Arg Lys Arg Arg Ser Thr
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Glu Glu Leu Phe Asn Glu Tyr Lys Leu Thr Arg Pro Tyr Met Ala Arg
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Cys Ile Arg Cys Ala Val Gly Ser Cys His Ser Pro Ile Ala Ile Glu
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Ala Val Lys Ser Asp Gly His Asp Gly Tyr Val Arg Leu Gln Thr Ser
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Ser Gln Tyr Gly Leu Asp Ser Ser Gly Asn Leu Lys Gly Arg Thr Met
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Arg Tyr Asp Met His Gly Thr Ile Lys Glu Ile Pro Leu His Gln Val
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Ser Leu Tyr Thr Ser Arg Pro Cys His Ile Val Asp Gly His Gly Tyr
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Phe Leu Leu Ala Arg Cys Pro Ala Gly Asp Ser Ile Thr Met Glu Phe
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Lys Lys Asp Ser Val Arg His Ser Cys Ser Val Pro Tyr Glu Val Lys
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Phe Asn Pro Val Gly Arg Glu Leu Tyr Thr His Pro Pro Glu His Gly
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Val Glu Gln Ala Cys Gln Val Tyr Ala His Asp Ala Gln Asn Arg Gly
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Ala Tyr Val Glu Met His Leu Pro Gly Ser Glu Val Asp Ser Ser Leu
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515 520 525

Pro Asp Gly Thr Ser Ala Leu Val Glu Cys Glu Cys Gly Gly Thr Lys
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Ile Ser Glu Thr Ile Asn Lys Thr Lys Gln Phe Ser Gln Cys Thr Lys
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Lys Glu Gln Cys Arg Ala Tyr Arg Leu Gln Asn Asp Lys Trp Val Tyr
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Asn Ser Asp Lys Leu Pro Lys Ala Ala Gly Ala Thr Leu Lys Gly Lys

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Leu His Val Pro Phe Leu Leu Ala Asp Gly Lys Cys Thr Val Pro Leu
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Ala Pro Glu Pro Met Ile Thr Phe Gly Phe Arg Ser Val Ser Leu Lys
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Leu His Pro Lys Asn Pro Thr Tyr Leu Ile Thr Arg Gln Leu Ala Asp
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Glu Pro His Tyr Thr His Glu Leu Ile Ser Glu Pro Ala Val Arg Asn
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Phe Thr Val Thr Glu Lys Gly Trp Glu Phe Val Trp Gly Asn His Pro
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Pro Lys Arg Phe Trp Ala Gln Glu Thr Ala Pro Gly Asn Pro His Gly
675 680 685

Leu Pro His Glu Val Ile Thr His Tyr Tyr His Arg Tyr Pro Met Ser
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Thr Ile Leu Gly Leu Ser Ile Cys Ala Ala Ile Ala Thr Val Ser Val
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Ala Ala Ser Thr Trp Leu Phe Cys Arg Ser Arg Val Ala Cys Leu Thr
725 730 735

Pro Tyr Arg Leu Thr Pro Asn Ala Arg Ile Pro Phe Cys Leu Ala Val
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Leu Cys Cys Ala Arg Thr Ala Arg Ala Glu Thr Thr Trp Glu Ser Leu
755 760 765

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

865 870 875 880

Gly Ser Gln Glu Cys Thr Pro Thr Tyr Arg Pro Asp Glu Gln Cys Lys
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Val Phe Thr Gly Val Tyr Pro Phe Met Trp Gly Gly Ala Tyr Cys Phe
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Cys Asp Thr Glu Asn Thr Gln Val Ser Lys Ala Tyr Val Met Lys Ser
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Asp Asp Cys Leu Ala Asp His Ala Glu Ala Tyr Lys Ala His Thr Ala
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Ser Val Gln Ala Phe Leu Asn Ile Thr Val Gly Glu His Ser Ile Val
945 950 955 960

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

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Ala Ala Val Glu Leu Thr Glu Gln Gly Ser Ala Thr Ile His Phe
1160 1165 1170

Ser Thr Ala Asn Ile His Pro Glu Phe Arg Leu Gln Ile Cys Thr
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Ser Tyr Val Thr Cys Lys Gly Asp Cys His Pro Pro Lys Asp His
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Ile Val Thr His Pro Gln Tyr His Ala Gln Thr Phe Thr Ala Ala
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Val Ser Lys Thr Ala Trp Thr Trp Leu Thr Ser Leu Leu Gly Gly
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Thr Phe Lys Gln Arg Arg Asp Ala Pro Pro Glu Gly Pro Ser Ala Asn
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Lys Pro Lys Lys Glu Ala Ser Gln Lys Gln Lys Gly Gly Gly Gln Gly
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Lys Lys Lys Lys Asn Gln Gly Lys Lys Lys Ala Lys Thr Gly Pro Pro
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Val Leu Ala Ala Leu Lys Thr Lys Lys Ala Ser Lys Tyr Asp Leu Glu
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His Glu Lys Pro Gln Gly Tyr Tyr Ser Trp His His Gly Ala Val Gln
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Tyr Glu Asn Gly Arg Phe Thr Val Pro Lys Gly Val Gly Ala Lys Gly
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Asp Ser Gly Arg Pro Ile Leu Asp Asn Gln Gly Arg Val Val Ala Ile
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Val Leu Gly Gly Val Asn Glu Gly Ser Arg Thr Ala Leu Ser Val Val
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Glu Glu Leu Phe Asn Glu Tyr Lys Leu Thr Arg Pro Tyr Met Ala Arg
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Cys Ile Arg Cys Ala Val Gly Ser Cys His Ser Pro Ile Ala Ile Glu
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Ser Gln Tyr Gly Leu Asp Ser Ser Gly Asn Leu Lys Gly Arg Thr Met
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Arg Tyr Asp Met His Gly Thr Ile Lys Glu Ile Pro Leu His Gln Val
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Ser Leu Tyr Thr Ser Arg Pro Cys His Ile Val Asp Gly His Gly Tyr
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Phe Leu Leu Ala Arg Cys Pro Ala Gly Asp Ser Ile Thr Met Glu Phe
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Lys Lys Asp Ser Val Arg His Ser Cys Ser Val Pro Tyr Glu Val Lys
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Phe Asn Pro Val Gly Arg Glu Leu Tyr Thr His Pro Pro Glu His Gly
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Val Glu Gln Ala Cys Gln Val Tyr Ala His Asp Ala Gln Asn Arg Gly
                485                 490                 495

Ala Tyr Val Glu Met His Leu Pro Gly Ser Glu Val Asp Ser Ser Leu
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Val Ser Leu Ser Gly Ser Ser Val Thr Val Thr Pro Pro Asp Gly Thr
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Ser Ala Leu Val Glu Cys Glu Cys Gly Ser Gly Gly Ser Gly Thr Lys
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Asn Ser Asp Lys Leu Pro Lys Ala Ala Gly Ala Thr Leu Lys Gly Lys
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Leu His Val Pro Phe Leu Leu Ala Asp Gly Lys Cys Thr Val Pro Leu
595 600 605

Ala Pro Glu Pro Met Ile Thr Phe Gly Phe Arg Ser Val Ser Leu Lys
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Leu His Pro Lys Asn Pro Thr Tyr Leu Ile Thr Arg Gln Leu Ala Asp
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Glu Pro His Tyr Thr His Glu Leu Ile Ser Glu Pro Ala Val Arg Asn
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Pro Lys Arg Phe Trp Ala Gln Glu Thr Ala Pro Gly Asn Pro His Gly
675 680 685

Leu Pro His Glu Val Ile Thr His Tyr Tyr His Arg Tyr Pro Met Ser
690 695 700

Thr Ile Leu Gly Leu Ser Ile Cys Ala Ala Ile Ala Thr Val Ser Val
705 710 715 720

Ala Ala Ser Thr Trp Leu Phe Cys Arg Ser Arg Val Ala Cys Leu Thr
725 730 735

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cgcgtgcaag tgtgctccac acaagtacac tgcgcagccg catgccaccc tccaaaggac 3600

cacatagtca attacccagc atcacacacc accettgggg tccaggatat atccacaacg 3660

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20 25 30

Arg Pro Gln Arg Gln Ala Gly Gln Leu Ala Gln Leu Ile Ser Ala Val
35 40 45

Asn Lys Leu Thr Met Arg Ala Val Pro Gln Gln Lys Pro Arg Arg Asn
50 55 60

Arg Lys Asn Lys Lys Gln Arg Gln Lys Lys Gln Ala Pro Gln Asn Asp
65 70 75 80

Pro Lys Gln Lys Lys Gln Pro Pro Gln Lys Lys Pro Ala Gln Lys Lys
85 90 95

Lys Lys Pro Gly Arg Arg Glu Arg Met Cys Met Lys Ile Glu Asn Asp
100 105 110

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Cys Ile Phe Glu Val Lys His Glu Gly Lys Val Met Gly Tyr Ala Cys
        115                 120                 125

Leu Val Gly Asp Lys Val Met Lys Pro Ala His Val Lys Gly Thr Ile
    130                 135                 140

Asp Asn Ala Asp Leu Ala Lys Leu Ala Phe Lys Arg Ser Ser Lys Tyr
145                 150                 155                 160

Asp Leu Glu Cys Ala Gln Ile Pro Val His Met Lys Ser Asp Ala Ser
                165                 170                 175

Lys Phe Thr His Glu Lys Pro Glu Gly Tyr Tyr Asn Trp His His Gly
            180                 185                 190

Ala Val Gln Tyr Ser Gly Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly
        195                 200                 205

Lys Pro Gly Asp Ser Gly Arg Pro Ile Phe Asp Asn Lys Gly Arg Val
    210                 215                 220

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

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

Gly Ala Glu Glu Trp Ser Leu Ala Leu Pro Val Leu Cys Leu Leu Ala
            260                 265                 270

Asn Thr Thr Phe Pro Cys Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr
        275                 280                 285

Glu Lys Glu Pro Glu Ser Thr Leu Arg Met Leu Glu Asp Asn Val Met
    290                 295                 300

Arg Pro Gly Tyr Tyr Gln Leu Leu Lys Ala Ser Leu Thr Cys Ser Pro
305                 310                 315                 320

His Arg Gln Arg Arg Ser Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala
                325                 330                 335

Thr Arg Pro Tyr Leu Ala His Cys Pro Asp Cys Gly Glu Gly His Ser
            340                 345                 350

Cys His Ser Pro Ile Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp
        355                 360                 365

Gly Thr Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp
    370                 375                 380

Asp Ser His Asp Trp Thr Lys Leu Arg Tyr Met Asp Ser His Thr Pro
385                 390                 395                 400
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Ala Asp Ala Glu Arg Ala Gly Leu Leu Val Arg Thr Ser Ala Pro Cys
405 410 415

Thr Ile Thr Gly Thr Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys
420 425 430

Gly Glu Thr Leu Thr Val Gly Phe Thr Asp Ser Arg Lys Ile Ser His
435 440 445

Thr Cys Thr His Pro Phe His His Glu Pro Pro Val Ile Gly Arg Glu
450 455 460

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

Tyr Val Gln Ser Thr Ala Ala Thr Ala Glu Glu Ile Glu Val His Met
485 490 495

Pro Pro Asp Thr Pro Asp Arg Thr Leu Met Thr Gln Gln Ser Gly Asn
500 505 510

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

Arg Tyr Lys Cys Asn Cys Gly Gly Ser Asn Glu Gly Leu Thr Thr Thr
530 535 540

Asp Lys Val Ile Asn Asn Cys Lys Ile Asp Gln Cys His Ala Ala Val
545 550 555 560

Thr Asn His Lys Asn Trp Gln Tyr Asn Ser Pro Leu Val Pro Arg Asn
565 570 575

Ala Glu Leu Gly Asp Arg Lys Gly Lys Ile His Ile Pro Phe Pro Leu
580 585 590

Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg Asn Pro Thr Val Thr
595 600 605

Tyr Gly Lys Asn Gln Val Thr Met Leu Leu Tyr Pro Asp His Pro Thr
610 615 620

Leu Leu Ser Tyr Arg Asn Met Gly Gln Glu Pro Asn Tyr His Glu Glu
625 630 635 640

Trp Val Thr His Lys Lys Glu Val Thr Leu Thr Val Pro Thr Glu Gly
645 650 655

Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr Lys Tyr Trp Pro Gln
660 665 670

Met Ser Thr Asn Gly Thr Ala His Gly His Pro His Glu Ile Ile Leu
675 680 685

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Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr Val Val Ile Val Ser Val
    690                 695                 700

Ala Ser Phe Val Leu Leu Ser Met Val Gly Thr Ala Val Gly Met Cys
705                 710                 715                 720

Val Cys Ala Arg Arg Arg Cys Ile Thr Pro Tyr Glu Leu Thr Pro Gly
                725                 730                 735

Ala Thr Val Pro Phe Leu Leu Ser Leu Leu Cys Cys Val Arg Thr Thr
            740                 745                 750

Lys Ala Ala Thr Tyr Tyr Glu Ala Ala Ala Tyr Leu Trp Asn Glu Gln
        755                 760                 765

Gln Pro Leu Phe Trp Leu Gln Ala Leu Ile Pro Leu Ala Ala Leu Ile
    770                 775                 780

Val Leu Cys Asn Cys Leu Lys Leu Leu Pro Cys Cys Cys Lys Thr Leu
785                 790                 795                 800

Ala Phe Leu Ala Val Met Ser Ile Gly Ala His Thr Val Ser Ala Tyr
                805                 810                 815

Glu His Val Thr Val Ile Pro Asn Thr Val Gly Val Pro Tyr Lys Thr
            820                 825                 830

Leu Val Asn Arg Pro Gly Tyr Ser Pro Met Val Leu Glu Met Glu Leu
        835                 840                 845

Gln Ser Val Thr Leu Glu Pro Thr Leu Ser Leu Asp Tyr Ile Thr Cys
    850                 855                 860

Glu Tyr Lys Thr Val Ile Pro Ser Pro Tyr Val Lys Cys Cys Gly Thr
865                 870                 875                 880

Ala Glu Cys Lys Asp Lys Ser Leu Pro Asp Tyr Ser Cys Lys Val Phe
                885                 890                 895

Thr Gly Val Tyr Pro Phe Met Trp Gly Gly Ala Tyr Cys Phe Cys Asp
            900                 905                 910

Ala Glu Asn Thr Gln Leu Ser Glu Ala His Val Glu Lys Ser Glu Ser
        915                 920                 925

Cys Lys Thr Glu Phe Ala Ser Ala Tyr Arg Ala His Thr Ala Ser Ala
    930                 935                 940

Ser Ala Lys Leu Arg Val Leu Tyr Gln Gly Asn Asn Ile Thr Val Ala
945                 950                 955                 960

Ala Tyr Ala Asn Gly Asp His Ala Val Thr Val Lys Asp Ala Lys Phe
                965                 970                 975
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Val Val Gly Pro Met Ser Ser Ala Trp Thr Pro Phe Asp Asn Lys Ile
980 985 990

Val Val Tyr Lys Gly Asp Val Tyr Asn Met Asp Tyr Pro Pro Phe Gly
995 1000 1005

Ala Gly Arg Pro Gly Gln Phe Gly Asp Ile Gln Ser Arg Thr Pro
1010 1015 1020

Glu Ser Lys Asp Val Tyr Ala Asn Thr Gln Leu Val Leu Gln Arg
1025 1030 1035

Pro Ala Ala Gly Thr Val His Val Pro Tyr Ser Gln Ala Pro Ser
1040 1045 1050

Gly Phe Lys Tyr Trp Leu Lys Glu Arg Gly Ala Ser Leu Gln His
1055 1060 1065

Thr Ala Pro Phe Gly Cys Gln Ile Ala Thr Asn Pro Val Arg Ala
1070 1075 1080

Val Asn Cys Ala Val Gly Asn Ile Pro Ile Ser Ile Asp Ile Pro
1085 1090 1095

Asp Ala Ala Phe Thr Arg Val Val Asp Ala Pro Ser Val Thr Asp
1100 1105 1110

Met Ser Cys Glu Val Pro Ala Cys Thr His Ser Ser Asp Phe Gly
1115 1120 1125

Gly Val Ala Ile Ile Lys Tyr Thr Ala Ser Lys Lys Gly Lys Cys
1130 1135 1140

Ala Val His Ser Met Thr Asn Ala Val Thr Ile Arg Glu Ala Asp
1145 1150 1155

Val Glu Val Glu Gly Asn Ser Gln Leu Gln Ile Ser Phe Ser Thr
1160 1165 1170

Ala Leu Ala Ser Ala Glu Phe Arg Val Gln Val Cys Ser Thr Gln
1175 1180 1185

Val His Cys Ala Ala Ala Cys His Pro Pro Lys Asp His Ile Val
1190 1195 1200

Asn Tyr Pro Ala Ser His Thr Thr Leu Gly Val Gln Asp Ile Ser
1205 1210 1215

Thr Thr Ala Met Ser Trp Val Gln Lys Ile Thr Gly Gly Val Gly
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Leu Ile Val Ala Val Ala Ala Leu Ile Leu Ile Val Val Leu Cys
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Val Ser Phe Ser Arg His
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Gln Tyr Cys Asn Ser Ile
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Ser Gly Gly Ile Tyr Asn Cys Glu Pro Ala Asn Pro Ser Glu Lys Asn
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Ser Pro Ser Thr Gln Tyr Cys Tyr Ser Ile Gln Gly Ser
20 25

<210> 43
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<212> PRT
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<400> 43

Ser Gly Tyr Asp Cys Glu Pro Ser Asn Ser Ser Glu Lys Asn Ser Pro
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Ser Thr Gln Tyr Cys Asn Ser Ile Gly Gly Ser
20 25

<210> 44
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<212> PRT
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Ser Gly Gly Tyr Asp Cys Glu Pro Ser Asn Ser Ser Glu Lys Asn Ser
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Pro Ser Thr Gln Tyr Cys Asn Ser Ile Gly Ser
20 25

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ctcgcccagc tgatctccgc agtcaacaaa ttgaccatgc gcgcggtacc tcaacagaag 180

cctcgcagaa atcggaaaaa caagaagcaa aggcagaaga agcaggcgcc gcaaaacgac 240

ccaaagcaaa agaagcaacc accacaaaag aagccggctc aaaagaagaa gaaaccaggc 300

cgtagggaga gaatgtgcat gaaaattgaa aatgattgca tcttcgaagt caagcatgaa 360

ggcaaagtga tgggctacgc atgcctggtg ggggataaag taatgaaacc agcacatgtg 420

aagggaacta tcgacaatgc cgatctggct aaactggcct ttaagcggtc gtctaaatac 480

gatcttgaat gtgcacagat accggtgcac atgaagtctg atgcctcgaa gtttacccac 540

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ttcactatcc cgacgggtgc aggcaagccg ggagacagcg gcagaccgat cttcgacaac 660

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tggagcctcg ccctcccggt cttgtgcctg ttggcaaaca ctacattccc ctgctctcag 840

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gacaacgtga tgagacccgg atactaccag ctactaaaag catcgctgac ttgctctccc 960

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cctgaccgca cgctgatgac gcagcagtct ggcaacgtga agatcacagt taatgggcag 1560

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Arg Pro Gln Arg Gln Ala Gly Gln Leu Ala Gln Leu Ile Ser Ala Val
        35                  40                  45

Asn Lys Leu Thr Met Arg Ala Val Pro Gln Gln Lys Pro Arg Arg Asn
    50                  55                  60

Arg Lys Asn Lys Lys Gln Arg Gln Lys Lys Gln Ala Pro Gln Asn Asp
65                  70                  75                  80

Pro Lys Gln Lys Lys Gln Pro Pro Gln Lys Lys Pro Ala Gln Lys Lys
                85                  90                  95

Lys Lys Pro Gly Arg Arg Glu Arg Met Cys Met Lys Ile Glu Asn Asp
            100                 105                 110

Cys Ile Phe Glu Val Lys His Glu Gly Lys Val Met Gly Tyr Ala Cys
        115                 120                 125

Leu Val Gly Asp Lys Val Met Lys Pro Ala His Val Lys Gly Thr Ile
    130                 135                 140

Asp Asn Ala Asp Leu Ala Lys Leu Ala Phe Lys Arg Ser Ser Lys Tyr
145                 150                 155                 160

Asp Leu Glu Cys Ala Gln Ile Pro Val His Met Lys Ser Asp Ala Ser
                165                 170                 175

Lys Phe Thr His Glu Lys Pro Glu Gly Tyr Tyr Asn Trp His His Gly
            180                 185                 190

Ala Val Gln Tyr Ser Gly Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly
        195                 200                 205

Lys Pro Gly Asp Ser Gly Arg Pro Ile Phe Asp Asn Lys Gly Arg Val
    210                 215                 220

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

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

Gly Ala Glu Glu Trp Ser Leu Ala Leu Pro Val Leu Cys Leu Leu Ala
            260                 265                 270

Asn Thr Thr Phe Pro Cys Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr
        275                 280                 285

Glu Lys Glu Pro Glu Ser Thr Leu Arg Met Leu Glu Asp Asn Val Met
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290 295 300

Arg Pro Gly Tyr Tyr Gln Leu Leu Lys Ala Ser Leu Thr Cys Ser Pro
305 310 315 320

His Arg Gln Arg Arg Ser Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala
325 330 335

Thr Arg Pro Tyr Leu Ala His Cys Pro Asp Cys Gly Glu Gly His Ser
340 345 350

Cys His Ser Pro Ile Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp
355 360 365

Gly Thr Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp
370 375 380

Asp Ser His Asp Trp Thr Lys Leu Arg Tyr Met Asp Ser His Thr Pro
385 390 395 400

Ala Asp Ala Glu Arg Ala Gly Leu Leu Val Arg Thr Ser Ala Pro Cys
405 410 415

Thr Ile Thr Gly Thr Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys
420 425 430

Gly Glu Thr Leu Thr Val Gly Phe Thr Asp Ser Arg Lys Ile Ser His
435 440 445

Thr Cys Thr His Pro Phe His His Glu Pro Pro Val Ile Gly Arg Glu
450 455 460

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

Tyr Val Gln Ser Thr Ala Ala Thr Ala Glu Glu Ile Glu Val His Met
485 490 495

Pro Pro Asp Thr Pro Asp Arg Thr Leu Met Thr Gln Gln Ser Gly Asn
500 505 510

Val Lys Ile Thr Val Asn Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys
515 520 525

Gly Gly Ser Gly Gly Ile Tyr Asn Cys Glu Pro Ala Asn Pro Ser Glu
530 535 540

Lys Asn Ser Pro Ser Thr Gln Tyr Cys Tyr Ser Ile Gln Gly Ser Asn
545 550 555 560

Glu Gly Leu Thr Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Ile Asp
565 570 575

Gln Cys His Ala Ala Val Thr Asn His Lys Asn Trp Gln Tyr Asn Ser

580 585 590

Pro Leu Val Pro Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly Lys Ile
595 600 605

His Ile Pro Phe Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala
610 615 620

Arg Asn Pro Thr Val Thr Tyr Gly Lys Asn Gln Val Thr Met Leu Leu
625 630 635 640

Tyr Pro Asp His Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Gln Glu
645 650 655

Pro Asn Tyr His Glu Glu Trp Val Thr His Lys Lys Glu Val Thr Leu
660 665 670

Thr Val Pro Thr Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro
675 680 685

Tyr Lys Tyr Trp Pro Gln Met Ser Thr Asn Gly Thr Ala His Gly His
690 695 700

Pro His Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr
705 710 715 720

Val Val Ile Val Ser Val Ala Ser Phe Val Leu Leu Ser Met Val Gly
725 730 735

Thr Ala Val Gly Met Cys Val Cys Ala Arg Arg Arg Cys Ile Thr Pro
740 745 750

Tyr Glu Leu Thr Pro Gly Ala Thr Val Pro Phe Leu Leu Ser Leu Leu
755 760 765

Cys Cys Val Arg Thr Thr Lys Ala Ala Thr Tyr Tyr Glu Ala Ala Ala
770 775 780

Tyr Leu Trp Asn Glu Gln Gln Pro Leu Phe Trp Leu Gln Ala Leu Ile
785 790 795 800

Pro Leu Ala Ala Leu Ile Val Leu Cys Asn Cys Leu Lys Leu Leu Pro
805 810 815

Cys Cys Cys Lys Thr Leu Ala Phe Leu Ala Val Met Ser Ile Gly Ala
820 825 830

His Thr Val Ser Ala Tyr Glu His Val Thr Val Ile Pro Asn Thr Val
835 840 845

Gly Val Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly Tyr Ser Pro Met
850 855 860

Val Leu Glu Met Glu Leu Gln Ser Val Thr Leu Glu Pro Thr Leu Ser

865 870 875 880

Leu Asp Tyr Ile Thr Cys Glu Tyr Lys Thr Val Ile Pro Ser Pro Tyr
885 890 895

Val Lys Cys Cys Gly Thr Ala Glu Cys Lys Asp Lys Ser Leu Pro Asp
900 905 910

Tyr Ser Cys Lys Val Phe Thr Gly Val Tyr Pro Phe Met Trp Gly Gly
915 920 925

Ala Tyr Cys Phe Cys Asp Ala Glu Asn Thr Gln Leu Ser Glu Ala His
930 935 940

Val Glu Lys Ser Glu Ser Cys Lys Thr Glu Phe Ala Ser Ala Tyr Arg
945 950 955 960

Ala His Thr Ala Ser Ala Ser Ala Lys Leu Arg Val Leu Tyr Gln Gly
965 970 975

Asn Asn Ile Thr Val Ala Ala Tyr Ala Asn Gly Asp His Ala Val Thr
980 985 990

Val Lys Asp Ala Lys Phe Val Val Gly Pro Met Ser Ser Ala Trp Thr
995 1000 1005

Pro Phe Asp Asn Lys Ile Val Val Tyr Lys Gly Asp Val Tyr Asn
1010 1015 1020

Met Asp Tyr Pro Pro Phe Gly Ala Gly Arg Pro Gly Gln Phe Gly
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Asp Ile Gln Ser Arg Thr Pro Glu Ser Lys Asp Val Tyr Ala Asn
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Thr Gln Leu Val Leu Gln Arg Pro Ala Ala Gly Thr Val His Val
1055 1060 1065

Pro Tyr Ser Gln Ala Pro Ser Gly Phe Lys Tyr Trp Leu Lys Glu
1070 1075 1080

Arg Gly Ala Ser Leu Gln His Thr Ala Pro Phe Gly Cys Gln Ile
1085 1090 1095

Ala Thr Asn Pro Val Arg Ala Val Asn Cys Ala Val Gly Asn Ile
1100 1105 1110

Pro Ile Ser Ile Asp Ile Pro Asp Ala Ala Phe Thr Arg Val Val
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Asp Ala Pro Ser Val Thr Asp Met Ser Cys Glu Val Pro Ala Cys
1130 1135 1140

Thr His Ser Ser Asp Phe Gly Gly Val Ala Ile Ile Lys Tyr Thr

1145 1150 1155

Ala Ser Lys Lys Gly Lys Cys Ala Val His Ser Met Thr Asn Ala
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Val Thr Ile Arg Glu Ala Asp Val Glu Val Glu Gly Asn Ser Gln
1175 1180 1185

Leu Gln Ile Ser Phe Ser Thr Ala Leu Ala Ser Ala Glu Phe Arg
1190 1195 1200

Val Gln Val Cys Ser Thr Gln Val His Cys Ala Ala Ala Cys His
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Pro Pro Lys Asp His Ile Val Asn Tyr Pro Ala Ser His Thr Thr
1220 1225 1230

Leu Gly Val Gln Asp Ile Ser Thr Thr Ala Met Ser Trp Val Gln
1235 1240 1245

Lys Ile Thr Gly Gly Val Gly Leu Ile Val Ala Val Ala Ala Leu
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Ile Leu Ile Val Val Leu Cys Val Ser Phe Ser Arg His
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ctcgcccagc tgatctccgc agtcaacaaa ttgaccatgc gcgcggtacc tcaacagaag 180

cctcgcagaa atcggaaaaa caagaagcaa aggcagaaga agcaggcgcc gcaaaacgac 240

ccaaagcaaa agaagcaacc accacaaaag aagccggctc aaaagaagaa gaaaccaggc 300

cgtagggaga gaatgtgcat gaaaattgaa aatgattgca tcttcgaagt caagcatgaa 360

ggcaaagtga tgggctacgc atgcctggtg ggggataaag taatgaaacc agcacatgtg 420

aagggaacta tcgacaatgc cgatctggct aaactggcct ttaagcggtc gtctaaatac 480

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ttcactatcc cgacgggtgc aggcaagccg ggagacagcg gcagaccgat cttcgacaac 660

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Asn Lys Leu Thr Met Arg Ala Val Pro Gln Gln Lys Pro Arg Arg Asn
50 55 60

Arg Lys Asn Lys Lys Gln Arg Gln Lys Lys Gln Ala Pro Gln Asn Asp
65 70 75 80

Pro Lys Gln Lys Lys Gln Pro Pro Gln Lys Lys Pro Ala Gln Lys Lys
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Lys Lys Pro Gly Arg Arg Glu Arg Met Cys Met Lys Ile Glu Asn Asp
100 105 110

Cys Ile Phe Glu Val Lys His Glu Gly Lys Val Met Gly Tyr Ala Cys
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Leu Val Gly Asp Lys Val Met Lys Pro Ala His Val Lys Gly Thr Ile
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Asp Asn Ala Asp Leu Ala Lys Leu Ala Phe Lys Arg Ser Ser Lys Tyr
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Asp Leu Glu Cys Ala Gln Ile Pro Val His Met Lys Ser Asp Ala Ser
165 170 175

Lys Phe Thr His Glu Lys Pro Glu Gly Tyr Tyr Asn Trp His His Gly
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Ala Val Gln Tyr Ser Gly Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly
195 200 205

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

225 230 235 240

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

Gly Ala Glu Glu Trp Ser Leu Ala Leu Pro Val Leu Cys Leu Leu Ala
260 265 270

Asn Thr Thr Phe Pro Cys Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr
275 280 285

Glu Lys Glu Pro Glu Ser Thr Leu Arg Met Leu Glu Asp Asn Val Met
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Arg Pro Gly Tyr Tyr Gln Leu Leu Lys Ala Ser Leu Thr Cys Ser Pro
305 310 315 320

His Arg Gln Arg Arg Ser Thr Lys Asp Asn Phe Asn Val Tyr Lys Ala
325 330 335

Thr Arg Pro Tyr Leu Ala His Cys Pro Asp Cys Gly Glu Gly His Ser
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Cys His Ser Pro Ile Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp
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Gly Thr Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp
370 375 380

Asp Ser His Asp Trp Thr Lys Leu Arg Tyr Met Asp Ser His Thr Pro
385 390 395 400

Ala Asp Ala Glu Arg Ala Gly Leu Leu Val Arg Thr Ser Ala Pro Cys
405 410 415

Thr Ile Thr Gly Thr Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys
420 425 430

Gly Glu Thr Leu Thr Val Gly Phe Thr Asp Ser Arg Lys Ile Ser His
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Thr Cys Thr His Pro Phe His His Glu Pro Pro Val Ile Gly Arg Glu
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Arg Phe His Ser Arg Pro Gln His Gly Lys Glu Leu Pro Cys Ser Thr
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Tyr Val Gln Ser Thr Ala Ala Thr Ala Glu Glu Ile Glu Val His Met
485 490 495

Pro Pro Asp Thr Pro Asp Arg Thr Leu Met Thr Gln Gln Ser Gly Asn
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Val Lys Ile Thr Val Asn Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys

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Gly Gly Ser Gly Tyr Asp Cys Glu Pro Ser Asn Ser Ser Glu Lys Asn
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Ser Pro Ser Thr Gln Tyr Cys Asn Ser Ile Gly Gly Ser Asn Glu Gly
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Leu Thr Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Ile Asp Gln Cys
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His Ala Ala Val Thr Asn His Lys Asn Trp Gln Tyr Asn Ser Pro Leu
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Val Pro Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly Lys Ile His Ile
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Pro Phe Pro Leu Ala Asn Val Thr Cys Arg Val Pro Lys Ala Arg Asn
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Pro Thr Val Thr Tyr Gly Lys Asn Gln Val Thr Met Leu Leu Tyr Pro
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Asp His Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Gln Glu Pro Asn
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Tyr His Glu Glu Trp Val Thr His Lys Lys Glu Val Thr Leu Thr Val
660 665 670

Pro Thr Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr Lys
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Tyr Trp Pro Gln Met Ser Thr Asn Gly Thr Ala His Gly His Pro His
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Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr Val Val
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Ile Val Ser Val Ala Ser Phe Val Leu Leu Ser Met Val Gly Thr Ala
725 730 735

Val Gly Met Cys Val Cys Ala Arg Arg Arg Cys Ile Thr Pro Tyr Glu
740 745 750

Leu Thr Pro Gly Ala Thr Val Pro Phe Leu Leu Ser Leu Leu Cys Cys
755 760 765

Val Arg Thr Thr Lys Ala Ala Thr Tyr Tyr Glu Ala Ala Ala Tyr Leu
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Ala Ala Leu Ile Val Leu Cys Asn Cys Leu Lys Leu Leu Pro Cys Cys

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Cys Lys Thr Leu Ala Phe Leu Ala Val Met Ser Ile Gly Ala His Thr
820 825 830

Val Ser Ala Tyr Glu His Val Thr Val Ile Pro Asn Thr Val Gly Val
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Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly Tyr Ser Pro Met Val Leu
850 855 860

Glu Met Glu Leu Gln Ser Val Thr Leu Glu Pro Thr Leu Ser Leu Asp
865 870 875 880

Tyr Ile Thr Cys Glu Tyr Lys Thr Val Ile Pro Ser Pro Tyr Val Lys
885 890 895

Cys Cys Gly Thr Ala Glu Cys Lys Asp Lys Ser Leu Pro Asp Tyr Ser
900 905 910

Cys Lys Val Phe Thr Gly Val Tyr Pro Phe Met Trp Gly Gly Ala Tyr
915 920 925

Cys Phe Cys Asp Ala Glu Asn Thr Gln Leu Ser Glu Ala His Val Glu
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Lys Ser Glu Ser Cys Lys Thr Glu Phe Ala Ser Ala Tyr Arg Ala His
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Thr Ala Ser Ala Ser Ala Lys Leu Arg Val Leu Tyr Gln Gly Asn Asn
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Ile Thr Val Ala Ala Tyr Ala Asn Gly Asp His Ala Val Thr Val Lys
980 985 990

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

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

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Lys Phe Thr His Glu Lys Pro Glu Gly Tyr Tyr Asn Trp His His Gly
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Ala Val Gln Tyr Ser Gly Gly Arg Phe Thr Ile Pro Thr Gly Ala Gly
        195                 200                 205

Lys Pro Gly Asp Ser Gly Arg Pro Ile Phe Asp Asn Lys Gly Arg Val
    210                 215                 220

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

Ser Val Val Thr Trp Asn Lys Asp Ile Val Thr Lys Ile Thr Pro Glu
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Gly Ala Glu Glu Trp Ser Leu Ala Leu Pro Val Leu Cys Leu Leu Ala
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Asn Thr Thr Phe Pro Cys Ser Gln Pro Pro Cys Thr Pro Cys Cys Tyr
        275                 280                 285

Glu Lys Glu Pro Glu Ser Thr Leu Arg Met Leu Glu Asp Asn Val Met
    290                 295                 300

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

Cys His Ser Pro Ile Ala Leu Glu Arg Ile Arg Asn Glu Ala Thr Asp
        355                 360                 365

Gly Thr Leu Lys Ile Gln Val Ser Leu Gln Ile Gly Ile Lys Thr Asp
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Asp Ser His Asp Trp Thr Lys Leu Arg Tyr Met Asp Ser His Thr Pro
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Ala Asp Ala Glu Arg Ala Gly Leu Leu Val Arg Thr Ser Ala Pro Cys
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Thr Ile Thr Gly Thr Met Gly His Phe Ile Leu Ala Arg Cys Pro Lys
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Gly Glu Thr Leu Thr Val Gly Phe Thr Asp Ser Arg Lys Ile Ser His
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Thr Cys Thr His Pro Phe His His Glu Pro Pro Val Ile Gly Arg Glu
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Pro Pro Asp Thr Pro Asp Arg Thr Leu Met Thr Gln Gln Ser Gly Asn
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Val Lys Ile Thr Val Asn Gly Gln Thr Val Arg Tyr Lys Cys Asn Cys
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Leu Thr Thr Thr Asp Lys Val Ile Asn Asn Cys Lys Ile Asp Gln Cys
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            580                 585                 590

Val Pro Arg Asn Ala Glu Leu Gly Asp Arg Lys Gly Lys Ile His Ile
        595                 600                 605

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Pro Thr Val Thr Tyr Gly Lys Asn Gln Val Thr Met Leu Leu Tyr Pro
625                 630                 635                 640

Asp His Pro Thr Leu Leu Ser Tyr Arg Asn Met Gly Gln Glu Pro Asn
                645                 650                 655

Tyr His Glu Glu Trp Val Thr His Lys Lys Glu Val Thr Leu Thr Val
            660                 665                 670

Pro Thr Glu Gly Leu Glu Val Thr Trp Gly Asn Asn Glu Pro Tyr Lys
        675                 680                 685

Tyr Trp Pro Gln Met Ser Thr Asn Gly Thr Ala His Gly His Pro His
    690                 695                 700

Glu Ile Ile Leu Tyr Tyr Tyr Glu Leu Tyr Pro Thr Met Thr Val Val
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Ile Val Ser Val Ala Ser Phe Val Leu Leu Ser Met Val Gly Thr Ala
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Val Gly Met Cys Val Cys Ala Arg Arg Arg Cys Ile Thr Pro Tyr Glu
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Leu Thr Pro Gly Ala Thr Val Pro Phe Leu Leu Ser Leu Leu Cys Cys
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Val Arg Thr Thr Lys Ala Ala Thr Tyr Tyr Glu Ala Ala Ala Tyr Leu
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Ala Ala Leu Ile Val Leu Cys Asn Cys Leu Lys Leu Leu Pro Cys Cys
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Cys Lys Thr Leu Ala Phe Leu Ala Val Met Ser Ile Gly Ala His Thr
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Val Ser Ala Tyr Glu His Val Thr Val Ile Pro Asn Thr Val Gly Val
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Pro Tyr Lys Thr Leu Val Asn Arg Pro Gly Tyr Ser Pro Met Val Leu
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Glu Met Glu Leu Gln Ser Val Thr Leu Glu Pro Thr Leu Ser Leu Asp
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Tyr Ile Thr Cys Glu Tyr Lys Thr Val Ile Pro Ser Pro Tyr Val Lys
885 890 895

Cys Cys Gly Thr Ala Glu Cys Lys Asp Lys Ser Leu Pro Asp Tyr Ser
900 905 910

Cys Lys Val Phe Thr Gly Val Tyr Pro Phe Met Trp Gly Gly Ala Tyr
915 920 925

Cys Phe Cys Asp Ala Glu Asn Thr Gln Leu Ser Glu Ala His Val Glu
930 935 940

Lys Ser Glu Ser Cys Lys Thr Glu Phe Ala Ser Ala Tyr Arg Ala His
945 950 955 960

Thr Ala Ser Ala Ser Ala Lys Leu Arg Val Leu Tyr Gln Gly Asn Asn
965 970 975

Ile Thr Val Ala Ala Tyr Ala Asn Gly Asp His Ala Val Thr Val Lys
980 985 990

Asp Ala Lys Phe Val Val Gly Pro Met Ser Ser Ala Trp Thr Pro Phe
995 1000 1005

Asp Asn Lys Ile Val Val Tyr Lys Gly Asp Val Tyr Asn Met Asp
1010 1015 1020

Tyr Pro Pro Phe Gly Ala Gly Arg Pro Gly Gln Phe Gly Asp Ile

1025 1030 1035

Gln Ser Arg Thr Pro Glu Ser Lys Asp Val Tyr Ala Asn Thr Gln
1040 1045 1050

Leu Val Leu Gln Arg Pro Ala Ala Gly Thr Val His Val Pro Tyr
1055 1060 1065

Ser Gln Ala Pro Ser Gly Phe Lys Tyr Trp Leu Lys Glu Arg Gly
1070 1075 1080

Ala Ser Leu Gln His Thr Ala Pro Phe Gly Cys Gln Ile Ala Thr
1085 1090 1095

Asn Pro Val Arg Ala Val Asn Cys Ala Val Gly Asn Ile Pro Ile
1100 1105 1110

Ser Ile Asp Ile Pro Asp Ala Ala Phe Thr Arg Val Val Asp Ala
1115 1120 1125

Pro Ser Val Thr Asp Met Ser Cys Glu Val Pro Ala Cys Thr His
1130 1135 1140

Ser Ser Asp Phe Gly Gly Val Ala Ile Ile Lys Tyr Thr Ala Ser
1145 1150 1155

Lys Lys Gly Lys Cys Ala Val His Ser Met Thr Asn Ala Val Thr
1160 1165 1170

Ile Arg Glu Ala Asp Val Glu Val Glu Gly Asn Ser Gln Leu Gln
1175 1180 1185

Ile Ser Phe Ser Thr Ala Leu Ala Ser Ala Glu Phe Arg Val Gln
1190 1195 1200

Val Cys Ser Thr Gln Val His Cys Ala Ala Ala Cys His Pro Pro
1205 1210 1215

Lys Asp His Ile Val Asn Tyr Pro Ala Ser His Thr Thr Leu Gly
1220 1225 1230

Val Gln Asp Ile Ser Thr Thr Ala Met Ser Trp Val Gln Lys Ile
1235 1240 1245

Thr Gly Gly Val Gly Leu Ile Val Ala Val Ala Ala Leu Ile Leu
1250 1255 1260

Ile Val Val Leu Cys Val Ser Phe Ser Arg His
1265 1270