SEQUENCE LISTING

<110> GenEdit Inc.

<120> CATIONIC POLYMER WITH ALKYL SIDE CHAINS

<130> 513107

<150> 62663985
<151> 2018-04-27

<150> 62750097
<151> 2018-10-24

<160> 20

<170> PatentIn version 3.5

<210> 1
<211> 1368
<212> PRT
<213> Streptococcus pyogenes

<220>
<221> MISC_FEATURE
<222> (1)..(20)
<223> AKP81606.1

<220>
<221> MISC_FEATURE
<222> (1)..(1368)
<223> AKP81606.1

<400> 1

Met Asp Lys Lys Tyr Ser Ile Gly Leu Asp Ile Gly Thr Asn Ser Val
1 5 10 15

Gly Trp Ala Val Ile Thr Asp Asp Tyr Lys Val Pro Ser Lys Lys Phe
20 25 30

Lys Val Leu Gly Asn Thr Asp Arg His Ser Ile Lys Lys Asn Leu Ile
35 40 45

Gly Ala Leu Leu Phe Asp Ser Gly Glu Thr Ala Glu Ala Thr Arg Leu
50 55 60

Lys Arg Thr Ala Arg Arg Arg Tyr Thr Arg Arg Lys Asn Arg Ile Cys
65 70 75 80

```
Tyr Leu Gln Glu Ile Phe Ser Asn Glu Met Ala Lys Val Asp Asp Ser
                85                  90                  95

Phe Phe His Arg Leu Glu Glu Ser Phe Leu Val Glu Glu Asp Lys Lys
            100                 105                 110

His Glu Arg His Pro Ile Phe Gly Asn Ile Val Asp Glu Val Ala Tyr
        115                 120                 125

His Glu Lys Tyr Pro Thr Ile Tyr His Leu Arg Lys Lys Leu Val Asp
    130                 135                 140

Ser Thr Asp Lys Ala Asp Leu Arg Leu Ile Tyr Leu Ala Leu Ala His
145                 150                 155                 160

Met Ile Lys Phe Arg Gly His Phe Leu Ile Glu Gly Asp Leu Asn Pro
                165                 170                 175

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

Asn Gln Leu Phe Glu Glu Asn Pro Ile Asn Ala Ser Gly Val Asp Ala
        195                 200                 205

Lys Ala Ile Leu Ser Ala Arg Leu Ser Lys Ser Arg Arg Leu Glu Asn
    210                 215                 220

Leu Ile Ala Gln Leu Pro Gly Glu Lys Lys Asn Ser Leu Phe Gly Asn
225                 230                 235                 240

Leu Ile Ala Leu Ser Leu Gly Leu Thr Pro Asn Phe Lys Ser Asn Phe
                245                 250                 255

Asp Leu Ala Glu Asp Ala Lys Leu Gln Leu Ser Lys Asp Thr Tyr Asp
            260                 265                 270

Asp Asp Leu Asp Asn Leu Leu Ala Gln Ile Gly Asp Gln Tyr Ala Asp
        275                 280                 285
```

```
Leu Phe Leu Ala Ala Lys Asn Leu Ser Asp Ala Ile Leu Leu Ser Asp
    290                 295                 300

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

Met Ile Lys Arg Tyr Asp Glu His His Gln Asp Leu Thr Leu Leu Lys
                325                 330                 335

Ala Leu Val Arg Gln Gln Leu Pro Glu Lys Tyr Lys Glu Ile Phe Phe
            340                 345                 350

Asp Gln Ser Lys Asn Gly Tyr Ala Gly Tyr Ile Asp Gly Gly Ala Ser
        355                 360                 365

Gln Glu Glu Phe Tyr Lys Phe Ile Lys Pro Ile Leu Glu Lys Met Asp
    370                 375                 380

Gly Thr Glu Glu Leu Leu Val Lys Leu Asn Arg Glu Asp Leu Leu Arg
385                 390                 395                 400

Lys Gln Arg Thr Phe Asp Asn Gly Ser Ile Pro His Gln Ile His Leu
                405                 410                 415

Gly Glu Leu His Ala Ile Leu Arg Arg Gln Glu Asp Phe Tyr Pro Phe
            420                 425                 430

Leu Lys Asp Asn Arg Glu Lys Ile Glu Lys Ile Leu Thr Phe Arg Ile
        435                 440                 445

Pro Tyr Tyr Val Gly Pro Leu Ala Arg Gly Asn Ser Arg Phe Ala Trp
    450                 455                 460

Met Thr Arg Lys Ser Glu Glu Thr Ile Thr Pro Trp Asn Phe Glu Glu
465                 470                 475                 480

Val Val Asp Lys Gly Ala Ser Ala Gln Ser Phe Ile Glu Arg Met Thr
                485                 490                 495

Asn Phe Asp Lys Asn Leu Pro Asn Glu Lys Val Leu Pro Lys His Ser
            500                 505                 510
```

```
Leu Leu Tyr Glu Tyr Phe Thr Val Tyr Asn Glu Leu Thr Lys Val Lys
        515                 520                 525

Tyr Val Thr Glu Gly Met Arg Lys Pro Ala Phe Leu Ser Gly Glu Gln
    530                 535                 540

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

Val Lys Gln Leu Lys Glu Asp Tyr Phe Lys Lys Ile Glu Cys Phe Asp
                565                 570                 575

Ser Val Glu Ile Ser Gly Val Glu Asp Arg Phe Asn Ala Ser Leu Gly
            580                 585                 590

Thr Tyr His Asp Leu Leu Lys Ile Ile Lys Asp Lys Asp Phe Leu Asp
        595                 600                 605

Asn Glu Glu Asn Glu Asp Ile Leu Glu Asp Ile Val Leu Thr Leu Thr
    610                 615                 620

Leu Phe Glu Asp Arg Glu Met Ile Glu Glu Arg Leu Lys Thr Tyr Ala
625                 630                 635                 640

His Leu Phe Asp Asp Lys Val Met Lys Gln Leu Lys Arg Arg Arg Tyr
                645                 650                 655

Thr Gly Trp Gly Arg Leu Ser Arg Lys Leu Ile Asn Gly Ile Arg Asp
            660                 665                 670

Lys Gln Ser Gly Lys Thr Ile Leu Asp Phe Leu Lys Ser Asp Gly Phe
        675                 680                 685

Ala Asn Arg Asn Phe Met Gln Leu Ile His Asp Asp Ser Leu Thr Phe
    690                 695                 700

Lys Glu Asp Ile Gln Lys Ala Gln Val Ser Gly Gln Gly Asp Ser Leu
705                 710                 715                 720
```

```
His Glu His Ile Ala Asn Leu Ala Gly Ser Pro Ala Ile Lys Lys Gly
                725                 730                 735

Ile Leu Gln Thr Val Lys Val Val Asp Glu Leu Val Lys Val Met Gly
            740                 745                 750

Arg His Lys Pro Glu Asn Ile Val Ile Glu Met Ala Arg Glu Asn Gln
        755                 760                 765

Thr Thr Gln Lys Gly Gln Lys Asn Ser Arg Glu Arg Met Lys Arg Ile
    770                 775                 780

Glu Glu Gly Ile Lys Glu Leu Gly Ser Gln Ile Leu Lys Glu His Pro
785                 790                 795                 800

Val Glu Asn Thr Gln Leu Gln Asn Glu Lys Leu Tyr Leu Tyr Tyr Leu
                805                 810                 815

Gln Asn Gly Arg Asp Met Tyr Val Asp Gln Glu Leu Asp Ile Asn Arg
            820                 825                 830

Leu Ser Asp Tyr Asp Val Asp His Ile Val Pro Gln Ser Phe Leu Lys
        835                 840                 845

Asp Asp Ser Ile Asp Asn Lys Val Leu Thr Arg Ser Asp Lys Asn Arg
    850                 855                 860

Gly Lys Ser Asp Asn Val Pro Ser Glu Glu Val Val Lys Lys Met Lys
865                 870                 875                 880

Asn Tyr Trp Arg Gln Leu Leu Asn Ala Lys Leu Ile Thr Gln Arg Lys
                885                 890                 895

Phe Asp Asn Leu Thr Lys Ala Glu Arg Gly Gly Leu Ser Glu Leu Asp
            900                 905                 910

Lys Ala Gly Phe Ile Lys Arg Gln Leu Val Glu Thr Arg Gln Ile Thr
        915                 920                 925

Lys His Val Ala Gln Ile Leu Asp Ser Arg Met Asn Thr Lys Tyr Asp
    930                 935                 940
```

```
Glu Asn Asp Lys Leu Ile Arg Glu Val Lys Val Ile Thr Leu Lys Ser
945                 950                 955                 960


Lys Leu Val Ser Asp Phe Arg Lys Asp Phe Gln Phe Tyr Lys Val Arg
                965                 970                 975


Glu Ile Asn Asn Tyr His His Ala His Asp Ala Tyr Leu Asn Ala Val
            980                 985                 990


Val Gly Thr Ala Leu Ile Lys Lys  Tyr Pro Lys Leu Glu  Ser Glu Phe
        995                 1000                1005


Val Tyr  Gly Asp Tyr Lys Val  Tyr Asp Val Arg Lys  Met Ile Ala
    1010                1015                1020


Lys Ser  Glu Gln Glu Ile Gly  Lys Ala Thr Ala Lys  Tyr Phe Phe
    1025                1030                1035


Tyr Ser  Asn Ile Met Asn Phe  Phe Lys Thr Glu Ile  Thr Leu Ala
    1040                1045                1050


Asn Gly  Glu Ile Arg Lys Arg  Pro Leu Ile Glu Thr  Asn Gly Glu
    1055                1060                1065


Thr Gly  Glu Ile Val Trp Asp  Lys Gly Arg Asp Phe  Ala Thr Val
    1070                1075                1080


Arg Lys  Val Leu Ser Met Pro  Gln Val Asn Ile Val  Lys Lys Thr
    1085                1090                1095


Glu Val  Gln Thr Gly Gly Phe  Ser Lys Glu Ser Ile  Leu Pro Lys
    1100                1105                1110


Arg Asn  Ser Asp Lys Leu Ile  Ala Arg Lys Lys Asp  Trp Asp Pro
    1115                1120                1125


Lys Lys  Tyr Gly Gly Phe Asp  Ser Pro Thr Val Ala  Tyr Ser Val
    1130                1135                1140
```

```
Leu Val  Val Ala Lys Val Glu  Lys Gly Lys Ser Lys  Lys Leu Lys
    1145                1150                1155

Ser Val  Lys Glu Leu Leu Gly  Ile Thr Ile Met Glu  Arg Ser Ser
    1160                1165                1170

Phe Glu  Lys Asn Pro Ile Asp  Phe Leu Glu Ala Lys  Gly Tyr Lys
    1175                1180                1185

Glu Val  Lys Lys Asp Leu Ile  Ile Lys Leu Pro Lys  Tyr Ser Leu
    1190                1195                1200

Phe Glu  Leu Glu Asn Gly Arg  Lys Arg Met Leu Ala  Ser Ala Gly
    1205                1210                1215

Glu Leu  Gln Lys Gly Asn Glu  Leu Ala Leu Pro Ser  Lys Tyr Val
    1220                1225                1230

Asn Phe  Leu Tyr Leu Ala Ser  His Tyr Glu Lys Leu  Lys Gly Ser
    1235                1240                1245

Pro Glu  Asp Asn Glu Gln Lys  Gln Leu Phe Val Glu  Gln His Lys
    1250                1255                1260

His Tyr  Leu Asp Glu Ile Ile  Glu Gln Ile Ser Glu  Phe Ser Lys
    1265                1270                1275

Arg Val  Ile Leu Ala Asp Ala  Asn Leu Asp Lys Val  Leu Ser Ala
    1280                1285                1290

Tyr Asn  Lys His Arg Asp Lys  Pro Ile Arg Glu Gln  Ala Glu Asn
    1295                1300                1305

Ile Ile  His Leu Phe Thr Leu  Thr Asn Leu Gly Ala  Pro Ala Ala
    1310                1315                1320

Phe Lys  Tyr Phe Asp Thr Thr  Ile Asp Arg Lys Arg  Tyr Thr Ser
    1325                1330                1335

Thr Lys  Glu Val Leu Asp Ala  Thr Leu Ile His Gln  Ser Ile Thr
    1340                1345                1350
```

Gly Leu Tyr Glu Thr Arg Ile Asp Leu Ser Gln Leu Gly Gly Asp
1355 1360 1365

<210> 2
<211> 2560
<212> PRT
<213> Francisella tularensis

<400> 2

Met Asp Lys Lys Tyr Ser Ile Gly Leu Asp Ile Gly Thr Asn Ser Val
1 5 10 15

Gly Trp Ala Val Ile Thr Asp Asp Tyr Lys Val Pro Ser Lys Lys Phe
20 25 30

Lys Val Leu Gly Asn Thr Asp Arg His Ser Ile Lys Lys Asn Leu Ile
35 40 45

Gly Ala Leu Leu Phe Asp Ser Gly Glu Thr Ala Glu Ala Thr Arg Leu
50 55 60

Lys Arg Thr Ala Arg Arg Arg Tyr Thr Arg Arg Lys Asn Arg Ile Cys
65 70 75 80

Tyr Leu Gln Glu Ile Phe Ser Asn Glu Met Ala Lys Val Asp Asp Ser
85 90 95

Phe Phe His Arg Leu Glu Glu Ser Phe Leu Val Glu Glu Asp Lys Lys
100 105 110

His Glu Arg His Pro Ile Phe Gly Asn Ile Val Asp Glu Val Ala Tyr
115 120 125

His Glu Lys Tyr Pro Thr Ile Tyr His Leu Arg Lys Lys Leu Val Asp
130 135 140

Ser Thr Asp Lys Ala Asp Leu Arg Leu Ile Tyr Leu Ala Leu Ala His
145 150 155 160

Met Ile Lys Phe Arg Gly His Phe Leu Ile Glu Gly Asp Leu Asn Pro

```
                165                 170                 175

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

Asn Gln Leu Phe Glu Glu Asn Pro Ile Asn Ala Ser Gly Val Asp Ala
        195                 200                 205

Lys Ala Ile Leu Ser Ala Arg Leu Ser Lys Ser Arg Arg Leu Glu Asn
    210                 215                 220

Leu Ile Ala Gln Leu Pro Gly Glu Lys Lys Asn Ser Leu Phe Gly Asn
225                 230                 235                 240

Leu Ile Ala Leu Ser Leu Gly Leu Thr Pro Asn Phe Lys Ser Asn Phe
                245                 250                 255

Asp Leu Ala Glu Asp Ala Lys Leu Gln Leu Ser Lys Asp Thr Tyr Asp
            260                 265                 270

Asp Asp Leu Asp Asn Leu Leu Ala Gln Ile Gly Asp Gln Tyr Ala Asp
        275                 280                 285

Leu Phe Leu Ala Ala Lys Asn Leu Ser Asp Ala Ile Leu Leu Ser Asp
    290                 295                 300

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

Met Ile Lys Arg Tyr Asp Glu His His Gln Asp Leu Thr Leu Leu Lys
                325                 330                 335

Ala Leu Val Arg Gln Gln Leu Pro Glu Lys Tyr Lys Glu Ile Phe Phe
            340                 345                 350

Asp Gln Ser Lys Asn Gly Tyr Ala Gly Tyr Ile Asp Gly Gly Ala Ser
        355                 360                 365

Gln Glu Glu Phe Tyr Lys Phe Ile Lys Pro Ile Leu Glu Lys Met Asp
    370                 375                 380
```

```
Gly Thr Glu Glu Leu Leu Val Lys Leu Asn Arg Glu Asp Leu Leu Arg
385                 390                 395                 400

Lys Gln Arg Thr Phe Asp Asn Gly Ser Ile Pro His Gln Ile His Leu
                405                 410                 415

Gly Glu Leu His Ala Ile Leu Arg Arg Gln Glu Asp Phe Tyr Pro Phe
            420                 425                 430

Leu Lys Asp Asn Arg Glu Lys Ile Glu Lys Ile Leu Thr Phe Arg Ile
        435                 440                 445

Pro Tyr Tyr Val Gly Pro Leu Ala Arg Gly Asn Ser Arg Phe Ala Trp
    450                 455                 460

Met Thr Arg Lys Ser Glu Glu Thr Ile Thr Pro Trp Asn Phe Glu Glu
465                 470                 475                 480

Val Val Asp Lys Gly Ala Ser Ala Gln Ser Phe Ile Glu Arg Met Thr
                485                 490                 495

Asn Phe Asp Lys Asn Leu Pro Asn Glu Lys Val Leu Pro Lys His Ser
            500                 505                 510

Leu Leu Tyr Glu Tyr Phe Thr Val Tyr Asn Glu Leu Thr Lys Val Lys
        515                 520                 525

Tyr Val Thr Glu Gly Met Arg Lys Pro Ala Phe Leu Ser Gly Glu Gln
    530                 535                 540

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

Val Lys Gln Leu Lys Glu Asp Tyr Phe Lys Lys Ile Glu Cys Phe Asp
                565                 570                 575

Ser Val Glu Ile Ser Gly Val Glu Asp Arg Phe Asn Ala Ser Leu Gly
            580                 585                 590

Thr Tyr His Asp Leu Leu Lys Ile Ile Lys Asp Lys Asp Phe Leu Asp
```

595 600 605

Asn Glu Glu Asn Glu Asp Ile Leu Glu Asp Ile Val Leu Thr Leu Thr
610 615 620

Leu Phe Glu Asp Arg Glu Met Ile Glu Glu Arg Leu Lys Thr Tyr Ala
625 630 635 640

His Leu Phe Asp Asp Lys Val Met Lys Gln Leu Lys Arg Arg Arg Tyr
645 650 655

Thr Gly Trp Gly Arg Leu Ser Arg Lys Leu Ile Asn Gly Ile Arg Asp
660 665 670

Lys Gln Ser Gly Lys Thr Ile Leu Asp Phe Leu Lys Ser Asp Gly Phe
675 680 685

Ala Asn Arg Asn Phe Met Gln Leu Ile His Asp Asp Ser Leu Thr Phe
690 695 700

Lys Glu Asp Ile Gln Lys Ala Gln Val Ser Gly Gln Gly Asp Ser Leu
705 710 715 720

His Glu His Ile Ala Asn Leu Ala Gly Ser Pro Ala Ile Lys Lys Gly
725 730 735

Ile Leu Gln Thr Val Lys Val Val Asp Glu Leu Val Lys Val Met Gly
740 745 750

Arg His Lys Pro Glu Asn Ile Val Ile Glu Met Ala Arg Glu Asn Gln
755 760 765

Thr Thr Gln Lys Gly Gln Lys Asn Ser Arg Glu Arg Met Lys Arg Ile
770 775 780

Glu Glu Gly Ile Lys Glu Leu Gly Ser Gln Ile Leu Lys Glu His Pro
785 790 795 800

Val Glu Asn Thr Gln Leu Gln Asn Glu Lys Leu Tyr Leu Tyr Tyr Leu
805 810 815

```
Gln Asn Gly Arg Asp Met Tyr Val Asp Gln Glu Leu Asp Ile Asn Arg
            820                 825                 830

Leu Ser Asp Tyr Asp Val Asp His Ile Val Pro Gln Ser Phe Leu Lys
        835                 840                 845

Asp Asp Ser Ile Asp Asn Lys Val Leu Thr Arg Ser Asp Lys Asn Arg
    850                 855                 860

Gly Lys Ser Asp Asn Val Pro Ser Glu Glu Val Val Lys Lys Met Lys
865                 870                 875                 880

Asn Tyr Trp Arg Gln Leu Leu Asn Ala Lys Leu Ile Thr Gln Arg Lys
                885                 890                 895

Phe Asp Asn Leu Thr Lys Ala Glu Arg Gly Gly Leu Ser Glu Leu Asp
            900                 905                 910

Lys Ala Gly Phe Ile Lys Arg Gln Leu Val Glu Thr Arg Gln Ile Thr
        915                 920                 925

Lys His Val Ala Gln Ile Leu Asp Ser Arg Met Asn Thr Lys Tyr Asp
    930                 935                 940

Glu Asn Asp Lys Leu Ile Arg Glu Val Lys Val Ile Thr Leu Lys Ser
945                 950                 955                 960

Lys Leu Val Ser Asp Phe Arg Lys Asp Phe Gln Phe Tyr Lys Val Arg
                965                 970                 975

Glu Ile Asn Asn Tyr His His Ala His Asp Ala Tyr Leu Asn Ala Val
            980                 985                 990

Val Gly Thr Ala Leu Ile Lys Lys  Tyr Pro Lys Leu Glu  Ser Glu Phe
        995                 1000                1005

Val Tyr  Gly Asp Tyr Lys Val  Tyr Asp Val Arg Lys  Met Ile Ala
    1010                1015                1020

Lys Ser  Glu Gln Glu Ile Gly  Lys Ala Thr Ala Lys  Tyr Phe Phe
```

```
    1025                1030                1035

Tyr Ser  Asn Ile Met Asn Phe  Phe Lys Thr Glu Ile  Thr Leu Ala
    1040                1045                1050

Asn Gly  Glu Ile Arg Lys Arg  Pro Leu Ile Glu Thr  Asn Gly Glu
    1055                1060                1065

Thr Gly  Glu Ile Val Trp Asp  Lys Gly Arg Asp Phe  Ala Thr Val
    1070                1075                1080

Arg Lys  Val Leu Ser Met Pro  Gln Val Asn Ile Val  Lys Lys Thr
    1085                1090                1095

Glu Val  Gln Thr Gly Gly Phe  Ser Lys Glu Ser Ile  Leu Pro Lys
    1100                1105                1110

Arg Asn  Ser Asp Lys Leu Ile  Ala Arg Lys Lys Asp  Trp Asp Pro
    1115                1120                1125

Lys Lys  Tyr Gly Gly Phe Asp  Ser Pro Thr Val Ala  Tyr Ser Val
    1130                1135                1140

Leu Val  Val Ala Lys Val Glu  Lys Gly Lys Ser Lys  Lys Leu Lys
    1145                1150                1155

Ser Val  Lys Glu Leu Leu Gly  Ile Thr Ile Met Glu  Arg Ser Ser
    1160                1165                1170

Phe Glu  Lys Asn Pro Ile Asp  Phe Leu Glu Ala Lys  Gly Tyr Lys
    1175                1180                1185

Glu Val  Lys Lys Asp Leu Ile  Ile Lys Leu Pro Lys  Tyr Ser Leu
    1190                1195                1200

Phe Glu  Leu Glu Asn Gly Arg  Lys Arg Met Leu Ala  Ser Ala Gly
    1205                1210                1215

Glu Leu  Gln Lys Gly Asn Glu  Leu Ala Leu Pro Ser  Lys Tyr Val
    1220                1225                1230
```

```
Asn Phe  Leu Tyr Leu Ala Ser  His Tyr Glu Lys Leu  Lys Gly Ser
    1235                1240                1245

Pro Glu  Asp Asn Glu Gln Lys  Gln Leu Phe Val Glu  Met Ser Ile
    1250                1255                1260

Tyr Gln  Glu Phe Val Asn Lys  Tyr Ser Leu Ser Lys  Thr Leu Arg
    1265                1270                1275

Phe Glu  Leu Ile Pro Gln Gly  Lys Thr Leu Glu Asn  Ile Lys Ala
    1280                1285                1290

Arg Gly  Leu Ile Leu Asp Asp  Glu Lys Arg Ala Lys  Asp Tyr Lys
    1295                1300                1305

Lys Ala  Lys Gln Ile Ile Asp  Lys Tyr His Gln Phe  Phe Ile Glu
    1310                1315                1320

Glu Ile  Leu Ser Ser Val Cys  Ile Ser Glu Asp Leu  Leu Gln Asn
    1325                1330                1335

Tyr Ser  Asp Val Tyr Phe Lys  Leu Lys Lys Ser Asp  Asp Asp Asn
    1340                1345                1350

Leu Gln  Lys Asp Phe Lys Ser  Ala Lys Asp Thr Ile  Lys Lys Gln
    1355                1360                1365

Ile Ser  Glu Tyr Ile Lys Asp  Ser Glu Lys Phe Lys  Asn Leu Phe
    1370                1375                1380

Asn Gln  Asn Leu Ile Asp Ala  Lys Lys Gly Gln Glu  Ser Asp Leu
    1385                1390                1395

Ile Leu  Trp Leu Lys Gln Ser  Lys Asp Asn Gly Ile  Glu Leu Phe
    1400                1405                1410

Lys Ala  Asn Ser Asp Ile Thr  Asp Ile Asp Glu Ala  Leu Glu Ile
    1415                1420                1425

Ile Lys  Ser Phe Lys Gly Trp  Thr Thr Tyr Phe Lys  Gly Phe His
```

```
    1430                1435                1440

Glu Asn  Arg Lys Asn Val Tyr  Ser Ser Asn Asp Ile  Pro Thr Ser
    1445                1450                1455

Ile Ile  Tyr Arg Ile Val Asp  Asp Asn Leu Pro Lys  Phe Leu Glu
    1460                1465                1470

Asn Lys  Ala Lys Tyr Glu Ser  Leu Lys Asp Lys Ala  Pro Glu Ala
    1475                1480                1485

Ile Asn  Tyr Glu Gln Ile Lys  Lys Asp Leu Ala Glu  Glu Leu Thr
    1490                1495                1500

Phe Asp  Ile Asp Tyr Lys Thr  Ser Glu Val Asn Gln  Arg Val Phe
    1505                1510                1515

Ser Leu  Asp Glu Val Phe Glu  Ile Ala Asn Phe Asn  Asn Tyr Leu
    1520                1525                1530

Asn Gln  Ser Gly Ile Thr Lys  Phe Asn Thr Ile Ile  Gly Gly Lys
    1535                1540                1545

Phe Val  Asn Gly Glu Asn Thr  Lys Arg Lys Gly Ile  Asn Glu Tyr
    1550                1555                1560

Ile Asn  Leu Tyr Ser Gln Gln  Ile Asn Asp Lys Thr  Leu Lys Lys
    1565                1570                1575

Tyr Lys  Met Ser Val Leu Phe  Lys Gln Ile Leu Ser  Asp Thr Glu
    1580                1585                1590

Ser Lys  Ser Phe Val Ile Asp  Lys Leu Glu Asp Asp  Ser Asp Val
    1595                1600                1605

Val Thr  Thr Met Gln Ser Phe  Tyr Glu Gln Ile Ala  Ala Phe Lys
    1610                1615                1620

Thr Val  Glu Glu Lys Ser Ile  Lys Glu Thr Leu Ser  Leu Leu Phe
    1625                1630                1635
```

```
Asp Asp  Leu Lys Ala Gln Lys  Leu Asp Leu Ser Lys  Ile Tyr Phe
    1640                1645                1650

Lys Asn  Asp Lys Ser Leu Thr  Asp Leu Ser Gln Gln  Val Phe Asp
    1655                1660                1665

Asp Tyr  Ser Val Ile Gly Thr  Ala Val Leu Glu Tyr  Ile Thr Gln
    1670                1675                1680

Gln Ile  Ala Pro Lys Asn Leu  Asp Asn Pro Ser Lys  Lys Glu Gln
    1685                1690                1695

Glu Leu  Ile Ala Lys Lys Thr  Glu Lys Ala Lys Tyr  Leu Ser Leu
    1700                1705                1710

Glu Thr  Ile Lys Leu Ala Leu  Glu Glu Phe Asn Lys  His Arg Asp
    1715                1720                1725

Ile Asp  Lys Gln Cys Arg Phe  Glu Glu Ile Leu Ala  Asn Phe Ala
    1730                1735                1740

Ala Ile  Pro Met Ile Phe Asp  Glu Ile Ala Gln Asn  Lys Asp Asn
    1745                1750                1755

Leu Ala  Gln Ile Ser Ile Lys  Tyr Gln Asn Gln Gly  Lys Lys Asp
    1760                1765                1770

Leu Leu  Gln Ala Ser Ala Glu  Asp Asp Val Lys Ala  Ile Lys Asp
    1775                1780                1785

Leu Leu  Asp Gln Thr Asn Asn  Leu Leu His Lys Leu  Lys Ile Phe
    1790                1795                1800

His Ile  Ser Gln Ser Glu Asp  Lys Ala Asn Ile Leu  Asp Lys Asp
    1805                1810                1815

Glu His  Phe Tyr Leu Val Phe  Glu Glu Cys Tyr Phe  Glu Leu Ala
    1820                1825                1830

Asn Ile  Val Pro Leu Tyr Asn  Lys Ile Arg Asn Tyr  Ile Thr Gln
```

```
    1835                1840                1845

Lys Pro  Tyr Ser Asp Glu Lys  Phe Lys Leu Asn Phe  Glu Asn Ser
    1850                1855                1860

Thr Leu  Ala Asn Gly Trp Asp  Lys Asn Lys Glu Pro  Asp Asn Thr
    1865                1870                1875

Ala Ile  Leu Phe Ile Lys Asp  Asp Lys Tyr Tyr Leu  Gly Val Met
    1880                1885                1890

Asn Lys  Lys Asn Asn Lys Ile  Phe Asp Asp Lys Ala  Ile Lys Glu
    1895                1900                1905

Asn Lys  Gly Glu Gly Tyr Lys  Lys Ile Val Tyr Lys  Leu Leu Pro
    1910                1915                1920

Gly Ala  Asn Lys Met Leu Pro  Lys Val Phe Phe Ser  Ala Lys Ser
    1925                1930                1935

Ile Lys  Phe Tyr Asn Pro Ser  Glu Asp Ile Leu Arg  Ile Arg Asn
    1940                1945                1950

His Ser  Thr His Thr Lys Asn  Gly Ser Pro Gln Lys  Gly Tyr Glu
    1955                1960                1965

Lys Phe  Glu Phe Asn Ile Glu  Asp Cys Arg Lys Phe  Ile Asp Phe
    1970                1975                1980

Tyr Lys  Gln Ser Ile Ser Lys  His Pro Glu Trp Lys  Asp Phe Gly
    1985                1990                1995

Phe Arg  Phe Ser Asp Thr Gln  Arg Tyr Asn Ser Ile  Asp Glu Phe
    2000                2005                2010

Tyr Arg  Glu Val Glu Asn Gln  Gly Tyr Lys Leu Thr  Phe Glu Asn
    2015                2020                2025

Ile Ser  Glu Ser Tyr Ile Asp  Ser Val Val Asn Gln  Gly Lys Leu
    2030                2035                2040
```

```
Tyr Leu  Phe Gln Ile Tyr Asn  Lys Asp Phe Ser Ala  Tyr Ser Lys
    2045                2050                2055

Gly Arg  Pro Asn Leu His Thr  Leu Tyr Trp Lys Ala  Leu Phe Asp
    2060                2065                2070

Glu Arg  Asn Leu Gln Asp Val  Val Tyr Lys Leu Asn  Gly Glu Ala
    2075                2080                2085

Glu Leu  Phe Tyr Arg Lys Gln  Ser Ile Pro Lys Lys  Ile Thr His
    2090                2095                2100

Pro Ala  Lys Glu Ala Ile Ala  Asn Lys Asn Lys Asp  Asn Pro Lys
    2105                2110                2115

Lys Glu  Ser Val Phe Glu Tyr  Asp Leu Ile Lys Asp  Lys Arg Phe
    2120                2125                2130

Thr Glu  Asp Lys Phe Phe Phe  His Cys Pro Ile Thr  Ile Asn Phe
    2135                2140                2145

Lys Ser  Ser Gly Ala Asn Lys  Phe Asn Asp Glu Ile  Asn Leu Leu
    2150                2155                2160

Leu Lys  Glu Lys Ala Asn Asp  Val His Ile Leu Ser  Ile Asp Arg
    2165                2170                2175

Gly Glu  Arg His Leu Ala Tyr  Tyr Thr Leu Val Asp  Gly Lys Gly
    2180                2185                2190

Asn Ile  Ile Lys Gln Asp Thr  Phe Asn Ile Ile Gly  Asn Asp Arg
    2195                2200                2205

Met Lys  Thr Asn Tyr His Asp  Lys Leu Ala Ala Ile  Glu Lys Asp
    2210                2215                2220

Arg Asp  Ser Ala Arg Lys Asp  Trp Lys Lys Ile Asn  Asn Ile Lys
    2225                2230                2235

Glu Met  Lys Glu Gly Tyr Leu  Ser Gln Val Val His  Glu Ile Ala
```

2240 2245 2250

Lys Leu Val Ile Glu Tyr Asn Ala Ile Val Val Phe Glu Asp Leu
2255 2260 2265

Asn Phe Gly Phe Lys Arg Gly Arg Phe Lys Val Glu Lys Gln Val
2270 2275 2280

Tyr Gln Lys Leu Glu Lys Met Leu Ile Glu Lys Leu Asn Tyr Leu
2285 2290 2295

Val Phe Lys Asp Asn Glu Phe Asp Lys Thr Gly Gly Val Leu Arg
2300 2305 2310

Ala Tyr Gln Leu Thr Ala Pro Phe Glu Thr Phe Lys Lys Met Gly
2315 2320 2325

Lys Gln Thr Gly Ile Ile Tyr Tyr Val Pro Ala Gly Phe Thr Ser
2330 2335 2340

Lys Ile Cys Pro Val Thr Gly Phe Val Asn Gln Leu Tyr Pro Lys
2345 2350 2355

Tyr Glu Ser Val Ser Lys Ser Gln Glu Phe Phe Ser Lys Phe Asp
2360 2365 2370

Lys Ile Cys Tyr Asn Leu Asp Lys Gly Tyr Phe Glu Phe Ser Phe
2375 2380 2385

Asp Tyr Lys Asn Phe Gly Asp Lys Ala Ala Lys Gly Lys Trp Thr
2390 2395 2400

Ile Ala Ser Phe Gly Ser Arg Leu Ile Asn Phe Arg Asn Ser Asp
2405 2410 2415

Lys Asn His Asn Trp Asp Thr Arg Glu Val Tyr Pro Thr Lys Glu
2420 2425 2430

Leu Glu Lys Leu Leu Lys Asp Tyr Ser Ile Glu Tyr Gly His Gly
2435 2440 2445

```
Glu Cys  Ile Lys Ala Ala Ile  Cys Gly Glu Ser Asp  Lys Lys Phe
    2450                 2455                 2460


Phe Ala  Lys Leu Thr Ser Val  Leu Asn Thr Ile Leu  Gln Met Arg
    2465                 2470                 2475


Asn Ser  Lys Thr Gly Thr Glu  Leu Asp Tyr Leu Ile  Ser Pro Val
    2480                 2485                 2490


Ala Asp  Val Asn Gly Asn Phe  Phe Asp Ser Arg Gln  Ala Pro Lys
    2495                 2500                 2505


Asn Met  Pro Gln Asp Ala Asp  Ala Asn Gly Ala Tyr  His Ile Gly
    2510                 2515                 2520


Leu Lys  Gly Leu Met Leu Leu  Gly Arg Ile Lys Asn  Asn Gln Glu
    2525                 2530                 2535


Gly Lys  Lys Leu Asn Leu Val  Ile Lys Asn Glu Glu  Tyr Phe Glu
    2540                 2545                 2550


Phe Val  Gln Asn Arg Asn Asn
    2555                 2560


<210>  3
<211>  15
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Synthetic

<400>  3

Ile Gly Leu Asp Ile Gly Thr Asn Ser Val Gly Trp Ala Val Ile
1               5                  10                  15


<210>  4
<211>  8
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Synthetic Sequence
```

<400> 4

Ile Val Ile Glu Met Ala Arg Glu
1 5

<210> 5
<211> 27
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Sequence

<400> 5

Asp Val Asp His Ile Val Pro Gln Ser Phe Leu Lys Asp Asp Ser Ile
1 5 10 15

Asp Asn Lys Val Leu Thr Arg Ser Asp Lys Asn
20 25

<210> 6
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Sequence

<400> 6

His His Ala His Asp Ala Tyr Leu
1 5

<210> 7
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Sequence

<400> 7

Tyr Gly Arg Lys Lys Arg Arg Gln Arg Arg Arg
1 5 10

<210> 8

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

<220>
<223> Synthetic Sequence

<400> 8

Arg Arg Gln Arg Arg Thr Ser Lys Leu Met Lys Arg
1 5 10

<210> 9
<211> 27
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Sequence

<400> 9

Gly Trp Thr Leu Asn Ser Ala Gly Tyr Leu Leu Gly Lys Ile Asn Leu
1 5 10 15

Lys Ala Leu Ala Ala Leu Ala Lys Lys Ile Leu
20 25

<210> 10
<211> 33
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Sequence

<400> 10

Lys Ala Leu Ala Trp Glu Ala Lys Leu Ala Lys Ala Leu Ala Lys Ala
1 5 10 15

Leu Ala Lys His Leu Ala Lys Ala Leu Ala Lys Ala Leu Lys Cys Glu
20 25 30

Ala

<210> 11

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

<220>
<223> Synthetic Sequence

<400> 11

Arg Gln Ile Lys Ile Trp Phe Gln Asn Arg Arg Met Lys Trp Lys Lys
1 5 10 15

<210> 12
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Sequence

<400> 12

Tyr Gly Arg Lys Lys Arg Arg Gln Arg Arg Arg
1 5 10

<210> 13
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Sequence

<400> 13

Arg Lys Lys Arg Arg Gln Arg Arg Arg
1 5

<210> 14
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Sequence

<400> 14

Tyr Gly Arg Lys Lys Arg Arg Gln Arg Arg Arg
1 5 10

<210> 15
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Sequence

<400> 15

Arg Lys Lys Arg Arg Gln Arg Arg
1 5

<210> 16
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Sequence

<400> 16

Tyr Ala Arg Ala Ala Ala Arg Gln Ala Arg Ala
1 5 10

<210> 17
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Sequence

<400> 17

Thr His Arg Leu Pro Arg Arg Arg Arg Arg Arg
1 5 10

<210> 18
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Sequence

<400> 18

Gly Gly Arg Arg Ala Arg Arg Arg Arg Arg Arg

1 5 10

<210> 19
<211> 1307
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Sequence

<400> 19

Met Thr Gln Phe Glu Gly Phe Thr Asn Leu Tyr Gln Val Ser Lys Thr
1 5 10 15

Leu Arg Phe Glu Leu Ile Pro Gln Gly Lys Thr Leu Lys His Ile Gln
20 25 30

Glu Gln Gly Phe Ile Glu Glu Asp Lys Ala Arg Asn Asp His Tyr Lys
35 40 45

Glu Leu Lys Pro Ile Ile Asp Arg Ile Tyr Lys Thr Tyr Ala Asp Gln
50 55 60

Cys Leu Gln Leu Val Gln Leu Asp Trp Glu Asn Leu Ser Ala Ala Ile
65 70 75 80

Asp Ser Tyr Arg Lys Glu Lys Thr Glu Glu Thr Arg Asn Ala Leu Ile
85 90 95

Glu Glu Gln Ala Thr Tyr Arg Asn Ala Ile His Asp Tyr Phe Ile Gly
100 105 110

Arg Thr Asp Asn Leu Thr Asp Ala Ile Asn Lys Arg His Ala Glu Ile
115 120 125

Tyr Lys Gly Leu Phe Lys Ala Glu Leu Phe Asn Gly Lys Val Leu Lys
130 135 140

Gln Leu Gly Thr Val Thr Thr Thr Glu His Glu Asn Ala Leu Leu Arg
145 150 155 160

Ser Phe Asp Lys Phe Thr Thr Tyr Phe Ser Gly Phe Tyr Glu Asn Arg

```
                165                 170                 175

Lys Asn Val Phe Ser Ala Glu Asp Ile Ser Thr Ala Ile Pro His Arg
            180                 185                 190

Ile Val Gln Asp Asn Phe Pro Lys Phe Lys Glu Asn Cys His Ile Phe
        195                 200                 205

Thr Arg Leu Ile Thr Ala Val Pro Ser Leu Arg Glu His Phe Glu Asn
    210                 215                 220

Val Lys Lys Ala Ile Gly Ile Phe Val Ser Thr Ser Ile Glu Glu Val
225                 230                 235                 240

Phe Ser Phe Pro Phe Tyr Asn Gln Leu Leu Thr Gln Thr Gln Ile Asp
                245                 250                 255

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

Lys Ile Lys Gly Leu Asn Glu Val Leu Asn Leu Ala Ile Gln Lys Asn
        275                 280                 285

Asp Glu Thr Ala His Ile Ile Ala Ser Leu Pro His Arg Phe Ile Pro
    290                 295                 300

Leu Phe Lys Gln Ile Leu Ser Asp Arg Asn Thr Leu Ser Phe Ile Leu
305                 310                 315                 320

Glu Glu Phe Lys Ser Asp Glu Glu Val Ile Gln Ser Phe Cys Lys Tyr
                325                 330                 335

Lys Thr Leu Leu Arg Asn Glu Asn Val Leu Glu Thr Ala Glu Ala Leu
            340                 345                 350

Phe Asn Glu Leu Asn Ser Ile Asp Leu Thr His Ile Phe Ile Ser His
        355                 360                 365

Lys Lys Leu Glu Thr Ile Ser Ser Ala Leu Cys Asp His Trp Asp Thr
    370                 375                 380
```

```
Leu Arg Asn Ala Leu Tyr Glu Arg Arg Ile Ser Glu Leu Thr Gly Lys
385                 390                 395                 400

Ile Thr Lys Ser Ala Lys Glu Lys Val Gln Arg Ser Leu Lys His Glu
                405                 410                 415

Asp Ile Asn Leu Gln Glu Ile Ile Ser Ala Ala Gly Lys Glu Leu Ser
            420                 425                 430

Glu Ala Phe Lys Gln Lys Thr Ser Glu Ile Leu Ser His Ala His Ala
        435                 440                 445

Ala Leu Asp Gln Pro Leu Pro Thr Thr Leu Lys Lys Gln Glu Glu Lys
    450                 455                 460

Glu Ile Leu Lys Ser Gln Leu Asp Ser Leu Leu Gly Leu Tyr His Leu
465                 470                 475                 480

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

Ser Ala Arg Leu Thr Gly Ile Lys Leu Glu Met Glu Pro Ser Leu Ser
            500                 505                 510

Phe Tyr Asn Lys Ala Arg Asn Tyr Ala Thr Lys Lys Pro Tyr Ser Val
        515                 520                 525

Glu Lys Phe Lys Leu Asn Phe Gln Met Pro Thr Leu Ala Ser Gly Trp
    530                 535                 540

Asp Val Asn Lys Glu Lys Asn Asn Gly Ala Ile Leu Phe Val Lys Asn
545                 550                 555                 560

Gly Leu Tyr Tyr Leu Gly Ile Met Pro Lys Gln Lys Gly Arg Tyr Lys
                565                 570                 575

Ala Leu Ser Phe Glu Pro Thr Glu Lys Thr Ser Glu Gly Phe Asp Lys
            580                 585                 590

Met Tyr Tyr Asp Tyr Phe Pro Asp Ala Ala Lys Met Ile Pro Lys Cys
```

595 600 605

Ser Thr Gln Leu Lys Ala Val Thr Ala His Phe Gln Thr His Thr Thr
610 615 620

Pro Ile Leu Leu Ser Asn Asn Phe Ile Glu Pro Leu Glu Ile Thr Lys
625 630 635 640

Glu Ile Tyr Asp Leu Asn Asn Pro Glu Lys Glu Pro Lys Lys Phe Gln
645 650 655

Thr Ala Tyr Ala Lys Lys Thr Gly Asp Gln Lys Gly Tyr Arg Glu Ala
660 665 670

Leu Cys Lys Trp Ile Asp Phe Thr Arg Asp Phe Leu Ser Lys Tyr Thr
675 680 685

Lys Thr Thr Ser Ile Asp Leu Ser Ser Leu Arg Pro Ser Ser Gln Tyr
690 695 700

Lys Asp Leu Gly Glu Tyr Tyr Ala Glu Leu Asn Pro Leu Leu Tyr His
705 710 715 720

Ile Ser Phe Gln Arg Ile Ala Glu Lys Glu Ile Met Asp Ala Val Glu
725 730 735

Thr Gly Lys Leu Tyr Leu Phe Gln Ile Tyr Asn Lys Asp Phe Ala Lys
740 745 750

Gly His His Gly Lys Pro Asn Leu His Thr Leu Tyr Trp Thr Gly Leu
755 760 765

Phe Ser Pro Glu Asn Leu Ala Lys Thr Ser Ile Lys Leu Asn Gly Gln
770 775 780

Ala Glu Leu Phe Tyr Arg Pro Lys Ser Arg Met Lys Arg Met Ala His
785 790 795 800

Arg Leu Gly Glu Lys Met Leu Asn Lys Lys Leu Lys Asp Gln Lys Thr
805 810 815

```
Pro Ile Pro Asp Thr Leu Tyr Gln Glu Leu Tyr Asp Tyr Val Asn His
            820                 825                 830

Arg Leu Ser His Asp Leu Ser Asp Glu Ala Arg Ala Leu Leu Pro Asn
        835                 840                 845

Val Ile Thr Lys Glu Val Ser His Glu Ile Ile Lys Asp Arg Arg Phe
    850                 855                 860

Thr Ser Asp Lys Phe Phe Phe His Val Pro Ile Thr Leu Asn Tyr Gln
865                 870                 875                 880

Ala Ala Asn Ser Pro Ser Lys Phe Asn Gln Arg Val Asn Ala Tyr Leu
                885                 890                 895

Lys Glu His Pro Glu Thr Pro Ile Ile Gly Ile Asp Arg Gly Glu Arg
            900                 905                 910

Asn Leu Ile Tyr Ile Thr Val Ile Asp Ser Thr Gly Lys Ile Leu Glu
        915                 920                 925

Gln Arg Ser Leu Asn Thr Ile Gln Gln Phe Asp Tyr Gln Lys Lys Leu
    930                 935                 940

Asp Asn Arg Glu Lys Glu Arg Val Ala Ala Arg Gln Ala Trp Ser Val
945                 950                 955                 960

Val Gly Thr Ile Lys Asp Leu Lys Gln Gly Tyr Leu Ser Gln Val Ile
                965                 970                 975

His Glu Ile Val Asp Leu Met Ile His Tyr Gln Ala Val Val Val Leu
            980                 985                 990

Glu Asn Leu Asn Phe Gly Phe Lys  Ser Lys Arg Thr Gly  Ile Ala Glu
        995                 1000                1005

Lys Ala  Val Tyr Gln Gln Phe  Glu Lys Met Leu Ile  Asp Lys Leu
    1010                1015                1020

Asn Cys  Leu Val Leu Lys Asp  Tyr Pro Ala Glu Lys  Val Gly Gly
```

```
    1025                1030                1035

Val Leu  Asn Pro Tyr Gln Leu  Thr Asp Gln Phe Thr  Ser Phe Ala
    1040                1045                1050

Lys Met  Gly Thr Gln Ser Gly  Phe Leu Phe Tyr Val  Pro Ala Pro
    1055                1060                1065

Tyr Thr  Ser Lys Ile Asp Pro  Leu Thr Gly Phe Val  Asp Pro Phe
    1070                1075                1080

Val Trp  Lys Thr Ile Lys Asn  His Glu Ser Arg Lys  His Phe Leu
    1085                1090                1095

Glu Gly  Phe Asp Phe Leu His  Tyr Asp Val Lys Thr  Gly Asp Phe
    1100                1105                1110

Ile Leu  His Phe Lys Met Asn  Arg Asn Leu Ser Phe  Gln Arg Gly
    1115                1120                1125

Leu Pro  Gly Phe Met Pro Ala  Trp Asp Ile Val Phe  Glu Lys Asn
    1130                1135                1140

Glu Thr  Gln Phe Asp Ala Lys  Gly Thr Pro Phe Ile  Ala Gly Lys
    1145                1150                1155

Arg Ile  Val Pro Val Ile Glu  Asn His Arg Phe Thr  Gly Arg Tyr
    1160                1165                1170

Arg Asp  Leu Tyr Pro Ala Asn  Glu Leu Ile Ala Leu  Leu Glu Glu
    1175                1180                1185

Lys Gly  Ile Val Phe Arg Asp  Gly Ser Asn Ile Leu  Pro Lys Leu
    1190                1195                1200

Leu Glu  Asn Asp Asp Ser His  Ala Ile Asp Thr Met  Val Ala Leu
    1205                1210                1215

Ile Arg  Ser Val Leu Gln Met  Arg Asn Ser Asn Ala  Ala Thr Gly
    1220                1225                1230
```

Glu Asp Tyr Ile Asn Ser Pro Val Arg Asp Leu Asn Gly Val Cys
1235 1240 1245

Phe Asp Ser Arg Phe Gln Asn Pro Glu Trp Pro Met Asp Ala Asp
1250 1255 1260

Ala Asn Gly Ala Tyr His Ile Ala Leu Lys Gly Gln Leu Leu Leu
1265 1270 1275

Asn His Leu Lys Glu Ser Lys Asp Leu Lys Leu Gln Asn Gly Ile
1280 1285 1290

Ser Asn Gln Asp Trp Leu Ala Tyr Ile Gln Glu Leu Arg Asn
1295 1300 1305

<210> 20
<211> 1228
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic

<400> 20

Ala Ala Ser Lys Leu Glu Lys Phe Thr Asn Cys Tyr Ser Leu Ser Lys
1 5 10 15

Thr Leu Arg Phe Lys Ala Ile Pro Val Gly Lys Thr Gln Glu Asn Ile
20 25 30

Asp Asn Lys Arg Leu Leu Val Glu Asp Glu Lys Arg Ala Glu Asp Tyr
35 40 45

Lys Gly Val Lys Lys Leu Leu Asp Arg Tyr Tyr Leu Ser Phe Ile Asn
50 55 60

Asp Val Leu His Ser Ile Lys Leu Lys Asn Leu Asn Asn Tyr Ile Ser
65 70 75 80

Leu Phe Arg Lys Lys Thr Arg Thr Glu Lys Glu Asn Lys Glu Leu Glu
85 90 95

```
Asn Leu Glu Ile Asn Leu Arg Lys Glu Ile Ala Lys Ala Phe Lys Gly
            100                 105                 110

Ala Ala Gly Tyr Lys Ser Leu Phe Lys Lys Asp Ile Ile Glu Thr Ile
        115                 120                 125

Leu Pro Glu Ala Ala Asp Asp Lys Asp Glu Ile Ala Leu Val Asn Ser
    130                 135                 140

Phe Asn Gly Phe Thr Thr Ala Phe Thr Gly Phe Phe Asp Asn Arg Glu
145                 150                 155                 160

Asn Met Phe Ser Glu Glu Ala Lys Ser Thr Ser Ile Ala Phe Arg Cys
                165                 170                 175

Ile Asn Glu Asn Leu Thr Arg Tyr Ile Ser Asn Met Asp Ile Phe Glu
            180                 185                 190

Lys Val Asp Ala Ile Phe Asp Lys His Glu Val Gln Glu Ile Lys Glu
        195                 200                 205

Lys Ile Leu Asn Ser Asp Tyr Asp Val Glu Asp Phe Phe Glu Gly Glu
    210                 215                 220

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

Ile Ile Gly Gly Phe Val Thr Glu Ser Gly Glu Lys Ile Lys Gly Leu
                245                 250                 255

Asn Glu Tyr Ile Asn Leu Tyr Asn Ala Lys Thr Lys Gln Ala Leu Pro
            260                 265                 270

Lys Phe Lys Pro Leu Tyr Lys Gln Val Leu Ser Asp Arg Glu Ser Leu
        275                 280                 285

Ser Phe Tyr Gly Glu Gly Tyr Thr Ser Asp Glu Glu Val Leu Glu Val
    290                 295                 300

Phe Arg Asn Thr Leu Asn Lys Asn Ser Glu Ile Phe Ser Ser Ile Lys
```

```
305                 310                 315                 320

Lys Leu Glu Lys Leu Phe Lys Asn Phe Asp Glu Tyr Ser Ser Ala Gly
                325                 330                 335

Ile Phe Val Lys Asn Gly Pro Ala Ile Ser Thr Ile Ser Lys Asp Ile
            340                 345                 350

Phe Gly Glu Trp Asn Leu Ile Arg Asp Lys Trp Asn Ala Glu Tyr Asp
        355                 360                 365

Asp Ile His Leu Lys Lys Lys Ala Val Val Thr Glu Lys Tyr Glu Asp
    370                 375                 380

Asp Arg Arg Lys Ser Phe Lys Lys Ile Gly Ser Phe Ser Leu Glu Gln
385                 390                 395                 400

Leu Gln Glu Tyr Ala Asp Ala Asp Leu Ser Val Val Glu Lys Leu Lys
                405                 410                 415

Glu Ile Ile Ile Gln Lys Val Asp Glu Ile Tyr Lys Val Tyr Gly Ser
            420                 425                 430

Ser Glu Lys Leu Phe Asp Ala Asp Phe Val Leu Glu Lys Ser Leu Lys
        435                 440                 445

Lys Asn Asp Ala Val Val Ala Ile Met Lys Asp Leu Leu Asp Ser Val
    450                 455                 460

Lys Ser Phe Glu Asn Tyr Ile Lys Ala Phe Phe Gly Glu Gly Lys Glu
465                 470                 475                 480

Thr Asn Arg Asp Glu Ser Phe Tyr Gly Asp Phe Val Leu Ala Tyr Asp
                485                 490                 495

Ile Leu Leu Lys Val Asp His Ile Tyr Asp Ala Ile Arg Asn Tyr Val
            500                 505                 510

Thr Gln Lys Pro Tyr Ser Lys Asp Lys Phe Lys Leu Tyr Phe Gln Asn
        515                 520                 525
```

```
Pro Gln Phe Met Gly Gly Trp Asp Lys Asp Lys Glu Thr Asp Tyr Arg
    530                 535                 540

Ala Thr Ile Leu Arg Tyr Gly Ser Lys Tyr Tyr Leu Ala Ile Met Asp
545                 550                 555                 560

Lys Lys Tyr Ala Lys Cys Leu Gln Lys Ile Asp Lys Asp Asp Val Asn
                565                 570                 575

Gly Asn Tyr Glu Lys Ile Asn Tyr Lys Leu Leu Pro Gly Pro Asn Lys
            580                 585                 590

Met Leu Pro Lys Val Phe Phe Ser Lys Lys Trp Met Ala Tyr Tyr Asn
        595                 600                 605

Pro Ser Glu Asp Ile Gln Lys Ile Tyr Lys Asn Gly Thr Phe Lys Lys
    610                 615                 620

Gly Asp Met Phe Asn Leu Asn Asp Cys His Lys Leu Ile Asp Phe Phe
625                 630                 635                 640

Lys Asp Ser Ile Ser Arg Tyr Pro Lys Trp Ser Asn Ala Tyr Asp Phe
                645                 650                 655

Asn Phe Ser Glu Thr Glu Lys Tyr Lys Asp Ile Ala Gly Phe Tyr Arg
            660                 665                 670

Glu Val Glu Glu Gln Gly Tyr Lys Val Ser Phe Glu Ser Ala Ser Lys
        675                 680                 685

Lys Glu Val Asp Lys Leu Val Glu Glu Gly Lys Leu Tyr Met Phe Gln
    690                 695                 700

Ile Tyr Asn Lys Asp Phe Ser Asp Lys Ser His Gly Thr Pro Asn Leu
705                 710                 715                 720

His Thr Met Tyr Phe Lys Leu Leu Phe Asp Glu Asn Asn His Gly Gln
                725                 730                 735

Ile Arg Leu Ser Gly Gly Ala Glu Leu Phe Met Arg Arg Ala Ser Leu
```

```
            740                 745                 750

Lys Lys Glu Glu Leu Val Val His Pro Ala Asn Ser Pro Ile Ala Asn
        755                 760                 765

Lys Asn Pro Asp Asn Pro Lys Lys Thr Thr Thr Leu Ser Tyr Asp Val
    770                 775                 780

Tyr Lys Asp Lys Arg Phe Ser Glu Asp Gln Tyr Glu Leu His Ile Pro
785                 790                 795                 800

Ile Ala Ile Asn Lys Cys Pro Lys Asn Ile Phe Lys Ile Asn Thr Glu
                805                 810                 815

Val Arg Val Leu Leu Lys His Asp Asp Asn Pro Tyr Val Ile Gly Ile
            820                 825                 830

Asp Arg Gly Glu Arg Asn Leu Leu Tyr Ile Val Val Val Asp Gly Lys
        835                 840                 845

Gly Asn Ile Val Glu Gln Tyr Ser Leu Asn Glu Ile Ile Asn Asn Phe
    850                 855                 860

Asn Gly Ile Arg Ile Lys Thr Asp Tyr His Ser Leu Leu Asp Lys Lys
865                 870                 875                 880

Glu Lys Glu Arg Phe Glu Ala Arg Gln Asn Trp Thr Ser Ile Glu Asn
                885                 890                 895

Ile Lys Glu Leu Lys Ala Gly Tyr Ile Ser Gln Val Val His Lys Ile
            900                 905                 910

Cys Glu Leu Val Glu Lys Tyr Asp Ala Val Ile Ala Leu Glu Asp Leu
        915                 920                 925

Asn Ser Gly Phe Lys Asn Ser Arg Val Lys Val Glu Lys Gln Val Tyr
    930                 935                 940

Gln Lys Phe Glu Lys Met Leu Ile Asp Lys Leu Asn Tyr Met Val Asp
945                 950                 955                 960
```

```
Lys Lys Ser Asn Pro Cys Ala Thr Gly Gly Ala Leu Lys Gly Tyr Gln
                965                 970                 975

Ile Thr Asn Lys Phe Glu Ser Phe Lys Ser Met Ser Thr Gln Asn Gly
            980                 985                 990

Phe Ile Phe Tyr Ile Pro Ala Trp  Leu Thr Ser Lys Ile  Asp Pro Ser
        995                 1000                1005

Thr Gly  Phe Val Asn Leu Leu  Lys Thr Lys Tyr Thr  Ser Ile Ala
    1010                1015                1020

Asp Ser  Lys Lys Phe Ile Ser  Ser Phe Asp Arg Ile  Met Tyr Val
    1025                1030                1035

Pro Glu  Glu Asp Leu Phe Glu  Phe Ala Leu Asp Tyr  Lys Asn Phe
    1040                1045                1050

Ser Arg  Thr Asp Ala Asp Tyr  Ile Lys Lys Trp Lys  Leu Tyr Ser
    1055                1060                1065

Tyr Gly  Asn Arg Ile Arg Ile  Phe Ala Ala Ala Lys  Lys Asn Asn
    1070                1075                1080

Val Phe  Ala Trp Glu Glu Val  Cys Leu Thr Ser Ala  Tyr Lys Glu
    1085                1090                1095

Leu Phe  Asn Lys Tyr Gly Ile  Asn Tyr Gln Gln Gly  Asp Ile Arg
    1100                1105                1110

Ala Leu  Leu Cys Glu Gln Ser  Asp Lys Ala Phe Tyr  Ser Ser Phe
    1115                1120                1125

Met Ala  Leu Met Ser Leu Met  Leu Gln Met Arg Asn  Ser Ile Thr
    1130                1135                1140

Gly Arg  Thr Asp Val Asp Phe  Leu Ile Ser Pro Val  Lys Asn Ser
    1145                1150                1155

Asp Gly  Ile Phe Tyr Asp Ser  Arg Asn Tyr Glu Ala  Gln Glu Asn
```

```
    1160                1165                1170

Ala Ile  Leu Pro Lys Asn Ala  Asp Ala Asn Gly Ala  Tyr Asn Ile
    1175                1180                1185

Ala Arg  Lys Val Leu Trp Ala  Ile Gly Gln Phe Lys  Lys Ala Glu
    1190                1195                1200

Asp Glu  Lys Leu Asp Lys Val  Lys Ile Ala Ile Ser  Asn Lys Glu
    1205                1210                1215

Trp Leu  Glu Tyr Ala Gln Thr  Ser Val Lys
    1220                1225
```