SEQUENCE LISTING

<110> Health Protection Agency
Microparm Limited
Shone, Clifford
Roberts, April
Ahern, Helen
Maynard-Smith, Michael

<120> Clostridium difficile antigens

<130> P33260WO-MRM

<150> GB 1016742.7
<151> 2010-10-05

<160> 81

<170> PatentIn version 3.5

<210> 1
<211> 2710
<212> PRT
<213> Clostridium difficile

<400> 1

Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1 5 10 15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
20 25 30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
35 40 45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Thr
50 55 60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65 70 75 80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
85 90 95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
100 105 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
115 120 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
130 135 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145 150 155 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu

```
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Val Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255

Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Ser Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
```

435 440 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
450 455 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465 470 475 480

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

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
500 505 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
515 520 525

Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
530 535 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545 550 555 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
565 570 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
580 585 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
595 600 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
610 615 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625 630 635 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
645 650 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
660 665 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
675 680 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
690 695 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser

705 710 715 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asn Ser
725 730 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
740 745 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
755 760 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
770 775 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785 790 795 800

Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
805 810 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
820 825 830

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

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
850 855 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865 870 875 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
885 890 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
900 905 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
915 920 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
930 935 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945 950 955 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
965 970 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr

980 985 990

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln
995 1000 1005

Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val
1010 1015 1020

Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
1025 1030 1035

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu
1040 1045 1050

His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val
1055 1060 1065

Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
1070 1075 1080

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
1085 1090 1095

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
1100 1105 1110

Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
1115 1120 1125

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
1130 1135 1140

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp
1145 1150 1155

Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala
1160 1165 1170

Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
1175 1180 1185

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
1190 1195 1200

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
1205 1210 1215

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
1220 1225 1230

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp

1235 1240 1245

Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys
1250 1255 1260

Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
1265 1270 1275

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
1280 1285 1290

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu
1295 1300 1305

Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
1310 1315 1320

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
1325 1330 1335

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val
1340 1345 1350

Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
1355 1360 1365

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
1370 1375 1380

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn
1385 1390 1395

Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile
1400 1405 1410

Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
1415 1420 1425

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
1430 1435 1440

Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
1445 1450 1455

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
1460 1465 1470

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
1475 1480 1485

Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe

1490 1495 1500

Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
1505 1510 1515

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
1520 1525 1530

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn
1535 1540 1545

Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
1550 1555 1560

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr
1565 1570 1575

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys
1580 1585 1590

Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
1595 1600 1605

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1610 1615 1620

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1625 1630 1635

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val
1640 1645 1650

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1655 1660 1665

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1670 1675 1680

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1685 1690 1695

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1700 1705 1710

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1715 1720 1725

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1730 1735 1740

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys

1745 1750 1755

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1760 1765 1770

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1775 1780 1785

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1790 1795 1800

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1805 1810 1815

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1820 1825 1830

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1835 1840 1845

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1850 1855 1860

Phe Asp Ile Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile
1865 1870 1875

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1880 1885 1890

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
1895 1900 1905

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1910 1915 1920

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1925 1930 1935

Asn Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1940 1945 1950

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1955 1960 1965

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1970 1975 1980

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1985 1990 1995

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp

2000 2005 2010

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
2015 2020 2025

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2030 2035 2040

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
2045 2050 2055

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
2060 2065 2070

Ser Lys Ala Val Thr Gly Leu Gln Thr Ile Asp Ser Lys Lys Tyr
2075 2080 2085

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
2090 2095 2100

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
2105 2110 2115

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2120 2125 2130

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
2135 2140 2145

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
2150 2155 2160

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2165 2170 2175

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
2180 2185 2190

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
2195 2200 2205

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
2210 2215 2220

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
2225 2230 2235

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
2240 2245 2250

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn

```
    2255                2260                2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                2275                2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                2290                2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                2305                2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                2320                2325

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                2335                2340

Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr Asp Ala Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490

Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                2500                2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
```

2510 2515 2520

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
2525 2530 2535

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
2540 2545 2550

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
2555 2560 2565

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
2570 2575 2580

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
2585 2590 2595

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2600 2605 2610

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2615 2620 2625

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2630 2635 2640

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2645 2650 2655

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val
2660 2665 2670

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2675 2680 2685

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2690 2695 2700

Lys Ala Pro Gly Ile Tyr Gly
2705 2710

<210> 2
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 2

Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1 5 10 15

Phe Arg Thr Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
20 25 30

```
Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
        35                  40                  45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
    50                  55                  60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65                  70                  75                  80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110

Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Val Val Glu Ser Ala Ile Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Phe Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Ala
            180                 185                 190

Gln Arg Glu Glu Asn Pro Glu Leu Ile Ile Asp Asp Ile Val Lys Thr
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Glu Ile Asp Glu Leu Asn Thr Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Ile Thr Gln Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Asn Gly Glu Ser Phe Asn Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Ile Gly Gly Met Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300
```

```
Ser Ser Val Thr Val Asp Phe Trp Glu Met Thr Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Glu Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380

Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Thr Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

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

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Ile Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575
```

```
Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

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

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655

Glu Phe Asn Thr Asp Ile Phe Ala Gly Phe Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Ala Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Ile Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Lys Val Lys
705                 710                 715                 720

Asp Lys Ile Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr
        835                 840                 845
```

```
Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925

Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Ile Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Thr Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

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

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Val Leu
    1100                1105                1110
```

```
Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Lys  His Val Ser
    1115                1120                1125

Leu Val  Glu Thr Glu Gly Val  Phe Thr Leu Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Val Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185

Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly Ile Asn  Ile Glu Leu
    1325                1330                1335

Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365
```

```
Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu Glu Asn  Lys Ile Ile
    1370                 1375                 1380

Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly Glu Val  Asn Gly Ser
    1385                 1390                 1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                 1405                 1410

Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Leu Leu
    1415                 1420                 1425

Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu Asn Ser  Asn His Ile
    1430                 1435                 1440

Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn Ser Glu  Leu Gln Lys
    1445                 1450                 1455

Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu Gly Lys  Glu Asn Gly
    1460                 1465                 1470

Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                 1480                 1485

Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asp Ser Lys
    1490                 1495                 1500

Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu Lys Asp  Val Lys Val
    1505                 1510                 1515

Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                 1525                 1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr Leu Gln  Asp Glu Lys
    1535                 1540                 1545

Thr Ile  Lys Leu Asn Ser Val  His Leu Asp Glu Ser  Gly Val Ala
    1550                 1555                 1560

Glu Ile  Leu Lys Phe Met Asn  Arg Lys Gly Asn Thr  Asn Thr Ser
    1565                 1570                 1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
    1580                 1585                 1590

Phe Val  Asn Phe Leu Gln Ser  Asn Ile Lys Phe Ile  Leu Asp Ala
    1595                 1600                 1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                 1615                 1620
```

```
Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Asn Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695

Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Thr
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1715                1720                1725

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1760                1765                1770

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Pro Val Ser Glu Ile  Ile Leu Ser Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1865                1870                1875
```

```
Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val
    1880                 1885                 1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                 1900                 1905

Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                 1915                 1920

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1925                 1930                 1935

Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1940                 1945                 1950

Glu Met  His Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1955                 1960                 1965

Leu Asn  Gln Ile Gly Asp Tyr  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1970                 1975                 1980

Val Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr
    1985                 1990                 1995

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp
    2000                 2005                 2010

Gly Lys  His Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                 2020                 2025

Val Phe  Asn Thr Glu Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    2030                 2035                 2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Glu Ile Ser  Tyr Ser Gly
    2045                 2050                 2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                 2065                 2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                 2080                 2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Leu Ser Leu
    2090                 2095                 2100

Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    2105                 2110                 2115

Val Gly  Phe Val Thr Ile Asn  Asp Lys Val Phe Tyr  Phe Ser Asp
    2120                 2125                 2130
```

```
Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    2135                 2140                 2145

Phe Tyr  Ile Asp Asp Asn Gly  Ile Val Gln Ile Gly  Val Phe Asp
    2150                 2155                 2160

Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                 2170                 2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    2180                 2185                 2190

Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                 2200                 2205

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                 2215                 2220

Phe Asn  Pro Glu Thr Lys Lys  Ala Cys Lys Gly Ile  Asn Leu Ile
    2225                 2230                 2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Lys Gly Ile  Met Arg Thr
    2240                 2245                 2250

Gly Leu  Ile Ser Phe Glu Asn  Asn Asn Tyr Tyr Phe  Asn Glu Asn
    2255                 2260                 2265

Gly Glu  Met Gln Phe Gly Tyr  Ile Asn Ile Glu Asp  Lys Met Phe
    2270                 2275                 2280

Tyr Phe  Gly Glu Asp Gly Val  Met Gln Ile Gly Val  Phe Asn Thr
    2285                 2290                 2295

Pro Asp  Gly Phe Lys Tyr Phe  Ala His Gln Asn Thr  Leu Asp Glu
    2300                 2305                 2310

Asn Phe  Glu Gly Glu Ser Ile  Asn Tyr Thr Gly Trp  Leu Asp Leu
    2315                 2320                 2325

Asp Glu  Lys Arg Tyr Tyr Phe  Thr Asp Glu Tyr Ile  Ala Ala Thr
    2330                 2335                 2340

Gly Ser  Val Ile Ile Asp Gly  Glu Glu Tyr Tyr Phe  Asp Pro Asp
    2345                 2350                 2355

Thr Ala  Gln Leu Val Ile Ser  Glu
    2360                 2365
```

<210> 3
<211> 2710

<212> PRT
<213> Clostridium difficile

<400> 3

```
Met Ser Leu Ile Ser Lys Glu Glu Leu Ile Lys Leu Ala Tyr Ser Ile
1               5                  10                  15

Arg Pro Arg Glu Asn Glu Tyr Lys Thr Ile Leu Thr Asn Leu Asp Glu
            20                  25                  30

Tyr Asn Lys Leu Thr Thr Asn Asn Asn Glu Asn Lys Tyr Leu Gln Leu
        35                  40                  45

Lys Lys Leu Asn Glu Ser Ile Asp Val Phe Met Asn Lys Tyr Lys Asn
    50                  55                  60

Ser Ser Arg Asn Arg Ala Leu Ser Asn Leu Lys Lys Asp Ile Leu Lys
65                  70                  75                  80

Glu Val Ile Leu Ile Lys Asn Ser Asn Thr Ser Pro Val Glu Lys Asn
                85                  90                  95

Leu His Phe Val Trp Ile Gly Gly Glu Val Ser Asp Ile Ala Leu Glu
            100                 105                 110

Tyr Ile Lys Gln Trp Ala Asp Ile Asn Ala Glu Tyr Asn Ile Lys Leu
        115                 120                 125

Trp Tyr Asp Ser Glu Ala Phe Leu Val Asn Thr Leu Lys Lys Ala Ile
    130                 135                 140

Val Glu Ser Ser Thr Thr Glu Ala Leu Gln Leu Leu Glu Glu Glu Ile
145                 150                 155                 160

Gln Asn Pro Gln Phe Asp Asn Met Lys Phe Tyr Lys Lys Arg Met Glu
                165                 170                 175

Phe Ile Tyr Asp Arg Gln Lys Arg Phe Ile Asn Tyr Tyr Lys Ser Gln
            180                 185                 190

Ile Asn Lys Pro Thr Val Pro Thr Ile Asp Asp Ile Ile Lys Ser His
        195                 200                 205

Leu Val Ser Glu Tyr Asn Arg Asp Glu Thr Leu Leu Glu Ser Tyr Arg
    210                 215                 220

Thr Asn Ser Leu Arg Lys Ile Asn Ser Asn His Gly Ile Asp Ile Arg
225                 230                 235                 240

Ala Asn Ser Leu Phe Thr Glu Gln Glu Leu Leu Asn Ile Tyr Ser Gln
                245                 250                 255
```

```
Glu Leu Leu Asn Arg Gly Asn Leu Ala Ala Ala Ser Asp Ile Val Arg
            260                 265                 270

Leu Leu Ala Leu Lys Asn Phe Gly Gly Val Tyr Leu Asp Val Asp Met
        275                 280                 285

Leu Pro Gly Ile His Ser Asp Leu Phe Lys Thr Ile Pro Arg Pro Ser
    290                 295                 300

Ser Ile Gly Leu Asp Arg Trp Glu Met Ile Lys Leu Glu Ala Ile Met
305                 310                 315                 320

Lys Tyr Lys Lys Tyr Ile Asn Asn Tyr Thr Ser Glu Asn Phe Asp Lys
                325                 330                 335

Leu Asp Gln Gln Leu Lys Asp Asn Phe Lys Leu Ile Ile Glu Ser Lys
            340                 345                 350

Ser Glu Lys Ser Glu Ile Phe Ser Lys Leu Glu Asn Leu Asn Val Ser
        355                 360                 365

Asp Leu Glu Ile Lys Ile Ala Phe Ala Leu Gly Ser Val Ile Asn Gln
    370                 375                 380

Ala Leu Ile Ser Lys Gln Gly Ser Tyr Leu Thr Asn Leu Val Ile Glu
385                 390                 395                 400

Gln Val Lys Asn Arg Tyr Gln Phe Leu Asn Gln His Leu Asn Pro Ala
                405                 410                 415

Ile Glu Ser Asp Asn Asn Phe Thr Asp Thr Thr Lys Ile Phe His Asp
            420                 425                 430

Ser Leu Phe Asn Ser Ala Thr Ala Glu Asn Ser Met Phe Leu Thr Lys
        435                 440                 445

Ile Ala Pro Tyr Leu Gln Val Gly Phe Met Pro Glu Ala Arg Ser Thr
    450                 455                 460

Ile Ser Leu Ser Gly Pro Gly Ala Tyr Ala Ser Ala Tyr Tyr Asp Phe
465                 470                 475                 480

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

Leu Ile Glu Phe Lys Phe Pro Glu Asn Asn Leu Ser Gln Leu Thr Glu
            500                 505                 510

Gln Glu Ile Asn Ser Leu Trp Ser Phe Asp Gln Ala Ser Ala Lys Tyr
        515                 520                 525
```

```
Gln Phe Glu Lys Tyr Val Arg Asp Tyr Thr Gly Gly Ser Leu Ser Glu
    530                 535                 540

Asp Asn Gly Val Asp Phe Asn Lys Asn Thr Ala Leu Asp Lys Asn Tyr
545                 550                 555                 560

Leu Leu Asn Asn Lys Ile Pro Ser Asn Asn Val Glu Glu Ala Gly Ser
                565                 570                 575

Lys Asn Tyr Val His Tyr Ile Ile Gln Leu Gln Gly Asp Asp Ile Ser
            580                 585                 590

Tyr Glu Ala Thr Cys Asn Leu Phe Ser Lys Asn Pro Lys Asn Ser Ile
        595                 600                 605

Ile Ile Gln Arg Asn Met Asn Glu Ser Ala Lys Ser Tyr Phe Leu Ser
    610                 615                 620

Asp Asp Gly Glu Ser Ile Leu Glu Leu Asn Lys Tyr Arg Ile Pro Glu
625                 630                 635                 640

Arg Leu Lys Asn Lys Glu Lys Val Lys Val Thr Phe Ile Gly His Gly
                645                 650                 655

Lys Asp Glu Phe Asn Thr Ser Glu Phe Ala Arg Leu Ser Val Asp Ser
            660                 665                 670

Leu Ser Asn Glu Ile Ser Ser Phe Leu Asp Thr Ile Lys Leu Asp Ile
        675                 680                 685

Ser Pro Lys Asn Val Glu Val Asn Leu Leu Gly Cys Asn Met Phe Ser
    690                 695                 700

Tyr Asp Phe Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Ser
705                 710                 715                 720

Ile Met Asp Lys Ile Thr Ser Thr Leu Pro Asp Val Asn Lys Asp Ser
                725                 730                 735

Ile Thr Ile Gly Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly
            740                 745                 750

Arg Lys Glu Leu Leu Ala His Ser Gly Lys Trp Ile Asn Lys Glu Glu
        755                 760                 765

Ala Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser
    770                 775                 780

Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala
785                 790                 795                 800
```

```
Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser
                805                 810                 815

Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser
            820                 825                 830

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

Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu
    850                 855                 860

Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu
865                 870                 875                 880

Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser
                885                 890                 895

Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr
            900                 905                 910

Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr
        915                 920                 925

Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly
    930                 935                 940

Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr
945                 950                 955                 960

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn
                965                 970                 975

Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr
            980                 985                 990

Ala Gln Leu Phe Ser Thr Gly Leu  Asn Thr Ile Tyr Asp  Ser Ile Gln
        995                 1000                1005

Leu Val  Asn Leu Ile Ser Asn  Ala Val Asn Asp Thr  Ile Asn Val
    1010                1015                1020

Leu Pro  Thr Ile Thr Glu Gly  Ile Pro Ile Val Ser  Thr Ile Leu
    1025                1030                1035

Asp Gly  Ile Asn Leu Gly Ala  Ala Ile Lys Glu Leu  Leu Asp Glu
    1040                1045                1050

His Asp  Pro Leu Leu Lys Lys  Glu Leu Glu Ala Lys  Val Gly Val
    1055                1060                1065
```

```
Leu Ala  Ile Asn Met Ser Leu  Ser Ile Ala Ala Thr  Val Ala Ser
    1070                1075                1080

Ile Val  Gly Ile Gly Ala Glu  Val Thr Ile Phe Leu  Leu Pro Ile
    1085                1090                1095

Ala Gly  Ile Ser Ala Gly Ile  Pro Ser Leu Val Asn  Asn Glu Leu
    1100                1105                1110

Ile Leu  His Asp Lys Ala Thr  Ser Val Val Asn Tyr  Phe Asn His
    1115                1120                1125

Leu Ser  Glu Ser Lys Glu Tyr  Gly Pro Leu Lys Thr  Glu Asp Asp
    1130                1135                1140

Lys Ile  Leu Val Pro Ile Asp  Asp Leu Val Ile Ser  Glu Ile Asp
    1145                1150                1155

Phe Asn  Asn Asn Ser Ile Lys  Leu Gly Thr Cys Asn  Ile Leu Ala
    1160                1165                1170

Met Glu  Gly Gly Ser Gly His  Thr Val Thr Gly Asn  Ile Asp His
    1175                1180                1185

Phe Phe  Ser Ser Pro Tyr Ile  Ser Ser His Ile Pro  Ser Leu Ser
    1190                1195                1200

Val Tyr  Ser Ala Ile Gly Ile  Lys Thr Glu Asn Leu  Asp Phe Ser
    1205                1210                1215

Lys Lys  Ile Met Met Leu Pro  Asn Ala Pro Ser Arg  Val Phe Trp
    1220                1225                1230

Trp Glu  Thr Gly Ala Val Pro  Gly Leu Arg Ser Leu  Glu Asn Asn
    1235                1240                1245

Gly Thr  Lys Leu Leu Asp Ser  Ile Arg Asp Leu Tyr  Pro Gly Lys
    1250                1255                1260

Phe Tyr  Trp Arg Phe Tyr Ala  Phe Phe Asp Tyr Ala  Ile Thr Thr
    1265                1270                1275

Leu Lys  Pro Val Tyr Glu Asp  Thr Asn Thr Lys Ile  Lys Leu Asp
    1280                1285                1290

Lys Asp  Thr Arg Asn Phe Ile  Met Pro Thr Ile Thr  Thr Asp Glu
    1295                1300                1305

Ile Arg  Asn Lys Leu Ser Tyr  Ser Phe Asp Gly Ala  Gly Gly Thr
    1310                1315                1320
```

```
Tyr Ser  Leu Leu Leu Ser Ser  Tyr Pro Ile Ser Met  Asn Ile Asn
    1325                 1330                 1335

Leu Ser  Lys Asp Asp Leu Trp  Ile Phe Asn Ile Asp  Asn Glu Val
    1340                 1345                 1350

Arg Glu  Ile Ser Ile Glu Asn  Gly Thr Ile Lys Lys  Gly Asn Leu
    1355                 1360                 1365

Ile Glu  Asp Val Leu Ser Lys  Ile Asp Ile Asn Lys  Asn Lys Leu
    1370                 1375                 1380

Ile Ile  Gly Asn Gln Thr Ile  Asp Phe Ser Gly Asp  Ile Asp Asn
    1385                 1390                 1395

Lys Asp  Arg Tyr Ile Phe Leu  Thr Cys Glu Leu Asp  Asp Lys Ile
    1400                 1405                 1410

Ser Leu  Ile Ile Glu Ile Asn  Leu Val Ala Lys Ser  Tyr Ser Leu
    1415                 1420                 1425

Leu Leu  Ser Gly Asp Lys Asn  Tyr Leu Ile Ser Asn  Leu Ser Asn
    1430                 1435                 1440

Thr Ile  Glu Lys Ile Asn Thr  Leu Gly Leu Asp Ser  Lys Asn Ile
    1445                 1450                 1455

Ala Tyr  Asn Tyr Thr Asp Glu  Ser Asn Asn Lys Tyr  Phe Gly Ala
    1460                 1465                 1470

Ile Ser  Lys Thr Ser Gln Lys  Ser Ile Ile His Tyr  Lys Lys Asp
    1475                 1480                 1485

Ser Lys  Asn Ile Leu Glu Phe  Tyr Asn Gly Ser Thr  Leu Glu Phe
    1490                 1495                 1500

Asn Ser  Lys Asp Phe Ile Ala  Glu Asp Ile Asn Val  Phe Met Lys
    1505                 1510                 1515

Asp Asp  Ile Asn Thr Ile Thr  Gly Lys Tyr Tyr Val  Asp Asn Asn
    1520                 1525                 1530

Thr Asp  Lys Ser Ile Asp Phe  Ser Ile Ser Leu Val  Ser Lys Asn
    1535                 1540                 1545

Gln Val  Lys Val Asn Gly Leu  Tyr Leu Asn Glu Ser  Val Tyr Ser
    1550                 1555                 1560

Ser Tyr  Leu Asp Phe Val Lys  Asn Ser Asp Gly His  His Asn Thr
    1565                 1570                 1575
```

```
Ser Asn  Phe Met Asn Leu Phe  Leu Asn Asn Ile Ser  Phe Trp Lys
    1580                1585                1590

Leu Phe  Gly Phe Glu Asn Ile  Asn Phe Val Ile Asp  Lys Tyr Phe
    1595                1600                1605

Thr Leu  Val Gly Lys Thr Asn  Leu Gly Tyr Val Glu  Phe Ile Cys
    1610                1615                1620

Asp Asn  Asn Lys Asn Ile Asp  Ile Tyr Phe Gly Glu  Trp Lys Thr
    1625                1630                1635

Ser Ser  Ser Lys Ser Thr Ile  Phe Ser Gly Asn Gly  Arg Asn Val
    1640                1645                1650

Val Val  Glu Pro Ile Tyr Asn  Pro Asp Thr Gly Glu  Asp Ile Ser
    1655                1660                1665

Thr Ser  Leu Asp Phe Ser Tyr  Glu Pro Leu Tyr Gly  Ile Asp Arg
    1670                1675                1680

Tyr Ile  Asn Lys Val Leu Ile  Ala Pro Asp Leu Tyr  Thr Ser Leu
    1685                1690                1695

Ile Asn  Ile Asn Thr Asn Tyr  Tyr Ser Asn Glu Tyr  Tyr Pro Glu
    1700                1705                1710

Ile Ile  Val Leu Asn Pro Asn  Thr Phe His Lys Lys  Val Asn Ile
    1715                1720                1725

Asn Leu  Asp Ser Ser Ser Phe  Glu Tyr Lys Trp Ser  Thr Glu Gly
    1730                1735                1740

Ser Asp  Phe Ile Leu Val Arg  Tyr Leu Glu Glu Ser  Asn Lys Lys
    1745                1750                1755

Ile Leu  Gln Lys Ile Arg Ile  Lys Gly Ile Leu Ser  Asn Thr Gln
    1760                1765                1770

Ser Phe  Asn Lys Met Ser Ile  Asp Phe Lys Asp Ile  Lys Lys Leu
    1775                1780                1785

Ser Leu  Gly Tyr Ile Met Ser  Asn Phe Lys Ser Phe  Asn Ser Glu
    1790                1795                1800

Asn Glu  Leu Asp Arg Asp His  Leu Gly Phe Lys Ile  Ile Asp Asn
    1805                1810                1815

Lys Thr  Tyr Tyr Tyr Asp Glu  Asp Ser Lys Leu Val  Lys Gly Leu
    1820                1825                1830
```

```
Ile Asn  Ile Asn Asn Ser Leu  Phe Tyr Phe Asp Pro  Ile Glu Ser
    1835                1840                1845

Asn Leu  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1850                1855                1860

Phe Asp  Ile Asn Thr Gly Ala  Ala Ser Thr Ser Tyr  Lys Ile Ile
    1865                1870                1875

Asn Gly  Lys His Phe Tyr Phe  Asn Asn Asn Gly Val  Met Gln Leu
    1880                1885                1890

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1895                1900                1905

Asn Thr  Gln Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1910                1915                1920

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1925                1930                1935

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Glu Lys
    1940                1945                1950

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Val  Gly Leu Gln
    1955                1960                1965

Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn Pro Asp  Thr Ala Ile
    1970                1975                1980

Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly Ser Arg  Tyr Tyr Phe
    1985                1990                1995

Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly Tyr Lys  Thr Ile Asp
    2000                2005                2010

Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys Val Val  Lys Ile Gly
    2015                2020                2025

Val Phe  Ser Gly Ser Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2030                2035                2040

Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser
    2045                2050                2055

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asn
    2060                2065                2070

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Ser  Lys Lys Tyr
    2075                2080                2085
```

```
Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2090                 2095                 2100

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    2105                 2110                 2115

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2120                 2125                 2130

Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr Thr Ile  Ile Asn Gly
    2135                 2140                 2145

Lys Tyr  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2150                 2155                 2160

Phe Lys  Val Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2165                 2170                 2175

His Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Lys
    2180                 2185                 2190

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser
    2195                 2200                 2205

Lys Ala  Ile Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2210                 2215                 2220

Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Thr His Leu  Cys Thr Ile
    2225                 2230                 2235

Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn
    2240                 2245                 2250

Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn
    2255                 2260                 2265

Asn Glu  Ser Lys Met Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly
    2270                 2275                 2280

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    2285                 2290                 2295

Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    2300                 2305                 2310

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    2315                 2320                 2325

Gln Thr  Ile Asp Ser Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    2330                 2335                 2340
```

```
Val Ala  Val Thr Gly Trp Gln  Thr Ile Asp Gly Glu  Lys Tyr Tyr
    2345                2350                2355

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    2360                2365                2370

Asp Gly  Lys Arg Tyr Tyr Phe  Asn Thr Asn Thr Tyr  Ile Ala Ser
    2375                2380                2385

Thr Gly  Tyr Thr Ile Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    2390                2395                2400

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asp Gly Phe
    2405                2410                2415

Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly
    2420                2425                2430

Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys
    2435                2440                2445

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg
    2450                2455                2460

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val
    2465                2470                2475

Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe
    2480                2485                2490

Asn Thr  Asn Thr Tyr Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser
    2495                2500                2505

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    2510                2515                2520

Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2525                2530                2535

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn
    2540                2545                2550

Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asp
    2555                2560                2565

Ser Lys  Ala Ala Thr Gly Trp  Ala Thr Ile Asp Gly  Asn Arg Tyr
    2570                2575                2580

Tyr Phe  Glu Pro Asn Thr Ala  Met Gly Ala Asn Gly  Tyr Lys Thr
    2585                2590                2595
```

```
Ile Asp  Asn Lys Asn Phe Tyr  Phe Arg Asn Gly Leu  Pro Gln Ile
    2600                 2605                 2610

Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    2615                 2620                 2625

Asn Thr  Asp Ala Asn Asn Ile  Asp Gly Gln Ala Ile  Arg Tyr Gln
    2630                 2635                 2640

Asn Arg  Phe Leu His Leu Leu  Gly Lys Ile Tyr Tyr  Phe Gly Asn
    2645                 2650                 2655

Asn Ser  Lys Ala Val Thr Gly  Trp Gln Thr Ile Asn  Ser Lys Val
    2660                 2665                 2670

Tyr Tyr  Phe Met Pro Asp Thr  Ala Met Ala Ala Ala  Gly Gly Leu
    2675                 2680                 2685

Phe Glu  Ile Asp Gly Val Ile  Tyr Phe Phe Gly Val  Asp Gly Val
    2690                 2695                 2700

Lys Ala  Pro Gly Ile Tyr Gly
    2705                 2710
```

<210> 4
<211> 2366
<212> PRT
<213> Clostridium difficile

<400> 4

```
Met Ser Leu Val Asn Arg Lys Gln Leu Glu Lys Met Ala Asn Val Arg
1               5                  10                  15

Phe Arg Val Gln Glu Asp Glu Tyr Val Ala Ile Leu Asp Ala Leu Glu
            20                  25                  30

Glu Tyr His Asn Met Ser Glu Asn Thr Val Val Glu Lys Tyr Leu Lys
        35                  40                  45

Leu Lys Asp Ile Asn Ser Leu Thr Asp Ile Tyr Ile Asp Thr Tyr Lys
    50                  55                  60

Lys Ser Gly Arg Asn Lys Ala Leu Lys Lys Phe Lys Glu Tyr Leu Val
65                  70                  75                  80

Thr Glu Val Leu Glu Leu Lys Asn Asn Asn Leu Thr Pro Val Glu Lys
                85                  90                  95

Asn Leu His Phe Val Trp Ile Gly Gly Gln Ile Asn Asp Thr Ala Ile
            100                 105                 110
```

```
Asn Tyr Ile Asn Gln Trp Lys Asp Val Asn Ser Asp Tyr Asn Val Asn
        115                 120                 125

Val Phe Tyr Asp Ser Asn Ala Phe Leu Ile Asn Thr Leu Lys Lys Thr
    130                 135                 140

Ile Val Glu Ser Ala Thr Asn Asp Thr Leu Glu Ser Phe Arg Glu Asn
145                 150                 155                 160

Leu Asn Asp Pro Arg Phe Asp Tyr Asn Lys Phe Tyr Arg Lys Arg Met
                165                 170                 175

Glu Ile Ile Tyr Asp Lys Gln Lys Asn Phe Ile Asn Tyr Tyr Lys Thr
            180                 185                 190

Gln Arg Glu Glu Asn Pro Asp Leu Ile Ile Asp Asp Ile Val Lys Ile
        195                 200                 205

Tyr Leu Ser Asn Glu Tyr Ser Lys Asp Ile Asp Glu Leu Asn Ser Tyr
    210                 215                 220

Ile Glu Glu Ser Leu Asn Lys Val Thr Glu Asn Ser Gly Asn Asp Val
225                 230                 235                 240

Arg Asn Phe Glu Glu Phe Lys Gly Gly Glu Ser Phe Lys Leu Tyr Glu
                245                 250                 255

Gln Glu Leu Val Glu Arg Trp Asn Leu Ala Ala Ala Ser Asp Ile Leu
            260                 265                 270

Arg Ile Ser Ala Leu Lys Glu Val Gly Gly Val Tyr Leu Asp Val Asp
        275                 280                 285

Met Leu Pro Gly Ile Gln Pro Asp Leu Phe Glu Ser Ile Glu Lys Pro
    290                 295                 300

Ser Ser Val Thr Val Asp Phe Trp Glu Met Val Lys Leu Glu Ala Ile
305                 310                 315                 320

Met Lys Tyr Lys Glu Tyr Ile Pro Gly Tyr Thr Ser Glu His Phe Asp
                325                 330                 335

Met Leu Asp Glu Glu Val Gln Ser Ser Phe Glu Ser Val Leu Ala Ser
            340                 345                 350

Lys Ser Asp Lys Ser Glu Ile Phe Ser Ser Leu Gly Asp Met Glu Ala
        355                 360                 365

Ser Pro Leu Glu Val Lys Ile Ala Phe Asn Ser Lys Gly Ile Ile Asn
    370                 375                 380
```

```
Gln Gly Leu Ile Ser Val Lys Asp Ser Tyr Cys Ser Asn Leu Ile Val
385                 390                 395                 400

Lys Gln Ile Glu Asn Arg Tyr Lys Ile Leu Asn Asn Ser Leu Asn Pro
                405                 410                 415

Ala Ile Ser Glu Asp Asn Asp Phe Asn Thr Thr Thr Asn Ala Phe Ile
            420                 425                 430

Asp Ser Ile Met Ala Glu Ala Asn Ala Asp Asn Gly Arg Phe Met Met
        435                 440                 445

Glu Leu Gly Lys Tyr Leu Arg Val Gly Phe Phe Pro Asp Val Lys Thr
    450                 455                 460

Thr Ile Asn Leu Ser Gly Pro Glu Ala Tyr Ala Ala Ala Tyr Gln Asp
465                 470                 475                 480

Leu Leu Met Phe Lys Glu Gly Ser Met Asn Ile His Leu Ile Glu Ala
                485                 490                 495

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

Glu Gln Glu Met Ala Ser Leu Trp Ser Phe Asp Asp Ala Arg Ala Lys
        515                 520                 525

Ala Gln Phe Glu Glu Tyr Lys Lys Asn Tyr Phe Glu Gly Ser Leu Gly
    530                 535                 540

Glu Asp Asp Asn Leu Asp Phe Ser Gln Asn Thr Val Val Asp Lys Glu
545                 550                 555                 560

Tyr Leu Leu Glu Lys Ile Ser Ser Leu Ala Arg Ser Ser Glu Arg Gly
                565                 570                 575

Tyr Ile His Tyr Ile Val Gln Leu Gln Gly Asp Lys Ile Ser Tyr Glu
            580                 585                 590

Ala Ala Cys Asn Leu Phe Ala Lys Thr Pro Tyr Asp Ser Val Leu Phe
        595                 600                 605

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

Asp Gly Glu Ile Gln Glu Ile Asp Lys Tyr Lys Ile Pro Ser Ile Ile
625                 630                 635                 640

Ser Asp Arg Pro Lys Ile Lys Leu Thr Phe Ile Gly His Gly Lys Asp
                645                 650                 655
```

```
Glu Phe Asn Thr Asp Ile Phe Ala Gly Leu Asp Val Asp Ser Leu Ser
            660                 665                 670

Thr Glu Ile Glu Thr Ala Ile Asp Leu Ala Lys Glu Asp Ile Ser Pro
        675                 680                 685

Lys Ser Ile Glu Ile Asn Leu Leu Gly Cys Asn Met Phe Ser Tyr Ser
    690                 695                 700

Val Asn Val Glu Glu Thr Tyr Pro Gly Lys Leu Leu Leu Arg Val Lys
705                 710                 715                 720

Asp Lys Val Ser Glu Leu Met Pro Ser Ile Ser Gln Asp Ser Ile Ile
                725                 730                 735

Val Ser Ala Asn Gln Tyr Glu Val Arg Ile Asn Ser Glu Gly Arg Arg
            740                 745                 750

Glu Leu Leu Asp His Ser Gly Glu Trp Ile Asn Lys Glu Glu Ser Ile
        755                 760                 765

Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu
    770                 775                 780

Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu
785                 790                 795                 800

Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu
                805                 810                 815

Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser Asn Ile
            820                 825                 830

Asp Thr Gln Val Val Glu Gly Arg Ile Glu Glu Ala Lys Ser Leu Thr
        835                 840                 845

Ser Asp Ser Ile Asn Tyr Ile Lys Asn Glu Phe Lys Leu Ile Glu Ser
    850                 855                 860

Ile Ser Asp Ala Leu Tyr Asp Leu Lys Gln Gln Asn Glu Leu Glu Glu
865                 870                 875                 880

Ser His Phe Ile Ser Phe Glu Asp Ile Leu Glu Thr Asp Glu Gly Phe
                885                 890                 895

Ser Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe Val Glu
            900                 905                 910

Thr Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu
        915                 920                 925
```

```
Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu
    930                 935                 940

Val Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr Leu Asn
945                 950                 955                 960

Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu
                965                 970                 975

Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln
            980                 985                 990

Leu Phe Ser Thr Gly Leu Asn Thr  Ile Thr Asp Ala Ala  Lys Val Val
        995                 1000                1005

Glu Leu  Val Ser Thr Ala Leu  Asp Glu Thr Ile Asp  Leu Leu Pro
    1010                1015                1020

Thr Leu  Ser Glu Gly Leu Pro  Val Ile Ala Thr Ile  Ile Asp Gly
    1025                1030                1035

Val Ser  Leu Gly Ala Ala Ile  Lys Glu Leu Ser Glu  Thr Ser Asp
    1040                1045                1050

Pro Leu  Leu Arg Gln Glu Ile  Glu Ala Lys Ile Gly  Ile Met Ala
    1055                1060                1065

Val Asn  Leu Thr Ala Ala Thr  Thr Ala Ile Ile Thr  Ser Ser Leu
    1070                1075                1080

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

Ile Ser  Ala Gly Ile Pro Ser  Leu Val Asn Asn Glu  Leu Ile Leu
    1100                1105                1110

Arg Asp  Lys Ala Thr Lys Val  Val Asp Tyr Phe Ser  His Ile Ser
    1115                1120                1125

Leu Ala  Glu Ser Glu Gly Ala  Phe Thr Ser Leu Asp  Asp Lys Ile
    1130                1135                1140

Met Met  Pro Gln Asp Asp Leu  Val Ile Ser Glu Ile  Asp Phe Asn
    1145                1150                1155

Asn Asn  Ser Ile Thr Leu Gly  Lys Cys Glu Ile Trp  Arg Met Glu
    1160                1165                1170

Gly Gly  Ser Gly His Thr Val  Thr Asp Asp Ile Asp  His Phe Phe
    1175                1180                1185
```

```
Ser Ala  Pro Ser Ile Thr Tyr  Arg Glu Pro His Leu  Ser Ile Tyr
    1190                1195                1200

Asp Val  Leu Glu Val Gln Lys  Glu Glu Leu Asp Leu  Ser Lys Asp
    1205                1210                1215

Leu Met  Val Leu Pro Asn Ala  Pro Asn Arg Val Phe  Ala Trp Glu
    1220                1225                1230

Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu Glu Asn  Asp Gly Thr
    1235                1240                1245

Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr Glu Gly  Glu Phe Tyr
    1250                1255                1260

Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala Leu Ile  Thr Thr Leu
    1265                1270                1275

Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg Ile Asn  Leu Asp Ser
    1280                1285                1290

Asn Thr  Arg Ser Phe Ile Val  Pro Val Ile Thr Thr  Glu Tyr Ile
    1295                1300                1305

Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly Ser Gly  Gly Thr Tyr
    1310                1315                1320

Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Asn Ile Asn  Ile Glu Leu
    1325                1330                1335

Asn Glu  Asn Asp Thr Trp Val  Ile Asp Val Asp Asn  Val Val Arg
    1340                1345                1350

Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys Lys Gly  Asp Leu Ile
    1355                1360                1365

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

Leu Asp  Asn His Glu Ile Asn  Phe Ser Gly Thr Leu  Asn Gly Gly
    1385                1390                1395

Asn Gly  Phe Val Ser Leu Thr  Phe Ser Ile Leu Glu  Gly Ile Asn
    1400                1405                1410

Ala Val  Ile Glu Val Asp Leu  Leu Ser Lys Ser Tyr  Lys Val Leu
    1415                1420                1425

Ile Ser  Gly Glu Leu Lys Thr  Leu Met Ala Asn Ser  Asn Ser Val
    1430                1435                1440
```

```
Gln Gln  Lys Ile Asp Tyr Ile  Gly Leu Asn Ser Glu  Leu Gln Lys
    1445                1450                1455

Asn Ile  Pro Tyr Ser Phe Met  Asp Asp Lys Gly Lys  Glu Asn Gly
    1460                1465                1470

Phe Ile  Asn Cys Ser Thr Lys  Glu Gly Leu Phe Val  Ser Glu Leu
    1475                1480                1485

Ser Asp  Val Val Leu Ile Ser  Lys Val Tyr Met Asp  Asn Ser Lys
    1490                1495                1500

Pro Leu  Phe Gly Tyr Cys Ser  Asn Asp Leu Lys Asp  Val Lys Val
    1505                1510                1515

Ile Thr  Lys Asp Asp Val Ile  Ile Leu Thr Gly Tyr  Tyr Leu Lys
    1520                1525                1530

Asp Asp  Ile Lys Ile Ser Leu  Ser Phe Thr Ile Gln  Asp Glu Asn
    1535                1540                1545

Thr Ile  Lys Leu Asn Gly Val  Tyr Leu Asp Glu Asn  Gly Val Ala
    1550                1555                1560

Glu Ile  Leu Lys Phe Met Asn  Lys Lys Gly Ser Thr  Asn Thr Ser
    1565                1570                1575

Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met Asn Ile  Lys Ser Ile
    1580                1585                1590

Phe Ile  Asn Ser Leu Gln Ser  Asn Thr Lys Leu Ile  Leu Asp Thr
    1595                1600                1605

Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
    1610                1615                1620

Ile Cys  Asp Lys Asp Asn Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1625                1630                1635

Asn Thr  Leu Glu Thr Lys Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1640                1645                1650

Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1655                1660                1665

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1670                1675                1680

Ile Asp  Ser Cys Val Asn Lys  Val Ile Ile Ser Pro  Asn Ile Tyr
    1685                1690                1695
```

```
Thr Asp  Glu Ile Asn Ile Thr  Pro Ile Tyr Glu Ala  Asn Asn Thr
    1700                1705                1710

Tyr Pro  Glu Val Ile Val Leu  Asp Thr Asn Tyr Ile  Ser Glu Lys
    1715                1720                1725

Ile Asn  Ile Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1730                1735                1740

Asn Asp  Gly Ser Asp Phe Ile  Leu Met Ser Thr Asp  Glu Glu Asn
    1745                1750                1755

Lys Val  Ser Gln Val Lys Ile  Arg Phe Thr Asn Val  Phe Lys Gly
    1760                1765                1770

Asn Thr  Ile Ser Asp Lys Ile  Ser Phe Asn Phe Ser  Asp Lys Gln
    1775                1780                1785

Asp Val  Ser Ile Asn Lys Val  Ile Ser Thr Phe Thr  Pro Ser Tyr
    1790                1795                1800

Tyr Val  Glu Gly Leu Leu Asn  Tyr Asp Leu Gly Leu  Ile Ser Leu
    1805                1810                1815

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1820                1825                1830

Gly Leu  Val Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1835                1840                1845

Ile Lys  Asn Leu Ile Thr Gly  Phe Thr Thr Ile Gly  Asp Asp Lys
    1850                1855                1860

Tyr Tyr  Phe Asn Pro Asp Asn  Gly Gly Ala Ala Ser  Val Gly Glu
    1865                1870                1875

Thr Ile  Ile Asp Gly Lys Asn  Tyr Tyr Phe Ser Gln  Asn Gly Val
    1880                1885                1890

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asp Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1910                1915                1920

Asp Phe  Thr Gly Lys Leu Thr  Ile Asp Glu Asn Val  Tyr Tyr Phe
    1925                1930                1935

Gly Asp  Asn Tyr Arg Ala Ala  Ile Glu Trp Gln Thr  Leu Asp Asp
    1940                1945                1950
```

```
Glu Val  Tyr Tyr Phe Ser Thr  Asp Thr Gly Arg Ala  Phe Lys Gly
    1955                1960                1965

Leu Asn  Gln Ile Gly Asp Asp  Lys Phe Tyr Phe Asn  Ser Asp Gly
    1970                1975                1980

Ile Met  Gln Lys Gly Phe Val  Asn Ile Asn Asp Lys  Thr Phe Tyr
    1985                1990                1995

Phe Asp  Asp Ser Gly Val Met  Lys Ser Gly Tyr Thr  Glu Ile Asp
    2000                2005                2010

Gly Lys  Tyr Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    2015                2020                2025

Val Phe  Asn Thr Ala Asp Gly  Phe Lys Tyr Phe Ala  His His Asp
    2030                2035                2040

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Ala Leu Ser  Tyr Ser Gly
    2045                2050                2055

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    2060                2065                2070

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    2075                2080                2085

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Ile Ser Ile
    2090                2095                2100

Ile Asn  Asp Gly Lys Tyr Tyr  Phe Asn Asp Ser Gly  Ile Met Gln
    2105                2110                2115

Ile Gly  Phe Val Thr Ile Asn  Asn Glu Val Phe Tyr  Phe Ser Asp
    2120                2125                2130

Ser Gly  Ile Val Glu Ser Gly  Met Gln Asn Ile Asp  Asp Asn Tyr
    2135                2140                2145

Phe Tyr  Ile Asp Glu Asn Gly  Leu Val Gln Ile Gly  Val Phe Asp
    2150                2155                2160

Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    2165                2170                2175

Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    2180                2185                2190

Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    2195                2200                2205
```

```
Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    2210                 2215                 2220

Phe Asp  Pro Glu Thr Lys Lys  Ala Tyr Lys Gly Ile  Asn Val Ile
    2225                 2230                 2235

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Asn Gly Ile  Met Arg Thr
    2240                 2245                 2250

Gly Leu  Ile Thr Phe Glu Asp  Asn His Tyr Tyr Phe  Asn Glu Asp
    2255                 2260                 2265

Gly Ile  Met Gln Tyr Gly Tyr  Leu Asn Ile Glu Asp  Lys Thr Phe
    2270                 2275                 2280

Tyr Phe  Ser Glu Asp Gly Ile  Met Gln Ile Gly Val  Phe Asn Thr
    2285                 2290                 2295

Pro Asp  Gly Phe Lys Tyr Phe  Ala His Gln Asn Thr  Leu Asp Glu
    2300                 2305                 2310

Asn Phe  Glu Gly Glu Ser Ile  Asn Tyr Thr Gly Trp  Leu Asp Leu
    2315                 2320                 2325

Asp Glu  Lys Arg Tyr Tyr Phe  Thr Asp Glu Tyr Ile  Ala Ala Thr
    2330                 2335                 2340

Gly Ser  Val Ile Ile Asp Gly  Glu Glu Tyr Tyr Phe  Asp Pro Asp
    2345                 2350                 2355

Thr Ala  Gln Leu Val Ile Ser  Glu
    2360                 2365


<210>  5
<211>  1580
<212>  PRT
<213>  Clostridium difficile

<400>  5

Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys Ile Leu
1               5                  10                  15

Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn
            20                  25                  30

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

Gly His Thr Val Thr Gly Asn Ile Asp His Phe Phe Ser Ser Pro Ser
    50                  55                  60

Ile Ser Ser His Ile Pro Ser Leu Ser Ile Tyr Ser Ala Ile Gly Ile
```

65 70 75 80

Glu Thr Glu Asn Leu Asp Phe Ser Lys Lys Ile Met Met Leu Pro Asn
85 90 95

Ala Pro Ser Arg Val Phe Trp Trp Glu Thr Gly Ala Val Pro Gly Leu
100 105 110

Arg Ser Leu Glu Asn Asp Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp
115 120 125

Leu Tyr Pro Gly Lys Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr
130 135 140

Ala Ile Thr Thr Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile
145 150 155 160

Lys Leu Asp Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr
165 170 175

Asn Glu Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly
180 185 190

Thr Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
195 200 205

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
210 215 220

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile Lys
225 230 235 240

Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile Ile Gly
245 250 255

Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys Asp Arg Tyr
260 265 270

Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser Leu Ile Ile Glu
275 280 285

Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu Leu Ser Gly Asp Lys
290 295 300

Asn Tyr Leu Ile Ser Asn Leu Ser Asn Ile Ile Glu Lys Ile Asn Thr
305 310 315 320

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

Asn Asn Lys Tyr Phe Gly Ala Ile Ser Lys Thr Ser Gln Lys Ser Ile

```
            340                 345                 350

Ile His Tyr Lys Lys Asp Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp
        355                 360                 365

Ser Thr Leu Glu Phe Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn
    370                 375                 380

Val Phe Met Lys Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val
385                 390                 395                 400

Asp Asn Asn Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser
                405                 410                 415

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

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

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
    450                 455                 460

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

Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp Asn Asn
                485                 490                 495

Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser Ser Ser Lys
            500                 505                 510

Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val Val Glu Pro Ile
        515                 520                 525

Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr Ser Leu Asp Phe Ser
    530                 535                 540

Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr Ile Asn Lys Val Leu Ile
545                 550                 555                 560

Ala Pro Asp Leu Tyr Thr Ser Leu Ile Asn Ile Asn Thr Asn Tyr Tyr
                565                 570                 575

Ser Asn Glu Tyr Tyr Pro Glu Ile Ile Val Leu Asn Pro Asn Thr Phe
            580                 585                 590

His Lys Lys Val Asn Ile Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys
        595                 600                 605

Trp Ser Thr Glu Gly Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu
```

610 615 620

Ser Asn Lys Lys Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser
625 630 635 640

Asn Thr Gln Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys
645 650 655

Lys Leu Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser
660 665 670

Glu Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
675 680 685

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
690 695 700

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn Leu
705 710 715 720

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asp Ile
725 730 735

Asn Thr Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile Asn Gly Lys His
740 745 750

Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly Val Phe Lys Gly
755 760 765

Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Gln Asn Asn Asn
770 775 780

Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe Leu Thr Leu Asn
785 790 795 800

Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
805 810 815

Arg Ile Ile Asn Asn Glu Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile
820 825 830

Ala Ala Val Gly Leu Gln Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn
835 840 845

Pro Asp Thr Ala Ile Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser
850 855 860

Arg Tyr Tyr Phe Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys
865 870 875 880

Thr Ile Asp Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys

885 890 895

Ile Gly Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
900 905 910

Asn Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
915 920 925

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
930 935 940

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe
945 950 955 960

Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly
965 970 975

Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp
980 985 990

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Ile
995 1000 1005

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

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn
1025 1030 1035

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile
1040 1045 1050

Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe Leu Thr Leu Asn
1055 1060 1065

Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly
1070 1075 1080

Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe Asn Pro Asn Asn
1085 1090 1095

Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn Asn Asp Lys Tyr
1100 1105 1110

Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly Tyr Ile Thr Ile
1115 1120 1125

Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn Glu Ser Lys Met
1130 1135 1140

Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala

```
    1145                1150                1155

Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu Gly Gln  Ala Ile Val
    1160                1165                1170

Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe
    1175                1180                1185

Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp Gln Thr  Ile Asp Gly
    1190                1195                1200

Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala Glu Ala  Ala Thr Gly
    1205                1210                1215

Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr Phe Asn  Leu Asn Thr
    1220                1225                1230

Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile Asp Gly  Lys Lys Tyr
    1235                1240                1245

Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser Thr Gly  Tyr Thr Ser
    1250                1255                1260

Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr Asp Gly  Ile Met Gln
    1265                1270                1275

Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe Glu Tyr  Phe Ala Pro
    1280                1285                1290

Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly Gln Ala  Ile Leu Tyr
    1295                1300                1305

Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys Lys Tyr  Tyr Phe Gly
    1310                1315                1320

Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg Thr Ile  Asp Gly Lys
    1325                1330                1335

Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val Ala Val  Thr Gly Trp
    1340                1345                1350

Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe Asn Thr  Asn Thr Ser
    1355                1360                1365

Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser Gly Lys  His Phe Tyr
    1370                1375                1380

Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly Val Phe  Lys Gly Pro
    1385                1390                1395

Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn Thr Asp  Ala Asn Asn
```

1400 1405 1410

Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu
1415 1420 1425

His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr
1430 1435 1440

Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn
1445 1450 1455

Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn
1460 1465 1470

Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val Phe Lys Gly
1475 1480 1485

Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn
1490 1495 1500

Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu His
1505 1510 1515

Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Val
1520 1525 1530

Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro
1535 1540 1545

Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu Ile Asp Gly
1550 1555 1560

Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Pro Gly Ile
1565 1570 1575

Tyr Gly
1580

<210> 6
<211> 1580
<212> PRT
<213> Clostridium difficile

<400> 6

Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys Ile Leu
1 5 10 15

Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn
20 25 30

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

```
Gly His Thr Val Thr Gly Asn Ile Asp His Phe Phe Ser Ser Pro Ser
    50                  55                  60

Ile Ser Ser His Ile Pro Ser Leu Ser Ile Tyr Ser Ala Ile Gly Ile
65                  70                  75                  80

Glu Thr Glu Asn Leu Asp Phe Ser Lys Lys Ile Met Met Leu Pro Asn
                85                  90                  95

Ala Pro Ser Arg Val Phe Trp Trp Glu Thr Gly Ala Val Pro Gly Leu
            100                 105                 110

Arg Ser Leu Glu Asn Asp Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp
        115                 120                 125

Leu Tyr Pro Gly Lys Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr
    130                 135                 140

Ala Ile Thr Thr Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile
145                 150                 155                 160

Lys Leu Asp Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr
                165                 170                 175

Asn Glu Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly
            180                 185                 190

Thr Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn
        195                 200                 205

Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg
    210                 215                 220

Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile Lys
225                 230                 235                 240

Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile Ile Gly
                245                 250                 255

Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys Asp Arg Tyr
            260                 265                 270

Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser Leu Ile Ile Glu
        275                 280                 285

Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu Leu Ser Gly Asp Lys
    290                 295                 300

Asn Tyr Leu Ile Ser Asn Leu Ser Asn Thr Ile Glu Lys Ile Asn Thr
305                 310                 315                 320
```

```
Leu Gly Leu Asp Ser Lys Asn Ile Ala Tyr Asn Tyr Thr Asp Glu Ser
                325                 330                 335

Asn Asn Lys Tyr Phe Gly Ala Ile Ser Lys Thr Ser Gln Lys Ser Ile
            340                 345                 350

Ile His Tyr Lys Lys Asp Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp
        355                 360                 365

Ser Thr Leu Glu Phe Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn
    370                 375                 380

Val Phe Met Lys Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val
385                 390                 395                 400

Asp Asn Asn Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser
                405                 410                 415

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

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

Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu
    450                 455                 460

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

Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp Asn Asn
                485                 490                 495

Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser Ser Ser Lys
            500                 505                 510

Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val Val Glu Pro Ile
        515                 520                 525

Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr Ser Leu Asp Phe Ser
    530                 535                 540

Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr Ile Asn Lys Val Leu Ile
545                 550                 555                 560

Ala Pro Asp Leu Tyr Thr Ser Leu Ile Asn Ile Asn Thr Asn Tyr Tyr
                565                 570                 575

Ser Asn Glu Tyr Tyr Pro Glu Ile Ile Val Leu Asn Pro Asn Thr Phe
            580                 585                 590
```

```
His Lys Lys Val Asn Ile Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys
        595                 600                 605

Trp Ser Thr Glu Gly Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu
    610                 615                 620

Ser Asn Lys Lys Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser
625                 630                 635                 640

Asn Thr Gln Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys
                645                 650                 655

Lys Leu Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser
            660                 665                 670

Glu Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
        675                 680                 685

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile
    690                 695                 700

Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn Leu
705                 710                 715                 720

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asp Ile
                725                 730                 735

Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn Gly Lys His
            740                 745                 750

Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly Val Phe Lys Gly
        755                 760                 765

Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Gln Asn Asn Asn
    770                 775                 780

Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe Leu Thr Leu Asn
785                 790                 795                 800

Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser Lys Ala Val Thr Gly Trp
                805                 810                 815

Arg Ile Ile Asn Asn Glu Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile
            820                 825                 830

Ala Ala Val Gly Leu Gln Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn
        835                 840                 845

Pro Asp Thr Ala Ile Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser
    850                 855                 860
```

```
Arg Tyr Tyr Phe Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys
865                 870                 875                 880

Thr Ile Asp Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys
                885                 890                 895

Ile Gly Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
            900                 905                 910

Asn Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
        915                 920                 925

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
    930                 935                 940

Lys Ala Val Thr Gly Leu Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe
945                 950                 955                 960

Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly
                965                 970                 975

Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp
            980                 985                 990

Gln Thr Ile Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Ile
        995                 1000                1005

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

Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val Phe Lys  Gly Pro Asn
    1025                1030                1035

Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr Asp Ala  Asn Asn Ile
    1040                1045                1050

Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Glu Phe Leu  Thr Leu Asn
    1055                1060                1065

Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser Lys Ala  Val Thr Gly
    1070                1075                1080

Trp Arg  Ile Ile Asn Asn Lys  Lys Tyr Tyr Phe Asn  Pro Asn Asn
    1085                1090                1095

Ala Ile  Ala Ala Ile His Leu  Cys Thr Ile Asn Asn  Asp Lys Tyr
    1100                1105                1110

Tyr Phe  Ser Tyr Asp Gly Ile  Leu Gln Asn Gly Tyr  Ile Thr Ile
    1115                1120                1125
```

```
Glu Arg  Asn Asn Phe Tyr Phe  Asp Ala Asn Asn Glu  Ser Lys Met
    1130                1135                1140

Val Thr  Gly Val Phe Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala
    1145                1150                1155

Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu Gly Gln  Ala Ile Val
    1160                1165                1170

Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe
    1175                1180                1185

Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp Gln Thr  Ile Asp Gly
    1190                1195                1200

Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala Glu Ala  Ala Thr Gly
    1205                1210                1215

Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr Phe Asn  Leu Asn Thr
    1220                1225                1230

Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile Asp Gly  Lys Lys Tyr
    1235                1240                1245

Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser Thr Gly  Tyr Thr Ser
    1250                1255                1260

Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr Asp Gly  Ile Met Gln
    1265                1270                1275

Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe Glu Tyr  Phe Ala Pro
    1280                1285                1290

Ala Asn  Thr Asp Ala Asn Asn  Ile Glu Gly Gln Ala  Ile Leu Tyr
    1295                1300                1305

Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys Lys Tyr  Tyr Phe Gly
    1310                1315                1320

Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg Thr Ile  Asp Gly Lys
    1325                1330                1335

Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val Ala Val  Thr Gly Trp
    1340                1345                1350

Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe Asn Thr  Asn Thr Ser
    1355                1360                1365

Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser Gly Lys  His Phe Tyr
    1370                1375                1380
```

```
Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly Val Phe  Lys Gly Pro
    1385                1390                1395

Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn Thr Asp  Ala Asn Asn
    1400                1405                1410

Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn Arg Phe  Leu Tyr Leu
    1415                1420                1425

His Asp  Asn Ile Tyr Tyr Phe  Gly Asn Asn Ser Lys  Ala Ala Thr
    1430                1435                1440

Gly Trp  Val Thr Ile Asp Gly  Asn Arg Tyr Tyr Phe  Glu Pro Asn
    1445                1450                1455

Thr Ala  Met Gly Ala Asn Gly  Tyr Lys Thr Ile Asp  Asn Lys Asn
    1460                1465                1470

Phe Tyr  Phe Arg Asn Gly Leu  Pro Gln Ile Gly Val  Phe Lys Gly
    1475                1480                1485

Ser Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala Asn Thr  Asp Ala Asn
    1490                1495                1500

Asn Ile  Glu Gly Gln Ala Ile  Arg Tyr Gln Asn Arg  Phe Leu His
    1505                1510                1515

Leu Leu  Gly Lys Ile Tyr Tyr  Phe Gly Asn Asn Ser  Lys Ala Val
    1520                1525                1530

Thr Gly  Trp Gln Thr Ile Asn  Gly Lys Val Tyr Tyr  Phe Met Pro
    1535                1540                1545

Asp Thr  Ala Met Ala Ala Ala  Gly Gly Leu Phe Glu  Ile Asp Gly
    1550                1555                1560

Val Ile  Tyr Phe Phe Gly Val  Asp Gly Val Lys Ala  Pro Gly Ile
    1565                1570                1575

Tyr Gly
    1580
```

<210> 7
<211> 1941
<212> PRT
<213> Clostridium difficile

<400> 7

```
Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
1               5                  10                  15
```

```
Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
            20                  25                  30

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
        35                  40                  45

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
    50                  55                  60

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
65                  70                  75                  80

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
                85                  90                  95

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
            100                 105                 110

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

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
    130                 135                 140

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
145                 150                 155                 160

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
                165                 170                 175

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
            180                 185                 190

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
        195                 200                 205

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
    210                 215                 220

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
225                 230                 235                 240

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu Pro
                245                 250                 255

Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp Gly Ile
            260                 265                 270

Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His Asp Pro Leu
        275                 280                 285
```

```
Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu Ala Ile Asn Met
    290                 295                 300

Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile Val Gly Ile Gly Ala
305                 310                 315                 320

Glu Val Thr Ile Phe Leu Leu Pro Ile Ala Gly Ile Ser Ala Gly Ile
                325                 330                 335

Pro Ser Leu Val Asn Asn Glu Leu Ile Leu His Asp Lys Ala Thr Ser
            340                 345                 350

Val Val Asn Tyr Phe Asn His Leu Ser Glu Ser Lys Lys Tyr Gly Pro
        355                 360                 365

Leu Lys Thr Glu Asp Asp Lys Ile Leu Val Pro Ile Asp Asp Leu Val
    370                 375                 380

Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys
385                 390                 395                 400

Asn Ile Leu Ala Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn
                405                 410                 415

Ile Asp His Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser
            420                 425                 430

Leu Ser Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe
        435                 440                 445

Ser Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
    450                 455                 460

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
465                 470                 475                 480

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

Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu Lys Pro
            500                 505                 510

Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys Asp Thr Arg
        515                 520                 525

Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile Arg Asn Lys Leu
    530                 535                 540

Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr Ser Leu Leu Leu Ser
545                 550                 555                 560
```

```
Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu Ser Lys Asp Asp Leu Trp
                565                 570                 575

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

Thr Ile Lys Lys Gly Lys Leu Ile Lys Asp Val Leu Ser Lys Ile Asp
        595                 600                 605

Ile Asn Lys Asn Lys Leu Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser
    610                 615                 620

Gly Asp Ile Asp Asn Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu
625                 630                 635                 640

Asp Asp Lys Ile Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser
                645                 650                 655

Tyr Ser Leu Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu
            660                 665                 670

Ser Asn Ile Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn
        675                 680                 685

Ile Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
    690                 695                 700

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
705                 710                 715                 720

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn Ser
                725                 730                 735

Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp Asp Ile
            740                 745                 750

Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr Asp Lys Ser
        755                 760                 765

Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln Val Lys Val Asn
    770                 775                 780

Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser Tyr Leu Asp Phe Val
785                 790                 795                 800

Lys Asn Ser Asp Gly His His Asn Thr Ser Asn Phe Met Asn Leu Phe
                805                 810                 815

Leu Asp Asn Ile Ser Phe Trp Lys Leu Phe Gly Phe Glu Asn Ile Asn
            820                 825                 830
```

```
Phe Val Ile Asp Lys Tyr Phe Thr Leu Val Gly Lys Thr Asn Leu Gly
        835                 840                 845

Tyr Val Glu Phe Ile Cys Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe
    850                 855                 860

Gly Glu Trp Lys Thr Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn
865                 870                 875                 880

Gly Arg Asn Val Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu
                885                 890                 895

Asp Ile Ser Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile
            900                 905                 910

Asp Arg Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser
        915                 920                 925

Leu Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
    930                 935                 940

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
945                 950                 955                 960

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser Asp
                965                 970                 975

Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile Leu Gln
            980                 985                 990

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

Met Ser  Ile Asp Phe Lys Asp  Ile Lys Lys Leu Ser  Leu Gly Tyr
    1010                1015                1020

Ile Met  Ser Asn Phe Lys Ser  Phe Asn Ser Glu Asn  Glu Leu Asp
    1025                1030                1035

Arg Asp  His Leu Gly Phe Lys  Ile Ile Asp Asn Lys  Thr Tyr Tyr
    1040                1045                1050

Tyr Asp  Glu Asp Ser Lys Leu  Val Lys Gly Leu Ile  Asn Ile Asn
    1055                1060                1065

Asn Ser  Leu Phe Tyr Phe Asp  Pro Ile Glu Phe Asn  Leu Val Thr
    1070                1075                1080

Gly Trp  Gln Thr Ile Asn Gly  Lys Lys Tyr Tyr Phe  Asp Ile Asn
    1085                1090                1095
```

```
Thr Gly  Ala Ala Leu Ile Ser  Tyr Lys Ile Ile Asn  Gly Lys His
    1100                1105                1110

Phe Tyr  Phe Asn Asn Asp Gly  Val Met Gln Leu Gly  Val Phe Lys
    1115                1120                1125

Gly Pro  Asp Gly Phe Glu Tyr  Phe Ala Pro Ala Asn  Thr Gln Asn
    1130                1135                1140

Asn Asn  Ile Glu Gly Gln Ala  Ile Val Tyr Gln Ser  Lys Phe Leu
    1145                1150                1155

Thr Leu  Asn Gly Lys Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala
    1160                1165                1170

Val Thr  Gly Trp Arg Ile Ile  Asn Asn Glu Lys Tyr  Tyr Phe Asn
    1175                1180                1185

Pro Asn  Asn Ala Ile Ala Ala  Val Gly Leu Gln Val  Ile Asp Asn
    1190                1195                1200

Asn Lys  Tyr Tyr Phe Asn Pro  Asp Thr Ala Ile Ile  Ser Lys Gly
    1205                1210                1215

Trp Gln  Thr Val Asn Gly Ser  Arg Tyr Tyr Phe Asp  Thr Asp Thr
    1220                1225                1230

Ala Ile  Ala Phe Asn Gly Tyr  Lys Thr Ile Asp Gly  Lys His Phe
    1235                1240                1245

Tyr Phe  Asp Ser Asp Cys Val  Val Lys Ile Gly Val  Phe Ser Thr
    1250                1255                1260

Ser Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala Asn Thr  Tyr Asn Asn
    1265                1270                1275

Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln Ser Lys  Phe Leu Thr
    1280                1285                1290

Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn Asn Ser  Lys Ala Val
    1295                1300                1305

Thr Gly  Trp Gln Thr Ile Asp  Ser Lys Lys Tyr Tyr  Phe Asn Thr
    1310                1315                1320

Asn Thr  Ala Glu Ala Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys
    1325                1330                1335

Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Glu Ala Ala  Thr Gly Trp
    1340                1345                1350
```

```
Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Thr  Asn Thr Ala
    1355                 1360                 1365

Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Asn Gly Lys  His Phe Tyr
    1370                 1375                 1380

Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly Val Phe  Lys Gly Pro
    1385                 1390                 1395

Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn Thr Asp  Ala Asn Asn
    1400                 1405                 1410

Ile Glu  Gly Gln Ala Ile Leu  Tyr Gln Asn Glu Phe  Leu Thr Leu
    1415                 1420                 1425

Asn Gly  Lys Lys Tyr Tyr Phe  Gly Ser Asp Ser Lys  Ala Val Thr
    1430                 1435                 1440

Gly Trp  Arg Ile Ile Asn Asn  Lys Lys Tyr Tyr Phe  Asn Pro Asn
    1445                 1450                 1455

Asn Ala  Ile Ala Ala Ile His  Leu Cys Thr Ile Asn  Asn Asp Lys
    1460                 1465                 1470

Tyr Tyr  Phe Ser Tyr Asp Gly  Ile Leu Gln Asn Gly  Tyr Ile Thr
    1475                 1480                 1485

Ile Glu  Arg Asn Asn Phe Tyr  Phe Asp Ala Asn Asn  Glu Ser Lys
    1490                 1495                 1500

Met Val  Thr Gly Val Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe
    1505                 1510                 1515

Ala Pro  Ala Asn Thr His Asn  Asn Asn Ile Glu Gly  Gln Ala Ile
    1520                 1525                 1530

Val Tyr  Gln Asn Lys Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr
    1535                 1540                 1545

Phe Asp  Asn Asp Ser Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp
    1550                 1555                 1560

Gly Lys  Lys Tyr Tyr Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr
    1565                 1570                 1575

Gly Trp  Gln Thr Ile Asp Gly  Lys Lys Tyr Tyr Phe  Asn Leu Asn
    1580                 1585                 1590

Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys
    1595                 1600                 1605
```

```
Tyr Tyr  Phe Asn Thr Asn Thr  Phe Ile Ala Ser Thr  Gly Tyr Thr
    1610                 1615                 1620

Ser Ile  Asn Gly Lys His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met
    1625                 1630                 1635

Gln Ile  Gly Val Phe Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala
    1640                 1645                 1650

Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu Gly Gln  Ala Ile Leu
    1655                 1660                 1665

Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe
    1670                 1675                 1680

Gly Ser  Asp Ser Lys Ala Val  Thr Gly Leu Arg Thr  Ile Asp Gly
    1685                 1690                 1695

Lys Lys  Tyr Tyr Phe Asn Thr  Asn Thr Ala Val Ala  Val Thr Gly
    1700                 1705                 1710

Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr
    1715                 1720                 1725

Ser Ile  Ala Ser Thr Gly Tyr  Thr Ile Ile Ser Gly  Lys His Phe
    1730                 1735                 1740

Tyr Phe  Asn Thr Asp Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly
    1745                 1750                 1755

Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala Asn Thr  Asp Ala Asn
    1760                 1765                 1770

Asn Ile  Glu Gly Gln Ala Ile  Arg Tyr Gln Asn Arg  Phe Leu Tyr
    1775                 1780                 1785

Leu His  Asp Asn Ile Tyr Tyr  Phe Gly Asn Asn Ser  Lys Ala Ala
    1790                 1795                 1800

Thr Gly  Trp Val Thr Ile Asp  Gly Asn Arg Tyr Tyr  Phe Glu Pro
    1805                 1810                 1815

Asn Thr  Ala Met Gly Ala Asn  Gly Tyr Lys Thr Ile  Asp Asn Lys
    1820                 1825                 1830

Asn Phe  Tyr Phe Arg Asn Gly  Leu Pro Gln Ile Gly  Val Phe Lys
    1835                 1840                 1845

Gly Ser  Asn Gly Phe Glu Tyr  Phe Ala Pro Ala Asn  Thr Asp Ala
    1850                 1855                 1860
```

```
Asn Asn  Ile Glu Gly Gln Ala  Ile Arg Tyr Gln Asn  Arg Phe Leu
    1865                 1870                 1875

His Leu  Leu Gly Lys Ile Tyr  Tyr Phe Gly Asn Asn  Ser Lys Ala
    1880                 1885                 1890

Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys Val Tyr  Tyr Phe Met
    1895                 1900                 1905

Pro Asp  Thr Ala Met Ala Ala  Ala Gly Gly Leu Phe  Glu Ile Asp
    1910                 1915                 1920

Gly Val  Ile Tyr Phe Phe Gly  Val Asp Gly Val Lys  Ala Pro Gly
    1925                 1930                 1935

Ile Tyr  Gly
    1940
```

<210> 8
<211> 1941
<212> PRT
<213> Clostridium difficile

<400> 8

```
Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
1               5                  10                  15

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
            20                  25                  30

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
        35                  40                  45

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
    50                  55                  60

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
65                  70                  75                  80

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
                85                  90                  95

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
            100                 105                 110

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

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
    130                 135                 140
```

```
Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
145                 150                 155                 160

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
                165                 170                 175

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
            180                 185                 190

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
        195                 200                 205

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
    210                 215                 220

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
225                 230                 235                 240

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu Pro
                245                 250                 255

Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp Gly Ile
            260                 265                 270

Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His Asp Pro Leu
        275                 280                 285

Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu Ala Ile Asn Met
    290                 295                 300

Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile Val Gly Ile Gly Ala
305                 310                 315                 320

Glu Val Thr Ile Phe Leu Leu Pro Ile Ala Gly Ile Ser Ala Gly Ile
                325                 330                 335

Pro Ser Leu Val Asn Asn Glu Leu Ile Leu His Asp Lys Ala Thr Ser
            340                 345                 350

Val Val Asn Tyr Phe Asn His Leu Ser Glu Ser Lys Glu Tyr Gly Pro
        355                 360                 365

Leu Lys Thr Glu Asp Asp Lys Ile Leu Val Pro Ile Asp Asp Leu Val
    370                 375                 380

Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys
385                 390                 395                 400

Asn Ile Leu Ala Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn
                405                 410                 415
```

```
Ile Asp His Phe Phe Ser Ser Pro Tyr Ile Ser Ser His Ile Pro Ser
            420                 425                 430

Leu Ser Val Tyr Ser Ala Ile Gly Ile Lys Thr Glu Asn Leu Asp Phe
        435                 440                 445

Ser Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
    450                 455                 460

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asn Gly
465                 470                 475                 480

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

Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu Lys Pro
            500                 505                 510

Val Tyr Glu Asp Thr Asn Thr Lys Ile Lys Leu Asp Lys Asp Thr Arg
        515                 520                 525

Asn Phe Ile Met Pro Thr Ile Thr Thr Asp Glu Ile Arg Asn Lys Leu
    530                 535                 540

Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr Ser Leu Leu Leu Ser
545                 550                 555                 560

Ser Tyr Pro Ile Ser Met Asn Ile Asn Leu Ser Lys Asp Asp Leu Trp
                565                 570                 575

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

Thr Ile Lys Lys Gly Asn Leu Ile Glu Asp Val Leu Ser Lys Ile Asp
        595                 600                 605

Ile Asn Lys Asn Lys Leu Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser
    610                 615                 620

Gly Asp Ile Asp Asn Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu
625                 630                 635                 640

Asp Asp Lys Ile Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser
                645                 650                 655

Tyr Ser Leu Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu
            660                 665                 670

Ser Asn Thr Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn
        675                 680                 685
```

```
Ile Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
    690                 695                 700

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
705                 710                 715                 720

Lys Asn Ile Leu Glu Phe Tyr Asn Gly Ser Thr Leu Glu Phe Asn Ser
                725                 730                 735

Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp Asp Ile
            740                 745                 750

Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr Asp Lys Ser
        755                 760                 765

Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln Val Lys Val Asn
    770                 775                 780

Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser Tyr Leu Asp Phe Val
785                 790                 795                 800

Lys Asn Ser Asp Gly His His Asn Thr Ser Asn Phe Met Asn Leu Phe
                805                 810                 815

Leu Asn Asn Ile Ser Phe Trp Lys Leu Phe Gly Phe Glu Asn Ile Asn
            820                 825                 830

Phe Val Ile Asp Lys Tyr Phe Thr Leu Val Gly Lys Thr Asn Leu Gly
        835                 840                 845

Tyr Val Glu Phe Ile Cys Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe
    850                 855                 860

Gly Glu Trp Lys Thr Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn
865                 870                 875                 880

Gly Arg Asn Val Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu
                885                 890                 895

Asp Ile Ser Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile
            900                 905                 910

Asp Arg Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser
        915                 920                 925

Leu Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
    930                 935                 940

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
945                 950                 955                 960
```

```
Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser Asp
               965                 970                 975

Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile Leu Gln
           980                 985                 990

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

Met Ser  Ile Asp Phe Lys Asp  Ile Lys Lys Leu Ser  Leu Gly Tyr
   1010                1015                1020

Ile Met  Ser Asn Phe Lys Ser  Phe Asn Ser Glu Asn  Glu Leu Asp
   1025                1030                1035

Arg Asp  His Leu Gly Phe Lys  Ile Ile Asp Asn Lys  Thr Tyr Tyr
   1040                1045                1050

Tyr Asp  Glu Asp Ser Lys Leu  Val Lys Gly Leu Ile  Asn Ile Asn
   1055                1060                1065

Asn Ser  Leu Phe Tyr Phe Asp  Pro Ile Glu Ser Asn  Leu Val Thr
   1070                1075                1080

Gly Trp  Gln Thr Ile Asn Gly  Lys Lys Tyr Tyr Phe  Asp Ile Asn
   1085                1090                1095

Thr Gly  Ala Ala Ser Thr Ser  Tyr Lys Ile Ile Asn  Gly Lys His
   1100                1105                1110

Phe Tyr  Phe Asn Asn Asn Gly  Val Met Gln Leu Gly  Val Phe Lys
   1115                1120                1125

Gly Pro  Asp Gly Phe Glu Tyr  Phe Ala Pro Ala Asn  Thr Gln Asn
   1130                1135                1140

Asn Asn  Ile Glu Gly Gln Ala  Ile Val Tyr Gln Ser  Lys Phe Leu
   1145                1150                1155

Thr Leu  Asn Gly Lys Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala
   1160                1165                1170

Val Thr  Gly Trp Arg Ile Ile  Asn Asn Glu Lys Tyr  Tyr Phe Asn
   1175                1180                1185

Pro Asn  Asn Ala Ile Ala Ala  Val Gly Leu Gln Val  Ile Asp Asn
   1190                1195                1200

Asn Lys  Tyr Tyr Phe Asn Pro  Asp Thr Ala Ile Ile  Ser Lys Gly
   1205                1210                1215
```

```
Trp Gln  Thr Val Asn Gly Ser  Arg Tyr Tyr Phe Asp  Thr Asp Thr
    1220                 1225                 1230

Ala Ile  Ala Phe Asn Gly Tyr  Lys Thr Ile Asp Gly  Lys His Phe
    1235                 1240                 1245

Tyr Phe  Asp Ser Asp Cys Val  Val Lys Ile Gly Val  Phe Ser Gly
    1250                 1255                 1260

Ser Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala Asn Thr  Tyr Asn Asn
    1265                 1270                 1275

Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln Ser Lys  Phe Leu Thr
    1280                 1285                 1290

Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn Asn Ser  Lys Ala Val
    1295                 1300                 1305

Thr Gly  Trp Gln Thr Ile Asp  Ser Lys Lys Tyr Tyr  Phe Asn Thr
    1310                 1315                 1320

Asn Thr  Ala Glu Ala Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys
    1325                 1330                 1335

Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Glu Ala Ala  Thr Gly Trp
    1340                 1345                 1350

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Thr  Asn Thr Ser
    1355                 1360                 1365

Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Asn Gly Lys  Tyr Phe Tyr
    1370                 1375                 1380

Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly Val Phe  Lys Val Pro
    1385                 1390                 1395

Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn Thr His  Asn Asn Asn
    1400                 1405                 1410

Ile Glu  Gly Gln Ala Ile Leu  Tyr Gln Asn Lys Phe  Leu Thr Leu
    1415                 1420                 1425

Asn Gly  Lys Lys Tyr Tyr Phe  Gly Ser Asp Ser Lys  Ala Ile Thr
    1430                 1435                 1440

Gly Trp  Gln Thr Ile Asp Gly  Lys Lys Tyr Tyr Phe  Asn Pro Asn
    1445                 1450                 1455

Asn Ala  Ile Ala Ala Thr His  Leu Cys Thr Ile Asn  Asn Asp Lys
    1460                 1465                 1470
```

```
Tyr Tyr  Phe Ser Tyr Asp Gly  Ile Leu Gln Asn Gly  Tyr Ile Thr
    1475                 1480                 1485

Ile Glu  Arg Asn Asn Phe Tyr  Phe Asp Ala Asn Asn  Glu Ser Lys
    1490                 1495                 1500

Met Val  Thr Gly Val Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe
    1505                 1510                 1515

Ala Pro  Ala Asn Thr His Asn  Asn Asn Ile Glu Gly  Gln Ala Ile
    1520                 1525                 1530

Val Tyr  Gln Asn Lys Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr
    1535                 1540                 1545

Phe Asp  Asn Asp Ser Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp
    1550                 1555                 1560

Ser Lys  Lys Tyr Tyr Phe Asn  Leu Asn Thr Ala Val  Ala Val Thr
    1565                 1570                 1575

Gly Trp  Gln Thr Ile Asp Gly  Glu Lys Tyr Tyr Phe  Asn Leu Asn
    1580                 1585                 1590

Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Arg
    1595                 1600                 1605

Tyr Tyr  Phe Asn Thr Asn Thr  Tyr Ile Ala Ser Thr  Gly Tyr Thr
    1610                 1615                 1620

Ile Ile  Asn Gly Lys His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met
    1625                 1630                 1635

Gln Ile  Gly Val Phe Lys Gly  Pro Asp Gly Phe Glu  Tyr Phe Ala
    1640                 1645                 1650

Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu Gly Gln  Ala Ile Leu
    1655                 1660                 1665

Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe
    1670                 1675                 1680

Gly Ser  Asp Ser Lys Ala Val  Thr Gly Leu Arg Thr  Ile Asp Gly
    1685                 1690                 1695

Lys Lys  Tyr Tyr Phe Asn Thr  Asn Thr Ala Val Ala  Val Thr Gly
    1700                 1705                 1710

Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr
    1715                 1720                 1725
```

```
Tyr Ile  Ala Ser Thr Gly Tyr  Thr Ile Ile Ser Gly  Lys His Phe
    1730                1735                1740

Tyr Phe  Asn Thr Asp Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly
    1745                1750                1755

Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala Asn Thr  Asp Ala Asn
    1760                1765                1770

Asn Ile  Glu Gly Gln Ala Ile  Arg Tyr Gln Asn Arg  Phe Leu Tyr
    1775                1780                1785

Leu His  Asp Asn Ile Tyr Tyr  Phe Gly Asn Asp Ser  Lys Ala Ala
    1790                1795                1800

Thr Gly  Trp Ala Thr Ile Asp  Gly Asn Arg Tyr Tyr  Phe Glu Pro
    1805                1810                1815

Asn Thr  Ala Met Gly Ala Asn  Gly Tyr Lys Thr Ile  Asp Asn Lys
    1820                1825                1830

Asn Phe  Tyr Phe Arg Asn Gly  Leu Pro Gln Ile Gly  Val Phe Lys
    1835                1840                1845

Gly Pro  Asn Gly Phe Glu Tyr  Phe Ala Pro Ala Asn  Thr Asp Ala
    1850                1855                1860

Asn Asn  Ile Asp Gly Gln Ala  Ile Arg Tyr Gln Asn  Arg Phe Leu
    1865                1870                1875

His Leu  Leu Gly Lys Ile Tyr  Tyr Phe Gly Asn Asn  Ser Lys Ala
    1880                1885                1890

Val Thr  Gly Trp Gln Thr Ile  Asn Ser Lys Val Tyr  Tyr Phe Met
    1895                1900                1905

Pro Asp  Thr Ala Met Ala Ala  Ala Gly Gly Leu Phe  Glu Ile Asp
    1910                1915                1920

Gly Val  Ile Tyr Phe Phe Gly  Val Asp Gly Val Lys  Ala Pro Gly
    1925                1930                1935

Ile Tyr  Gly
    1940
```

<210> 9
<211> 1222
<212> PRT
<213> Clostridium difficile

<400> 9

```
Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn
```

```
1               5                   10                  15

Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly Gly Ser
            20                  25                  30

Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser Ala Pro Ser
        35                  40                  45

Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp Val Leu Glu Val
    50                  55                  60

Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu Met Val Leu Pro Asn
65                  70                  75                  80

Ala Pro Asn Arg Val Phe Ala Trp Glu Thr Gly Trp Thr Pro Gly Leu
                85                  90                  95

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

Asn Tyr Glu Gly Glu Phe Tyr Trp Arg Tyr Phe Ala Phe Ile Ala Asp
        115                 120                 125

Ala Leu Ile Thr Thr Leu Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg
    130                 135                 140

Ile Asn Leu Asp Ser Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr
145                 150                 155                 160

Thr Glu Tyr Ile Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly
                165                 170                 175

Gly Thr Tyr Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile
            180                 185                 190

Glu Leu Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val
        195                 200                 205

Arg Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
    210                 215                 220

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
225                 230                 235                 240

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn Gly
                245                 250                 255

Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala Ile Ile
            260                 265                 270

Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile Ser Gly Glu
```

```
        275                 280                 285

Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln Gln Lys Ile Asp
    290                 295                 300

Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn Ile Pro Tyr Ser Phe
305                 310                 315                 320

Val Asp Ser Glu Gly Lys Glu Asn Gly Phe Ile Asn Gly Ser Thr Lys
                325                 330                 335

Glu Gly Leu Phe Val Ser Glu Leu Pro Asp Val Val Leu Ile Ser Lys
            340                 345                 350

Val Tyr Met Asp Asp Ser Lys Pro Ser Phe Gly Tyr Tyr Ser Asn Asn
        355                 360                 365

Leu Lys Asp Val Lys Val Ile Thr Lys Asp Asn Val Asn Ile Leu Thr
    370                 375                 380

Gly Tyr Tyr Leu Lys Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu
385                 390                 395                 400

Gln Asp Glu Lys Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser
                405                 410                 415

Gly Val Ala Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn
            420                 425                 430

Thr Ser Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser
        435                 440                 445

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

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
465                 470                 475                 480

Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn Thr
                485                 490                 495

Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn Met Ile
            500                 505                 510

Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile Ser Ser Thr
        515                 520                 525

Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile Asp Ser Cys Val
    530                 535                 540

Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr Asp Glu Ile Asn Ile
```

545 550 555 560

Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr Pro Glu Val Ile Val Leu
565 570 575

Asp Ala Asn Tyr Ile Asn Glu Lys Ile Asn Val Asn Ile Asn Asp Leu
580 585 590

Ser Ile Arg Tyr Val Trp Ser Asn Asp Gly Asn Asp Phe Ile Leu Met
595 600 605

Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys Ile Arg Phe Val
610 615 620

Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe
625 630 635 640

Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr
645 650 655

Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val
660 665 670

Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val
675 680 685

Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
690 695 700

Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
705 710 715 720

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr Ile
725 730 735

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

Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala Pro Ala Asn
755 760 765

Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp Phe Thr Gly Lys
770 775 780

Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp Asn Tyr Arg Gly
785 790 795 800

Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His Tyr Phe Ser Pro
805 810 815

Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile Gly Asp Tyr Lys

820 825 830

Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly Phe Val Ser Ile
835 840 845

Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val Met Lys Val Gly
850 855 860

Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu
865 870 875 880

Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala
885 890 895

His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr
900 905 910

Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser
915 920 925

Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
930 935 940

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
945 950 955 960

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val Gly
965 970 975

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

Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe Tyr Ile Asp
995 1000 1005

Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr Ser Asp Gly
1010 1015 1020

Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn Ile Tyr
1025 1030 1035

Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu Asp
1040 1045 1050

Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile
1055 1060 1065

Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu
1070 1075 1080

Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys

1085 1090 1095

Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser
1100 1105 1110

Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln
1115 1120 1125

Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu
1130 1135 1140

Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro Asp Gly Phe
1145 1150 1155

Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn Phe Glu Gly
1160 1165 1170

Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp Glu Lys Arg
1175 1180 1185

Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly Ser Val Ile
1190 1195 1200

Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr Ala Gln Leu
1205 1210 1215

Val Ile Ser Glu
1220

<210> 10
<211> 1222
<212> PRT
<213> Clostridium difficile

<400> 10

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn
1 5 10 15

Ser Ile Thr Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly Gly Ser
20 25 30

Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser Ala Pro Ser
35 40 45

Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp Val Leu Glu Val
50 55 60

Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu Met Val Leu Pro Asn
65 70 75 80

Ala Pro Asn Arg Val Phe Ala Trp Glu Thr Gly Trp Thr Pro Gly Leu
85 90 95

```
Arg Ser Leu Glu Asn Asp Gly Thr Lys Leu Leu Asp Arg Ile Arg Asp
            100                 105                 110

Asn Tyr Glu Gly Glu Phe Tyr Trp Arg Tyr Phe Ala Phe Ile Ala Asp
        115                 120                 125

Ala Leu Ile Thr Thr Leu Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg
    130                 135                 140

Ile Asn Leu Asp Ser Asn Thr Arg Ser Phe Ile Val Pro Val Ile Thr
145                 150                 155                 160

Thr Glu Tyr Ile Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly
                165                 170                 175

Gly Thr Tyr Ala Leu Ser Leu Ser Gln Tyr Asn Met Asn Ile Asn Ile
            180                 185                 190

Glu Leu Asn Glu Asn Asp Thr Trp Val Ile Asp Val Asp Asn Val Val
        195                 200                 205

Arg Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
    210                 215                 220

Glu Asn Ile Leu Ser Lys Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu
225                 230                 235                 240

Asp Asn His Glu Ile Asn Phe Ser Gly Thr Leu Asn Gly Gly Asn Gly
                245                 250                 255

Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala Val Ile
            260                 265                 270

Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Val Leu Ile Ser Gly Glu
        275                 280                 285

Leu Lys Thr Leu Met Ala Asn Ser Asn Ser Val Gln Gln Lys Ile Asp
    290                 295                 300

Tyr Ile Gly Leu Asn Ser Glu Leu Gln Lys Asn Ile Pro Tyr Ser Phe
305                 310                 315                 320

Met Asp Asp Lys Gly Lys Glu Asn Gly Phe Ile Asn Cys Ser Thr Lys
                325                 330                 335

Glu Gly Leu Phe Val Ser Glu Leu Ser Asp Val Val Leu Ile Ser Lys
            340                 345                 350

Val Tyr Met Asp Asn Ser Lys Pro Leu Phe Gly Tyr Cys Ser Asn Asp
        355                 360                 365
```

```
Leu Lys Asp Val Lys Val Ile Thr Lys Asp Asp Val Ile Ile Leu Thr
    370                 375                 380

Gly Tyr Tyr Leu Lys Asp Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile
385                 390                 395                 400

Gln Asp Glu Asn Thr Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn
                405                 410                 415

Gly Val Ala Glu Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn
            420                 425                 430

Thr Ser Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser
        435                 440                 445

Ile Phe Ile Asn Ser Leu Gln Ser Asn Thr Lys Leu Ile Leu Asp Thr
    450                 455                 460

Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile
465                 470                 475                 480

Cys Asp Lys Asp Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn Thr
                485                 490                 495

Leu Glu Thr Lys Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn Met Ile
            500                 505                 510

Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile Ser Ser Thr
        515                 520                 525

Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile Asp Ser Cys Val
    530                 535                 540

Asn Lys Val Ile Ile Ser Pro Asn Ile Tyr Thr Asp Glu Ile Asn Ile
545                 550                 555                 560

Thr Pro Ile Tyr Glu Ala Asn Asn Thr Tyr Pro Glu Val Ile Val Leu
                565                 570                 575

Asp Thr Asn Tyr Ile Ser Glu Lys Ile Asn Ile Asn Ile Asn Asp Leu
            580                 585                 590

Ser Ile Arg Tyr Val Trp Ser Asn Asp Gly Ser Asp Phe Ile Leu Met
        595                 600                 605

Ser Thr Asp Glu Glu Asn Lys Val Ser Gln Val Lys Ile Arg Phe Thr
    610                 615                 620

Asn Val Phe Lys Gly Asn Thr Ile Ser Asp Lys Ile Ser Phe Asn Phe
625                 630                 635                 640
```

```
Ser Asp Lys Gln Asp Val Ser Ile Asn Lys Val Ile Ser Thr Phe Thr
                645                 650                 655

Pro Ser Tyr Tyr Val Glu Gly Leu Leu Asn Tyr Asp Leu Gly Leu Ile
            660                 665                 670

Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val
        675                 680                 685

Ser Gly Leu Val Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro
    690                 695                 700

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

Tyr Phe Asn Pro Asp Asn Gly Gly Ala Ala Ser Val Gly Glu Thr Ile
                725                 730                 735

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

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

Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp Phe Thr Gly Lys
    770                 775                 780

Leu Thr Ile Asp Glu Asn Val Tyr Tyr Phe Gly Asp Asn Tyr Arg Ala
785                 790                 795                 800

Ala Ile Glu Trp Gln Thr Leu Asp Asp Glu Val Tyr Tyr Phe Ser Thr
                805                 810                 815

Asp Thr Gly Arg Ala Phe Lys Gly Leu Asn Gln Ile Gly Asp Asp Lys
            820                 825                 830

Phe Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly Phe Val Asn Ile
        835                 840                 845

Asn Asp Lys Thr Phe Tyr Phe Asp Asp Ser Gly Val Met Lys Ser Gly
    850                 855                 860

Tyr Thr Glu Ile Asp Gly Lys Tyr Phe Tyr Phe Ala Glu Asn Gly Glu
865                 870                 875                 880

Met Gln Ile Gly Val Phe Asn Thr Ala Asp Gly Phe Lys Tyr Phe Ala
                885                 890                 895

His His Asp Glu Asp Leu Gly Asn Glu Glu Gly Glu Ala Leu Ser Tyr
            900                 905                 910
```

```
Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser
        915                 920                 925

Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr
    930                 935                 940

Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Ile Ser Ile Ile
945                 950                 955                 960

Asn Asp Gly Lys Tyr Tyr Phe Asn Asp Ser Gly Ile Met Gln Ile Gly
                965                 970                 975

Phe Val Thr Ile Asn Asn Glu Val Phe Tyr Phe Ser Asp Ser Gly Ile
            980                 985                 990

Val Glu Ser Gly Met Gln Asn Ile  Asp Asp Asn Tyr Phe  Tyr Ile Asp
        995                 1000                1005

Glu Asn  Gly Leu Val Gln Ile  Gly Val Phe Asp Thr  Ser Asp Gly
    1010                1015                1020

Tyr Lys  Tyr Phe Ala Pro Ala  Asn Thr Val Asn Asp  Asn Ile Tyr
    1025                1030                1035

Gly Gln  Ala Val Glu Tyr Ser  Gly Leu Val Arg Val  Gly Glu Asp
    1040                1045                1050

Val Tyr  Tyr Phe Gly Glu Thr  Tyr Thr Ile Glu Thr  Gly Trp Ile
    1055                1060                1065

Tyr Asp  Met Glu Asn Glu Ser  Asp Lys Tyr Tyr Phe  Asp Pro Glu
    1070                1075                1080

Thr Lys  Lys Ala Tyr Lys Gly  Ile Asn Val Ile Asp  Asp Ile Lys
    1085                1090                1095

Tyr Tyr  Phe Asp Glu Asn Gly  Ile Met Arg Thr Gly  Leu Ile Thr
    1100                1105                1110

Phe Glu  Asp Asn His Tyr Tyr  Phe Asn Glu Asp Gly  Ile Met Gln
    1115                1120                1125

Tyr Gly  Tyr Leu Asn Ile Glu  Asp Lys Thr Phe Tyr  Phe Ser Glu
    1130                1135                1140

Asp Gly  Ile Met Gln Ile Gly  Val Phe Asn Thr Pro  Asp Gly Phe
    1145                1150                1155

Lys Tyr  Phe Ala His Gln Asn  Thr Leu Asp Glu Asn  Phe Glu Gly
    1160                1165                1170
```

Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp Glu Lys Arg
1175 1180 1185

Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly Ser Val Ile
1190 1195 1200

Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr Ala Gln Leu
1205 1210 1215

Val Ile Ser Glu
1220

<210> 11
<211> 1410
<212> PRT
<213> Clostridium difficile

<400> 11

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

Ser Ser Lys Glu Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln
20 25 30

Val Tyr Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala
35 40 45

Ala Lys Val Val Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp
50 55 60

Leu Leu Pro Thr Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile
65 70 75 80

Asp Gly Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser
85 90 95

Asp Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
100 105 110

Val Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
115 120 125

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile Ser
130 135 140

Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg Asp Lys
145 150 155 160

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

```
Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met Met Pro Gln Asp
            180                 185                 190

Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Val Leu
        195                 200                 205

Gly Lys Cys Glu Ile Trp Arg Met Glu Gly Gly Ser Gly His Thr Val
    210                 215                 220

Thr Asp Asp Ile Asp His Phe Phe Ser Ala Pro Ser Ile Thr Tyr Arg
225                 230                 235                 240

Glu Pro His Leu Ser Ile Tyr Asp Val Leu Glu Val Gln Lys Glu Glu
                245                 250                 255

Leu Asp Leu Ser Lys Asp Leu Met Val Leu Pro Asn Ala Pro Asn Arg
            260                 265                 270

Val Phe Ala Trp Glu Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu
        275                 280                 285

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

Glu Phe Tyr Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr
305                 310                 315                 320

Thr Leu Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp
                325                 330                 335

Ser Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile
            340                 345                 350

Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
        355                 360                 365

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser Glu
    370                 375                 380

Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp Val Thr
385                 390                 395                 400

Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu Gly Ile Leu
                405                 410                 415

Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu Asn Ser His Glu
            420                 425                 430

Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn Gly Phe Val Ser Leu
        435                 440                 445
```

```
Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala Ile Ile Glu Val Asp Leu
    450                 455                 460

Leu Ser Lys Ser Tyr Lys Leu Leu Ile Ser Gly Glu Leu Lys Ile Leu
465                 470                 475                 480

Met Leu Asn Ser Asn His Ile Gln Gln Lys Ile Asp Tyr Ile Gly Phe
                485                 490                 495

Asn Ser Glu Leu Gln Lys Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu
            500                 505                 510

Gly Lys Glu Asn Gly Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe
        515                 520                 525

Val Ser Glu Leu Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp
    530                 535                 540

Asp Ser Lys Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val
545                 550                 555                 560

Lys Val Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu
                565                 570                 575

Lys Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
            580                 585                 590

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
        595                 600                 605

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp Ser
    610                 615                 620

Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe Val Asn
625                 630                 635                 640

Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn Phe Ile Ile
                645                 650                 655

Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile Cys Asp Glu Asn
            660                 665                 670

Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn Thr Leu Glu Thr Asn
        675                 680                 685

Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn Met Ile Val Glu Pro Asn
    690                 695                 700

Tyr Asp Leu Asp Asp Ser Gly Asp Ile Ser Ser Thr Val Ile Asn Phe
705                 710                 715                 720
```

```
Ser Gln Lys Tyr Leu Tyr Gly Ile Asp Ser Cys Val Asn Lys Val Val
                725                 730                 735

Ile Ser Pro Asn Ile Tyr Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr
            740                 745                 750

Glu Thr Asn Asn Thr Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr
        755                 760                 765

Ile Asn Glu Lys Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr
    770                 775                 780

Val Trp Ser Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu
785                 790                 795                 800

Glu Asn Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys
                805                 810                 815

Asp Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
            820                 825                 830

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
        835                 840                 845

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr Asn
    850                 855                 860

Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly Leu Ile
865                 870                 875                 880

Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val Asn Asn Leu
                885                 890                 895

Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr Tyr Phe Asn Pro
            900                 905                 910

Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr Ile Ile Asp Asp Lys
        915                 920                 925

Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu Gln Thr Gly Val Phe Ser
    930                 935                 940

Thr Glu Asp Gly Phe Lys Tyr Phe Ala Pro Ala Asn Thr Leu Asp Glu
945                 950                 955                 960

Asn Leu Glu Gly Glu Ala Ile Asp Phe Thr Gly Lys Leu Ile Ile Asp
                965                 970                 975

Glu Asn Ile Tyr Tyr Phe Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp
            980                 985                 990
```

```
Lys Glu Leu Asp Gly Glu Met His  Tyr Phe Ser Pro Glu  Thr Gly Lys
        995                 1000                1005

Ala Phe  Lys Gly Leu Asn Gln  Ile Gly Asp Tyr Lys  Tyr Tyr Phe
    1010                1015                1020

Asn Ser  Asp Gly Val Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp
    1025                1030                1035

Asn Lys  His Tyr Phe Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr
    1040                1045                1050

Thr Glu  Ile Asp Gly Lys His  Phe Tyr Phe Ala Glu  Asn Gly Glu
    1055                1060                1065

Met Gln  Ile Gly Val Phe Asn  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1070                1075                1080

Ala His  His Asn Glu Asp Leu  Gly Asn Glu Glu Gly  Glu Glu Ile
    1085                1090                1095

Ser Tyr  Ser Gly Ile Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe
    1100                1105                1110

Asp Asp  Ser Phe Thr Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp
    1115                1120                1125

Gly Ser  Lys Tyr Tyr Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile
    1130                1135                1140

Gly Leu  Ser Leu Ile Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp
    1145                1150                1155

Gly Ile  Met Gln Val Gly Phe  Val Thr Ile Asn Asp  Lys Val Phe
    1160                1165                1170

Tyr Phe  Ser Asp Ser Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile
    1175                1180                1185

Asp Asp  Asn Tyr Phe Tyr Ile  Asp Asp Asn Gly Ile  Val Gln Ile
    1190                1195                1200

Gly Val  Phe Asp Thr Ser Asp  Gly Tyr Lys Tyr Phe  Ala Pro Ala
    1205                1210                1215

Asn Thr  Val Asn Asp Asn Ile  Tyr Gly Gln Ala Val  Glu Tyr Ser
    1220                1225                1230

Gly Leu  Val Arg Val Gly Glu  Asp Val Tyr Tyr Phe  Gly Glu Thr
    1235                1240                1245
```

```
Tyr Thr  Ile Glu Thr Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser
    1250                1255                1260

Asp Lys  Tyr Tyr Phe Asn Pro  Glu Thr Lys Lys Ala  Cys Lys Gly
    1265                1270                1275

Ile Asn  Leu Ile Asp Asp Ile  Lys Tyr Tyr Phe Asp  Glu Lys Gly
    1280                1285                1290

Ile Met  Arg Thr Gly Leu Ile  Ser Phe Glu Asn Asn  Asn Tyr Tyr
    1295                1300                1305

Phe Asn  Glu Asn Gly Glu Met  Gln Phe Gly Tyr Ile  Asn Ile Glu
    1310                1315                1320

Asp Lys  Met Phe Tyr Phe Gly  Glu Asp Gly Val Met  Gln Ile Gly
    1325                1330                1335

Val Phe  Asn Thr Pro Asp Gly  Phe Lys Tyr Phe Ala  His Gln Asn
    1340                1345                1350

Thr Leu  Asp Glu Asn Phe Glu  Gly Glu Ser Ile Asn  Tyr Thr Gly
    1355                1360                1365

Trp Leu  Asp Leu Asp Glu Lys  Arg Tyr Tyr Phe Thr  Asp Glu Tyr
    1370                1375                1380

Ile Ala  Ala Thr Gly Ser Val  Ile Ile Asp Gly Glu  Glu Tyr Tyr
    1385                1390                1395

Phe Asp  Pro Asp Thr Ala Gln  Leu Val Ile Ser Glu
    1400                1405                1410
```

<210> 12
<211> 1410
<212> PRT
<213> Clostridium difficile

<400> 12

```
Asn Thr Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn
1               5                   10                  15

Ser Ser Lys Glu Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln
            20                  25                  30

Val Tyr Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala
        35                  40                  45

Ala Lys Val Val Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp
    50                  55                  60
```

```
Leu Leu Pro Thr Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile
65                  70                  75                  80

Asp Gly Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser
                85                  90                  95

Asp Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
            100                 105                 110

Val Asn Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
        115                 120                 125

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile Ser
    130                 135                 140

Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile Leu Arg Asp Lys
145                 150                 155                 160

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

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

Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Thr Leu
        195                 200                 205

Gly Lys Cys Glu Ile Trp Arg Met Glu Gly Gly Ser Gly His Thr Val
    210                 215                 220

Thr Asp Asp Ile Asp His Phe Phe Ser Ala Pro Ser Ile Thr Tyr Arg
225                 230                 235                 240

Glu Pro His Leu Ser Ile Tyr Asp Val Leu Glu Val Gln Lys Glu Glu
                245                 250                 255

Leu Asp Leu Ser Lys Asp Leu Met Val Leu Pro Asn Ala Pro Asn Arg
            260                 265                 270

Val Phe Ala Trp Glu Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu
        275                 280                 285

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

Glu Phe Tyr Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr
305                 310                 315                 320

Thr Leu Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp
                325                 330                 335
```

```
Ser Asn Thr Arg Ser Phe Ile Val Pro Val Ile Thr Thr Glu Tyr Ile
            340                 345                 350

Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
        355                 360                 365

Leu Ser Leu Ser Gln Tyr Asn Met Asn Ile Asn Ile Glu Leu Asn Glu
    370                 375                 380

Asn Asp Thr Trp Val Ile Asp Val Asp Asn Val Val Arg Asp Val Thr
385                 390                 395                 400

Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu Asn Ile Leu
                405                 410                 415

Ser Lys Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu Asp Asn His Glu
            420                 425                 430

Ile Asn Phe Ser Gly Thr Leu Asn Gly Gly Asn Gly Phe Val Ser Leu
        435                 440                 445

Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala Val Ile Glu Val Asp Leu
    450                 455                 460

Leu Ser Lys Ser Tyr Lys Val Leu Ile Ser Gly Glu Leu Lys Thr Leu
465                 470                 475                 480

Met Ala Asn Ser Asn Ser Val Gln Gln Lys Ile Asp Tyr Ile Gly Leu
                485                 490                 495

Asn Ser Glu Leu Gln Lys Asn Ile Pro Tyr Ser Phe Met Asp Asp Lys
            500                 505                 510

Gly Lys Glu Asn Gly Phe Ile Asn Cys Ser Thr Lys Glu Gly Leu Phe
        515                 520                 525

Val Ser Glu Leu Ser Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp
    530                 535                 540

Asn Ser Lys Pro Leu Phe Gly Tyr Cys Ser Asn Asp Leu Lys Asp Val
545                 550                 555                 560

Lys Val Ile Thr Lys Asp Asp Val Ile Ile Leu Thr Gly Tyr Tyr Leu
                565                 570                 575

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

Thr Ile Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val Ala Glu
        595                 600                 605
```

```
Ile Leu Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp Ser
    610                 615                 620

Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe Ile Asn
625                 630                 635                 640

Ser Leu Gln Ser Asn Thr Lys Leu Ile Leu Asp Thr Asn Phe Ile Ile
                645                 650                 655

Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile Cys Asp Lys Asp
            660                 665                 670

Asn Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn Thr Leu Glu Thr Lys
        675                 680                 685

Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn Met Ile Val Glu Pro Asn
    690                 695                 700

Tyr Asp Leu Asp Asp Ser Gly Asp Ile Ser Ser Thr Val Ile Asn Phe
705                 710                 715                 720

Ser Gln Lys Tyr Leu Tyr Gly Ile Asp Ser Cys Val Asn Lys Val Ile
                725                 730                 735

Ile Ser Pro Asn Ile Tyr Thr Asp Glu Ile Asn Ile Thr Pro Ile Tyr
            740                 745                 750

Glu Ala Asn Asn Thr Tyr Pro Glu Val Ile Val Leu Asp Thr Asn Tyr
        755                 760                 765

Ile Ser Glu Lys Ile Asn Ile Asn Ile Asn Asp Leu Ser Ile Arg Tyr
    770                 775                 780

Val Trp Ser Asn Asp Gly Ser Asp Phe Ile Leu Met Ser Thr Asp Glu
785                 790                 795                 800

Glu Asn Lys Val Ser Gln Val Lys Ile Arg Phe Thr Asn Val Phe Lys
                805                 810                 815

Gly Asn Thr Ile Ser Asp Lys Ile Ser Phe Asn Phe Ser Asp Lys Gln
            820                 825                 830

Asp Val Ser Ile Asn Lys Val Ile Ser Thr Phe Thr Pro Ser Tyr Tyr
        835                 840                 845

Val Glu Gly Leu Leu Asn Tyr Asp Leu Gly Leu Ile Ser Leu Tyr Asn
    850                 855                 860

Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly Leu Val
865                 870                 875                 880
```

```
Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Ile Lys Asn Leu
                885                 890                 895

Ile Thr Gly Phe Thr Thr Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Pro
            900                 905                 910

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

Asn Tyr Tyr Phe Ser Gln Asn Gly Val Leu Gln Thr Gly Val Phe Ser
    930                 935                 940

Thr Glu Asp Gly Phe Lys Tyr Phe Ala Pro Ala Asp Thr Leu Asp Glu
945                 950                 955                 960

Asn Leu Glu Gly Glu Ala Ile Asp Phe Thr Gly Lys Leu Thr Ile Asp
                965                 970                 975

Glu Asn Val Tyr Tyr Phe Gly Asp Asn Tyr Arg Ala Ala Ile Glu Trp
            980                 985                 990

Gln Thr Leu Asp Asp Glu Val Tyr  Tyr Phe Ser Thr Asp  Thr Gly Arg
        995                 1000                1005

Ala Phe  Lys Gly Leu Asn Gln  Ile Gly Asp Asp Lys  Phe Tyr Phe
    1010                1015                1020

Asn Ser  Asp Gly Ile Met Gln  Lys Gly Phe Val Asn  Ile Asn Asp
    1025                1030                1035

Lys Thr  Phe Tyr Phe Asp Asp  Ser Gly Val Met Lys  Ser Gly Tyr
    1040                1045                1050

Thr Glu  Ile Asp Gly Lys Tyr  Phe Tyr Phe Ala Glu  Asn Gly Glu
    1055                1060                1065

Met Gln  Ile Gly Val Phe Asn  Thr Ala Asp Gly Phe  Lys Tyr Phe
    1070                1075                1080

Ala His  His Asp Glu Asp Leu  Gly Asn Glu Glu Gly  Glu Ala Leu
    1085                1090                1095

Ser Tyr  Ser Gly Ile Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe
    1100                1105                1110

Asp Asp  Ser Phe Thr Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp
    1115                1120                1125

Gly Ser  Lys Tyr Tyr Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile
    1130                1135                1140
```

```
Gly Ile  Ser Ile Ile Asn Asp  Gly Lys Tyr Tyr Phe  Asn Asp Ser
    1145                1150                1155

Gly Ile  Met Gln Ile Gly Phe  Val Thr Ile Asn Asn  Glu Val Phe
    1160                1165                1170

Tyr Phe  Ser Asp Ser Gly Ile  Val Glu Ser Gly Met  Gln Asn Ile
    1175                1180                1185

Asp Asp  Asn Tyr Phe Tyr Ile  Asp Glu Asn Gly Leu  Val Gln Ile
    1190                1195                1200

Gly Val  Phe Asp Thr Ser Asp  Gly Tyr Lys Tyr Phe  Ala Pro Ala
    1205                1210                1215

Asn Thr  Val Asn Asp Asn Ile  Tyr Gly Gln Ala Val  Glu Tyr Ser
    1220                1225                1230

Gly Leu  Val Arg Val Gly Glu  Asp Val Tyr Tyr Phe  Gly Glu Thr
    1235                1240                1245

Tyr Thr  Ile Glu Thr Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser
    1250                1255                1260

Asp Lys  Tyr Tyr Phe Asp Pro  Glu Thr Lys Lys Ala  Tyr Lys Gly
    1265                1270                1275

Ile Asn  Val Ile Asp Asp Ile  Lys Tyr Tyr Phe Asp  Glu Asn Gly
    1280                1285                1290

Ile Met  Arg Thr Gly Leu Ile  Thr Phe Glu Asp Asn  His Tyr Tyr
    1295                1300                1305

Phe Asn  Glu Asp Gly Ile Met  Gln Tyr Gly Tyr Leu  Asn Ile Glu
    1310                1315                1320

Asp Lys  Thr Phe Tyr Phe Ser  Glu Asp Gly Ile Met  Gln Ile Gly
    1325                1330                1335

Val Phe  Asn Thr Pro Asp Gly  Phe Lys Tyr Phe Ala  His Gln Asn
    1340                1345                1350

Thr Leu  Asp Glu Asn Phe Glu  Gly Glu Ser Ile Asn  Tyr Thr Gly
    1355                1360                1365

Trp Leu  Asp Leu Asp Glu Lys  Arg Tyr Tyr Phe Thr  Asp Glu Tyr
    1370                1375                1380

Ile Ala  Ala Thr Gly Ser Val  Ile Ile Asp Gly Glu  Glu Tyr Tyr
    1385                1390                1395
```

Phe Asp Pro Asp Thr Ala Gln Leu Val Ile Ser Glu
1400 1405 1410

<210> 13
<211> 1600
<212> PRT
<213> Clostridium difficile

<400> 13

Ser Ile Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro
1 5 10 15

Lys Glu Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser
20 25 30

Thr Leu Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu
35 40 45

Leu Glu Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser
50 55 60

Asn Ile Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn
65 70 75 80

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

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

Glu Asp Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu
115 120 125

Gly Phe Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe
130 135 140

Val Glu Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr
145 150 155 160

Glu Glu Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly
165 170 175

Lys Leu Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr
180 185 190

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser
195 200 205

Lys Glu Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr
210 215 220

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys

225 230 235 240

Val Val Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu
245 250 255

Pro Thr Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly
260 265 270

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
275 280 285

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val Asn
290 295 300

Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly Ile Ala
305 310 315 320

Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile Ser Ala Gly
325 330 335

Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg Asp Lys Ala Thr
340 345 350

Lys Val Val Asp Tyr Phe Lys His Val Ser Leu Val Glu Thr Glu Gly
355 360 365

Val Phe Thr Leu Leu Asp Asp Lys Ile Met Met Pro Gln Asp Asp Leu
370 375 380

Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Val Leu Gly Lys
385 390 395 400

Cys Glu Ile Trp Arg Met Glu Gly Gly Ser Gly His Thr Val Thr Asp
405 410 415

Asp Ile Asp His Phe Phe Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro
420 425 430

His Leu Ser Ile Tyr Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp
435 440 445

Leu Ser Lys Asp Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe
450 455 460

Ala Trp Glu Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp
465 470 475 480

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

Tyr Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu

500 505 510

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
515 520 525

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg Glu
530 535 540

Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala Leu Ser
545 550 555 560

Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser Glu Ser Asp
565 570 575

Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp Val Thr Ile Glu
580 585 590

Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu Gly Ile Leu Ser Thr
595 600 605

Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu Asn Ser His Glu Ile Asn
610 615 620

Phe Ser Gly Glu Val Asn Gly Ser Asn Gly Phe Val Ser Leu Thr Phe
625 630 635 640

Ser Ile Leu Glu Gly Ile Asn Ala Ile Ile Glu Val Asp Leu Leu Ser
645 650 655

Lys Ser Tyr Lys Leu Leu Ile Ser Gly Glu Leu Lys Ile Leu Met Leu
660 665 670

Asn Ser Asn His Ile Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser
675 680 685

Glu Leu Gln Lys Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys
690 695 700

Glu Asn Gly Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser
705 710 715 720

Glu Leu Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser
725 730 735

Lys Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
740 745 750

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
755 760 765

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr Ile

770 775 780

Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu Ile Leu
785 790 795 800

Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp Ser Leu Met
805 810 815

Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe Val Asn Phe Leu
820 825 830

Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn Phe Ile Ile Ser Gly
835 840 845

Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile Cys Asp Glu Asn Asp Asn
850 855 860

Ile Gln Pro Tyr Phe Ile Lys Phe Asn Thr Leu Glu Thr Asn Tyr Thr
865 870 875 880

Leu Tyr Val Gly Asn Arg Gln Asn Met Ile Val Glu Pro Asn Tyr Asp
885 890 895

Leu Asp Asp Ser Gly Asp Ile Ser Ser Thr Val Ile Asn Phe Ser Gln
900 905 910

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

Pro Asn Ile Tyr Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr
930 935 940

Asn Asn Thr Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn
945 950 955 960

Glu Lys Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp
965 970 975

Ser Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn
980 985 990

Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys
995 1000 1005

Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp
1010 1015 1020

Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
1025 1030 1035

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr

1040 1045 1050

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly
1055 1060 1065

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

Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr
1085 1090 1095

Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
1100 1105 1110

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu
1115 1120 1125

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

Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
1145 1150 1155

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp
1160 1165 1170

Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu
1175 1180 1185

Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
1190 1195 1200

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val
1205 1210 1215

Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe
1220 1225 1230

Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly
1235 1240 1245

Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val
1250 1255 1260

Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu
1265 1270 1275

Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile
1280 1285 1290

Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr

1295 1300 1305

Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr
1310 1315 1320

Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile
1325 1330 1335

Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
1340 1345 1350

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser
1355 1360 1365

Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe
1370 1375 1380

Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr
1385 1390 1395

Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp
1400 1405 1410

Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val
1415 1420 1425

Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr
1430 1435 1440

Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe
1445 1450 1455

Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp
1460 1465 1470

Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly
1475 1480 1485

Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly
1490 1495 1500

Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr
1505 1510 1515

Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro
1520 1525 1530

Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn
1535 1540 1545

Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp

1550 1555 1560

Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly
1565 1570 1575

Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr
1580 1585 1590

Ala Gln Leu Val Ile Ser Glu
1595 1600

<210> 14
<211> 1600
<212> PRT
<213> Clostridium difficile

<400> 14

Ser Ile Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro
1 5 10 15

Lys Glu Asn Lys Ile Ile Val Lys Ser Lys Asn Leu Pro Glu Leu Ser
20 25 30

Thr Leu Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu
35 40 45

Leu Glu Glu Lys Val Met Leu Ala Glu Cys Glu Ile Asn Val Ile Ser
50 55 60

Asn Ile Asp Thr Gln Val Val Glu Gly Arg Ile Glu Glu Ala Lys Ser
65 70 75 80

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

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

Glu Glu Ser His Phe Ile Ser Phe Glu Asp Ile Leu Glu Thr Asp Glu
115 120 125

Gly Phe Ser Ile Arg Phe Ile Asp Lys Glu Thr Gly Glu Ser Ile Phe
130 135 140

Val Glu Thr Glu Lys Ala Ile Phe Ser Glu Tyr Ala Asn His Ile Thr
145 150 155 160

Glu Glu Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly
165 170 175

Lys Leu Val Lys Lys Val Asn Leu Asp Ala Thr His Glu Val Asn Thr
180 185 190

```
Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser
        195                 200                 205

Lys Glu Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr
    210                 215                 220

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys
225                 230                 235                 240

Val Val Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu
                245                 250                 255

Pro Thr Leu Ser Glu Gly Leu Pro Val Ile Ala Thr Ile Ile Asp Gly
            260                 265                 270

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
        275                 280                 285

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val Asn
    290                 295                 300

Leu Thr Ala Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly Ile Ala
305                 310                 315                 320

Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile Ser Ala Gly
                325                 330                 335

Ile Pro Ser Leu Val Asn Asn Glu Leu Ile Leu Arg Asp Lys Ala Thr
            340                 345                 350

Lys Val Val Asp Tyr Phe Ser His Ile Ser Leu Ala Glu Ser Glu Gly
        355                 360                 365

Ala Phe Thr Ser Leu Asp Asp Lys Ile Met Met Pro Gln Asp Asp Leu
    370                 375                 380

Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Thr Leu Gly Lys
385                 390                 395                 400

Cys Glu Ile Trp Arg Met Glu Gly Gly Ser Gly His Thr Val Thr Asp
                405                 410                 415

Asp Ile Asp His Phe Phe Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro
            420                 425                 430

His Leu Ser Ile Tyr Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp
        435                 440                 445

Leu Ser Lys Asp Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe
    450                 455                 460
```

```
Ala Trp Glu Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp
465                 470                 475                 480

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

Tyr Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
            500                 505                 510

Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn
        515                 520                 525

Thr Arg Ser Phe Ile Val Pro Val Ile Thr Thr Glu Tyr Ile Arg Glu
    530                 535                 540

Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala Leu Ser
545                 550                 555                 560

Leu Ser Gln Tyr Asn Met Asn Ile Asn Ile Glu Leu Asn Glu Asn Asp
                565                 570                 575

Thr Trp Val Ile Asp Val Asp Asn Val Val Arg Asp Val Thr Ile Glu
            580                 585                 590

Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu Asn Ile Leu Ser Lys
        595                 600                 605

Leu Ser Ile Glu Asp Asn Lys Ile Ile Leu Asp Asn His Glu Ile Asn
    610                 615                 620

Phe Ser Gly Thr Leu Asn Gly Gly Asn Gly Phe Val Ser Leu Thr Phe
625                 630                 635                 640

Ser Ile Leu Glu Gly Ile Asn Ala Val Ile Glu Val Asp Leu Leu Ser
                645                 650                 655

Lys Ser Tyr Lys Val Leu Ile Ser Gly Glu Leu Lys Thr Leu Met Ala
            660                 665                 670

Asn Ser Asn Ser Val Gln Gln Lys Ile Asp Tyr Ile Gly Leu Asn Ser
        675                 680                 685

Glu Leu Gln Lys Asn Ile Pro Tyr Ser Phe Met Asp Asp Lys Gly Lys
    690                 695                 700

Glu Asn Gly Phe Ile Asn Cys Ser Thr Lys Glu Gly Leu Phe Val Ser
705                 710                 715                 720

Glu Leu Ser Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asn Ser
                725                 730                 735
```

```
Lys Pro Leu Phe Gly Tyr Cys Ser Asn Asp Leu Lys Asp Val Lys Val
            740                 745                 750

Ile Thr Lys Asp Asp Val Ile Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
        755                 760                 765

Asp Ile Lys Ile Ser Leu Ser Phe Thr Ile Gln Asp Glu Asn Thr Ile
    770                 775                 780

Lys Leu Asn Gly Val Tyr Leu Asp Glu Asn Gly Val Ala Glu Ile Leu
785                 790                 795                 800

Lys Phe Met Asn Lys Lys Gly Ser Thr Asn Thr Ser Asp Ser Leu Met
                805                 810                 815

Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe Ile Asn Ser Leu
            820                 825                 830

Gln Ser Asn Thr Lys Leu Ile Leu Asp Thr Asn Phe Ile Ile Ser Gly
        835                 840                 845

Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile Cys Asp Lys Asp Asn Asn
    850                 855                 860

Ile Gln Pro Tyr Phe Ile Lys Phe Asn Thr Leu Glu Thr Lys Tyr Thr
865                 870                 875                 880

Leu Tyr Val Gly Asn Arg Gln Asn Met Ile Val Glu Pro Asn Tyr Asp
                885                 890                 895

Leu Asp Asp Ser Gly Asp Ile Ser Ser Thr Val Ile Asn Phe Ser Gln
            900                 905                 910

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

Pro Asn Ile Tyr Thr Asp Glu Ile Asn Ile Thr Pro Ile Tyr Glu Ala
    930                 935                 940

Asn Asn Thr Tyr Pro Glu Val Ile Val Leu Asp Thr Asn Tyr Ile Ser
945                 950                 955                 960

Glu Lys Ile Asn Ile Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp
                965                 970                 975

Ser Asn Asp Gly Ser Asp Phe Ile Leu Met Ser Thr Asp Glu Glu Asn
            980                 985                 990

Lys Val Ser Gln Val Lys Ile Arg  Phe Thr Asn Val Phe  Lys Gly Asn
        995                 1000                1005
```

```
Thr Ile  Ser Asp Lys Ile Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1010                1015                1020

Val Ser  Ile Asn Lys Val Ile  Ser Thr Phe Thr Pro  Ser Tyr Tyr
    1025                1030                1035

Val Glu  Gly Leu Leu Asn Tyr  Asp Leu Gly Leu Ile  Ser Leu Tyr
    1040                1045                1050

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1055                1060                1065

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

Lys Asn  Leu Ile Thr Gly Phe  Thr Thr Ile Gly Asp  Asp Lys Tyr
    1085                1090                1095

Tyr Phe  Asn Pro Asp Asn Gly  Gly Ala Ala Ser Val  Gly Glu Thr
    1100                1105                1110

Ile Ile  Asp Gly Lys Asn Tyr  Tyr Phe Ser Gln Asn  Gly Val Leu
    1115                1120                1125

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

Pro Ala  Asp Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1145                1150                1155

Phe Thr  Gly Lys Leu Thr Ile  Asp Glu Asn Val Tyr  Tyr Phe Gly
    1160                1165                1170

Asp Asn  Tyr Arg Ala Ala Ile  Glu Trp Gln Thr Leu  Asp Asp Glu
    1175                1180                1185

Val Tyr  Tyr Phe Ser Thr Asp  Thr Gly Arg Ala Phe  Lys Gly Leu
    1190                1195                1200

Asn Gln  Ile Gly Asp Asp Lys  Phe Tyr Phe Asn Ser  Asp Gly Ile
    1205                1210                1215

Met Gln  Lys Gly Phe Val Asn  Ile Asn Asp Lys Thr  Phe Tyr Phe
    1220                1225                1230

Asp Asp  Ser Gly Val Met Lys  Ser Gly Tyr Thr Glu  Ile Asp Gly
    1235                1240                1245

Lys Tyr  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    1250                1255                1260
```

```
Phe Asn  Thr Ala Asp Gly Phe  Lys Tyr Phe Ala His  His Asp Glu
    1265                1270                1275

Asp Leu  Gly Asn Glu Glu Gly  Glu Ala Leu Ser Tyr  Ser Gly Ile
    1280                1285                1290

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    1295                1300                1305

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    1310                1315                1320

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile Gly Ile  Ser Ile Ile
    1325                1330                1335

Asn Asp  Gly Lys Tyr Tyr Phe  Asn Asp Ser Gly Ile  Met Gln Ile
    1340                1345                1350

Gly Phe  Val Thr Ile Asn Asn  Glu Val Phe Tyr Phe  Ser Asp Ser
    1355                1360                1365

Gly Ile  Val Glu Ser Gly Met  Gln Asn Ile Asp Asp  Asn Tyr Phe
    1370                1375                1380

Tyr Ile  Asp Glu Asn Gly Leu  Val Gln Ile Gly Val  Phe Asp Thr
    1385                1390                1395

Ser Asp  Gly Tyr Lys Tyr Phe  Ala Pro Ala Asn Thr  Val Asn Asp
    1400                1405                1410

Asn Ile  Tyr Gly Gln Ala Val  Glu Tyr Ser Gly Leu  Val Arg Val
    1415                1420                1425

Gly Glu  Asp Val Tyr Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr
    1430                1435                1440

Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe
    1445                1450                1455

Asp Pro  Glu Thr Lys Lys Ala  Tyr Lys Gly Ile Asn  Val Ile Asp
    1460                1465                1470

Asp Ile  Lys Tyr Tyr Phe Asp  Glu Asn Gly Ile Met  Arg Thr Gly
    1475                1480                1485

Leu Ile  Thr Phe Glu Asp Asn  His Tyr Tyr Phe Asn  Glu Asp Gly
    1490                1495                1500

Ile Met  Gln Tyr Gly Tyr Leu  Asn Ile Glu Asp Lys  Thr Phe Tyr
    1505                1510                1515
```

```
Phe Ser  Glu Asp Gly Ile Met  Gln Ile Gly Val Phe  Asn Thr Pro
    1520                1525                1530

Asp Gly  Phe Lys Tyr Phe Ala  His Gln Asn Thr Leu  Asp Glu Asn
    1535                1540                1545

Phe Glu  Gly Glu Ser Ile Asn  Tyr Thr Gly Trp Leu  Asp Leu Asp
    1550                1555                1560

Glu Lys  Arg Tyr Tyr Phe Thr  Asp Glu Tyr Ile Ala  Ala Thr Gly
    1565                1570                1575

Ser Val  Ile Ile Asp Gly Glu  Glu Tyr Tyr Phe Asp  Pro Asp Thr
    1580                1585                1590

Ala Gln  Leu Val Ile Ser Glu
    1595                1600
```

<210> 15
<211> 1756
<212> PRT
<213> Clostridium difficile

<400> 15

```
Asn Thr Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn
1               5                   10                  15

Ser Ser Lys Glu Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln
            20                  25                  30

Val Tyr Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala
        35                  40                  45

Ala Lys Val Val Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp
    50                  55                  60

Leu Leu Pro Thr Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile
65                  70                  75                  80

Asp Gly Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser
                85                  90                  95

Asp Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala
            100                 105                 110

Val Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly
        115                 120                 125

Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile Ser
    130                 135                 140
```

```
Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg Asp Lys
145                 150                 155                 160

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

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

Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Val Leu
        195                 200                 205

Gly Lys Cys Glu Ile Trp Arg Met Glu Gly Gly Ser Gly His Thr Val
    210                 215                 220

Thr Asp Asp Ile Asp His Phe Phe Ser Ala Pro Ser Ile Thr Tyr Arg
225                 230                 235                 240

Glu Pro His Leu Ser Ile Tyr Asp Val Leu Glu Val Gln Lys Glu Glu
                245                 250                 255

Leu Asp Leu Ser Lys Asp Leu Met Val Leu Pro Asn Ala Pro Asn Arg
            260                 265                 270

Val Phe Ala Trp Glu Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu
        275                 280                 285

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

Glu Phe Tyr Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr
305                 310                 315                 320

Thr Leu Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp
                325                 330                 335

Ser Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile
            340                 345                 350

Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala
        355                 360                 365

Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser Glu
    370                 375                 380

Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp Val Thr
385                 390                 395                 400

Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu Gly Ile Leu
                405                 410                 415
```

```
Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu Asn Ser His Glu
            420                 425                 430

Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn Gly Phe Val Ser Leu
        435                 440                 445

Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala Ile Ile Glu Val Asp Leu
    450                 455                 460

Leu Ser Lys Ser Tyr Lys Leu Leu Ile Ser Gly Glu Leu Lys Ile Leu
465                 470                 475                 480

Met Leu Asn Ser Asn His Ile Gln Gln Lys Ile Asp Tyr Ile Gly Phe
                485                 490                 495

Asn Ser Glu Leu Gln Lys Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu
            500                 505                 510

Gly Lys Glu Asn Gly Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe
        515                 520                 525

Val Ser Glu Leu Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp
    530                 535                 540

Asp Ser Lys Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val
545                 550                 555                 560

Lys Val Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu
                565                 570                 575

Lys Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys
            580                 585                 590

Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu
        595                 600                 605

Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp Ser
    610                 615                 620

Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe Val Asn
625                 630                 635                 640

Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn Phe Ile Ile
                645                 650                 655

Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile Cys Asp Glu Asn
            660                 665                 670

Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn Thr Leu Glu Thr Asn
        675                 680                 685
```

```
Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn Met Ile Val Glu Pro Asn
    690                 695                 700

Tyr Asp Leu Asp Asp Ser Gly Asp Ile Ser Ser Thr Val Ile Asn Phe
705                 710                 715                 720

Ser Gln Lys Tyr Leu Tyr Gly Ile Asp Ser Cys Val Asn Lys Val Val
                725                 730                 735

Ile Ser Pro Asn Ile Tyr Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr
            740                 745                 750

Glu Thr Asn Asn Thr Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr
        755                 760                 765

Ile Asn Glu Lys Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr
    770                 775                 780

Val Trp Ser Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu
785                 790                 795                 800

Glu Asn Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys
                805                 810                 815

Asp Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln
            820                 825                 830

Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr
        835                 840                 845

Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr Asn
    850                 855                 860

Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly Leu Ile
865                 870                 875                 880

Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val Asn Asn Leu
                885                 890                 895

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asp Ile
            900                 905                 910

Asn Thr Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile Asn Gly Lys His
        915                 920                 925

Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly Val Phe Lys Gly
    930                 935                 940

Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Gln Asn Asn Asn
945                 950                 955                 960
```

```
Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe Leu Thr Leu Asn
                965                 970                 975

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

Arg Ile Ile Asn Asn Glu Lys Tyr  Tyr Phe Asn Pro Asn  Asn Ala Ile
        995                 1000                1005

Ala Ala  Val Gly Leu Gln Val  Ile Asp Asn Asn Lys  Tyr Tyr Phe
    1010                1015                1020

Asn Pro  Asp Thr Ala Ile Ile  Ser Lys Gly Trp Gln  Thr Val Asn
    1025                1030                1035

Gly Ser  Arg Tyr Tyr Phe Asp  Thr Asp Thr Ala Ile  Ala Phe Asn
    1040                1045                1050

Gly Tyr  Lys Thr Ile Asp Gly  Lys His Phe Tyr Phe  Asp Ser Asp
    1055                1060                1065

Cys Val  Val Lys Ile Gly Val  Phe Ser Thr Ser Asn  Gly Phe Glu
    1070                1075                1080

Tyr Phe  Ala Pro Ala Asn Thr  Tyr Asn Asn Asn Ile  Glu Gly Gln
    1085                1090                1095

Ala Ile  Val Tyr Gln Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    1100                1105                1110

Tyr Tyr  Phe Asp Asn Asn Ser  Lys Ala Val Thr Gly  Trp Gln Thr
    1115                1120                1125

Ile Asp  Ser Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    1130                1135                1140

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    1145                1150                1155

Thr Asn  Thr Ala Glu Ala Ala  Thr Gly Trp Gln Thr  Ile Asp Gly
    1160                1165                1170

Lys Lys  Tyr Tyr Phe Asn Thr  Asn Thr Ala Ile Ala  Ser Thr Gly
    1175                1180                1185

Tyr Thr  Ile Ile Asn Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly
    1190                1195                1200

Ile Met  Gln Ile Gly Val Phe  Lys Gly Pro Asn Gly  Phe Glu Tyr
    1205                1210                1215
```

```
Phe Ala  Pro Ala Asn Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala
    1220                 1225                 1230

Ile Leu  Tyr Gln Asn Glu Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr
    1235                 1240                 1245

Tyr Phe  Gly Ser Asp Ser Lys  Ala Val Thr Gly Trp  Arg Ile Ile
    1250                 1255                 1260

Asn Asn  Lys Lys Tyr Tyr Phe  Asn Pro Asn Asn Ala  Ile Ala Ala
    1265                 1270                 1275

Ile His  Leu Cys Thr Ile Asn  Asn Asp Lys Tyr Tyr  Phe Ser Tyr
    1280                 1285                 1290

Asp Gly  Ile Leu Gln Asn Gly  Tyr Ile Thr Ile Glu  Arg Asn Asn
    1295                 1300                 1305

Phe Tyr  Phe Asp Ala Asn Asn  Glu Ser Lys Met Val  Thr Gly Val
    1310                 1315                 1320

Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    1325                 1330                 1335

His Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Val Tyr  Gln Asn Lys
    1340                 1345                 1350

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Asp  Asn Asp Ser
    1355                 1360                 1365

Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    1370                 1375                 1380

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    1385                 1390                 1395

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Leu Asn Thr Ala  Glu Ala Ala
    1400                 1405                 1410

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    1415                 1420                 1425

Asn Thr  Phe Ile Ala Ser Thr  Gly Tyr Thr Ser Ile  Asn Gly Lys
    1430                 1435                 1440

His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    1445                 1450                 1455

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His
    1460                 1465                 1470
```

```
Asn Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Lys Phe
    1475                 1480                 1485

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys
    1490                 1495                 1500

Ala Val  Thr Gly Leu Arg Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    1505                 1510                 1515

Asn Thr  Asn Thr Ala Val Ala  Val Thr Gly Trp Gln  Thr Ile Asn
    1520                 1525                 1530

Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr Ser Ile  Ala Ser Thr
    1535                 1540                 1545

Gly Tyr  Thr Ile Ile Ser Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    1550                 1555                 1560

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu
    1565                 1570                 1575

Tyr Phe  Ala Pro Ala Asn Thr  Asp Ala Asn Asn Ile  Glu Gly Gln
    1580                 1585                 1590

Ala Ile  Arg Tyr Gln Asn Arg  Phe Leu Tyr Leu His  Asp Asn Ile
    1595                 1600                 1605

Tyr Tyr  Phe Gly Asn Asn Ser  Lys Ala Ala Thr Gly  Trp Val Thr
    1610                 1615                 1620

Ile Asp  Gly Asn Arg Tyr Tyr  Phe Glu Pro Asn Thr  Ala Met Gly
    1625                 1630                 1635

Ala Asn  Gly Tyr Lys Thr Ile  Asp Asn Lys Asn Phe  Tyr Phe Arg
    1640                 1645                 1650

Asn Gly  Leu Pro Gln Ile Gly  Val Phe Lys Gly Ser  Asn Gly Phe
    1655                 1660                 1665

Glu Tyr  Phe Ala Pro Ala Asn  Thr Asp Ala Asn Asn  Ile Glu Gly
    1670                 1675                 1680

Gln Ala  Ile Arg Tyr Gln Asn  Arg Phe Leu His Leu  Leu Gly Lys
    1685                 1690                 1695

Ile Tyr  Tyr Phe Gly Asn Asn  Ser Lys Ala Val Thr  Gly Trp Gln
    1700                 1705                 1710

Thr Ile  Asn Gly Lys Val Tyr  Tyr Phe Met Pro Asp  Thr Ala Met
    1715                 1720                 1725
```

```
Ala Ala  Ala Gly Gly Leu Phe  Glu Ile Asp Gly Val  Ile Tyr Phe
    1730                1735                1740


Phe Gly  Val Asp Gly Val Lys  Ala Pro Gly Ile Tyr  Gly
    1745                1750                1755


<210>  16
<211>  1595
<212>  PRT
<213>  Clostridium difficile

<400>  16

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
1               5                  10                  15


Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
            20                  25                  30


Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
        35                  40                  45


Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
    50                  55                  60


Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
65                  70                  75                  80


Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
                85                  90                  95


Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
            100                 105                 110


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


Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
    130                 135                 140


Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
145                 150                 155                 160


Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn
                165                 170                 175


Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
            180                 185                 190


Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
        195                 200                 205
```

```
Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
    210                 215                 220

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
225                 230                 235                 240

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu Pro
                245                 250                 255

Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp Gly Ile
            260                 265                 270

Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His Asp Pro Leu
        275                 280                 285

Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu Ala Ile Asn Met
    290                 295                 300

Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile Val Gly Ile Gly Ala
305                 310                 315                 320

Glu Val Thr Ile Phe Leu Leu Pro Ile Ala Gly Ile Ser Ala Gly Ile
                325                 330                 335

Pro Ser Leu Val Asn Asn Glu Leu Ile Leu His Asp Lys Ala Thr Ser
            340                 345                 350

Val Val Asn Tyr Phe Asn His Leu Ser Glu Ser Lys Lys Tyr Gly Pro
        355                 360                 365

Leu Lys Thr Glu Asp Asp Lys Ile Leu Val Pro Ile Asp Asp Leu Val
    370                 375                 380

Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys
385                 390                 395                 400

Asn Ile Leu Ala Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn
                405                 410                 415

Ile Asp His Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser
            420                 425                 430

Leu Ser Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe
        435                 440                 445

Ser Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
    450                 455                 460

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
465                 470                 475                 480
```

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

Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu Lys Pro
            500                 505                 510

Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys Asp Thr Arg
        515                 520                 525

Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile Arg Asn Lys Leu
    530                 535                 540

Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr Ser Leu Leu Leu Ser
545                 550                 555                 560

Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu Ser Lys Asp Asp Leu Trp
                565                 570                 575

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

Thr Ile Lys Lys Gly Lys Leu Ile Lys Asp Val Leu Ser Lys Ile Asp
        595                 600                 605

Ile Asn Lys Asn Lys Leu Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser
    610                 615                 620

Gly Asp Ile Asp Asn Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu
625                 630                 635                 640

Asp Asp Lys Ile Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser
                645                 650                 655

Tyr Ser Leu Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu
            660                 665                 670

Ser Asn Ile Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn
        675                 680                 685

Ile Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
    690                 695                 700

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
705                 710                 715                 720

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn Ser
                725                 730                 735

Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp Asp Ile
            740                 745                 750
```

```
Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr Asp Lys Ser
        755                 760                 765

Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln Val Lys Val Asn
    770                 775                 780

Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser Tyr Leu Asp Phe Val
785                 790                 795                 800

Lys Asn Ser Asp Gly His His Asn Thr Ser Asn Phe Met Asn Leu Phe
                805                 810                 815

Leu Asp Asn Ile Ser Phe Trp Lys Leu Phe Gly Phe Glu Asn Ile Asn
            820                 825                 830

Phe Val Ile Asp Lys Tyr Phe Thr Leu Val Gly Lys Thr Asn Leu Gly
        835                 840                 845

Tyr Val Glu Phe Ile Cys Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe
    850                 855                 860

Gly Glu Trp Lys Thr Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn
865                 870                 875                 880

Gly Arg Asn Val Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu
                885                 890                 895

Asp Ile Ser Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile
            900                 905                 910

Asp Arg Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser
        915                 920                 925

Leu Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
    930                 935                 940

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
945                 950                 955                 960

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser Asp
                965                 970                 975

Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile Leu Gln
            980                 985                 990

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

Met Ser  Ile Asp Phe Lys Asp  Ile Lys Lys Leu Ser  Leu Gly Tyr
    1010                1015                1020
```

```
Ile Met  Ser Asn Phe Lys Ser  Phe Asn Ser Glu Asn  Glu Leu Asp
    1025                1030                1035

Arg Asp  His Leu Gly Phe Lys  Ile Ile Asp Asn Lys  Thr Tyr Tyr
    1040                1045                1050

Tyr Asp  Glu Asp Ser Lys Leu  Val Lys Gly Leu Ile  Asn Ile Asn
    1055                1060                1065

Asn Ser  Leu Phe Tyr Phe Asp  Pro Ile Glu Phe Asn  Leu Ile Thr
    1070                1075                1080

Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr Tyr Phe  Asn Pro Ile
    1085                1090                1095

Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr Ile Ile  Asp Asp Lys
    1100                1105                1110

Asn Tyr  Tyr Phe Asn Gln Ser  Gly Val Leu Gln Thr  Gly Val Phe
    1115                1120                1125

Ser Thr  Glu Asp Gly Phe Lys  Tyr Phe Ala Pro Ala  Asn Thr Leu
    1130                1135                1140

Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp Phe Thr  Gly Lys Leu
    1145                1150                1155

Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Asp Asp Asn  Tyr Arg Gly
    1160                1165                1170

Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu Met His  Tyr Phe Ser
    1175                1180                1185

Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu Asn Gln  Ile Gly Asp
    1190                1195                1200

Tyr Lys  Tyr Tyr Phe Asn Ser  Asp Gly Val Met Gln  Lys Gly Phe
    1205                1210                1215

Val Ser  Ile Asn Asp Asn Lys  His Tyr Phe Asp Asp  Ser Gly Val
    1220                1225                1230

Met Lys  Val Gly Tyr Thr Glu  Ile Asp Gly Lys His  Phe Tyr Phe
    1235                1240                1245

Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val Phe Asn  Thr Glu Asp
    1250                1255                1260

Gly Phe  Lys Tyr Phe Ala His  His Asn Glu Asp Leu  Gly Asn Glu
    1265                1270                1275
```

```
Glu Gly  Glu Glu Ile Ser Tyr  Ser Gly Ile Leu Asn  Phe Asn Asn
    1280                1285                1290

Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr Ala Val  Val Gly Trp
    1295                1300                1305

Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr Phe Asp  Glu Asp Thr
    1310                1315                1320

Ala Glu  Ala Tyr Ile Gly Leu  Ser Leu Ile Asn Asp  Gly Gln Tyr
    1325                1330                1335

Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val Gly Phe  Val Thr Ile
    1340                1345                1350

Asn Asp  Lys Val Phe Tyr Phe  Ser Asp Ser Gly Ile  Ile Glu Ser
    1355                1360                1365

Gly Val  Gln Asn Ile Asp Asp  Asn Tyr Phe Tyr Ile  Asp Asp Asn
    1370                1375                1380

Gly Ile  Val Gln Ile Gly Val  Phe Asp Thr Ser Asp  Gly Tyr Lys
    1385                1390                1395

Tyr Phe  Ala Pro Ala Asn Thr  Val Asn Asp Asn Ile  Tyr Gly Gln
    1400                1405                1410

Ala Val  Glu Tyr Ser Gly Leu  Val Arg Val Gly Glu  Asp Val Tyr
    1415                1420                1425

Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr Gly Trp  Ile Tyr Asp
    1430                1435                1440

Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe Asn Pro  Glu Thr Lys
    1445                1450                1455

Lys Ala  Cys Lys Gly Ile Asn  Leu Ile Asp Asp Ile  Lys Tyr Tyr
    1460                1465                1470

Phe Asp  Glu Lys Gly Ile Met  Arg Thr Gly Leu Ile  Ser Phe Glu
    1475                1480                1485

Asn Asn  Asn Tyr Tyr Phe Asn  Glu Asn Gly Glu Met  Gln Phe Gly
    1490                1495                1500

Tyr Ile  Asn Ile Glu Asp Lys  Met Phe Tyr Phe Gly  Glu Asp Gly
    1505                1510                1515

Val Met  Gln Ile Gly Val Phe  Asn Thr Pro Asp Gly  Phe Lys Tyr
    1520                1525                1530
```

Phe Ala His Gln Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser
1535 1540 1545

Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr
1550 1555 1560

Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly Ser Val Ile Ile Asp
1565 1570 1575

Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr Ala Gln Leu Val Ile
1580 1585 1590

Ser Glu
1595

<210> 17
<211> 1595
<212> PRT
<213> Clostridium difficile

<400> 17

Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile
1 5 10 15

Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser
20 25 30

Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro
35 40 45

Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser
50 55 60

Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile
65 70 75 80

Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu
85 90 95

Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp
100 105 110

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

Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val
130 135 140

Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys
145 150 155 160

Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn

```
                165                 170                 175

Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu
            180                 185                 190

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys
        195                 200                 205

Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala
    210                 215                 220

Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu
225                 230                 235                 240

Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu Pro
                245                 250                 255

Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp Gly Ile
            260                 265                 270

Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His Asp Pro Leu
        275                 280                 285

Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu Ala Ile Asn Met
    290                 295                 300

Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile Val Gly Ile Gly Ala
305                 310                 315                 320

Glu Val Thr Ile Phe Leu Leu Pro Ile Ala Gly Ile Ser Ala Gly Ile
                325                 330                 335

Pro Ser Leu Val Asn Asn Glu Leu Ile Leu His Asp Lys Ala Thr Ser
            340                 345                 350

Val Val Asn Tyr Phe Asn His Leu Ser Glu Ser Lys Lys Tyr Gly Pro
        355                 360                 365

Leu Lys Thr Glu Asp Asp Lys Ile Leu Val Pro Ile Asp Asp Leu Val
    370                 375                 380

Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys
385                 390                 395                 400

Asn Ile Leu Ala Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn
                405                 410                 415

Ile Asp His Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser
            420                 425                 430

Leu Ser Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe
```

435 440 445

Ser Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
450 455 460

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
465 470 475 480

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

Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu Lys Pro
500 505 510

Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys Asp Thr Arg
515 520 525

Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile Arg Asn Lys Leu
530 535 540

Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr Ser Leu Leu Leu Ser
545 550 555 560

Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu Ser Lys Asp Asp Leu Trp
565 570 575

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

Thr Ile Lys Lys Gly Lys Leu Ile Lys Asp Val Leu Ser Lys Ile Asp
595 600 605

Ile Asn Lys Asn Lys Leu Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser
610 615 620

Gly Asp Ile Asp Asn Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu
625 630 635 640

Asp Asp Lys Ile Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser
645 650 655

Tyr Ser Leu Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu
660 665 670

Ser Asn Ile Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn
675 680 685

Ile Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
690 695 700

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser

705 710 715 720

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn Ser
725 730 735

Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp Asp Ile
740 745 750

Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr Asp Lys Ser
755 760 765

Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln Val Lys Val Asn
770 775 780

Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser Tyr Leu Asp Phe Val
785 790 795 800

Lys Asn Ser Asp Gly His His Asn Thr Ser Asn Phe Met Asn Leu Phe
805 810 815

Leu Asp Asn Ile Ser Phe Trp Lys Leu Phe Gly Phe Glu Asn Ile Asn
820 825 830

Phe Val Ile Asp Lys Tyr Phe Thr Leu Val Gly Lys Thr Asn Leu Gly
835 840 845

Tyr Val Glu Phe Ile Cys Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe
850 855 860

Gly Glu Trp Lys Thr Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn
865 870 875 880

Gly Arg Asn Val Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu
885 890 895

Asp Ile Ser Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile
900 905 910

Asp Arg Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser
915 920 925

Leu Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
930 935 940

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
945 950 955 960

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser Asp
965 970 975

Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile Leu Gln

980 985 990

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

Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser Leu Gly Tyr
1010 1015 1020

Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn Glu Leu Asp
1025 1030 1035

Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys Thr Tyr Tyr
1040 1045 1050

Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile Asn Ile Asn
1055 1060 1065

Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn Leu Ile Thr
1070 1075 1080

Gly Phe Thr Thr Ile Gly Asp Asp Lys Tyr Tyr Phe Asn Pro Asp
1085 1090 1095

Asn Gly Gly Ala Ala Ser Val Gly Glu Thr Ile Ile Asp Gly Lys
1100 1105 1110

Asn Tyr Tyr Phe Ser Gln Asn Gly Val Leu Gln Thr Gly Val Phe
1115 1120 1125

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

Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp Phe Thr Gly Lys Leu
1145 1150 1155

Thr Ile Asp Glu Asn Val Tyr Tyr Phe Gly Asp Asn Tyr Arg Ala
1160 1165 1170

Ala Ile Glu Trp Gln Thr Leu Asp Asp Glu Val Tyr Tyr Phe Ser
1175 1180 1185

Thr Asp Thr Gly Arg Ala Phe Lys Gly Leu Asn Gln Ile Gly Asp
1190 1195 1200

Asp Lys Phe Tyr Phe Asn Ser Asp Gly Ile Met Gln Lys Gly Phe
1205 1210 1215

Val Asn Ile Asn Asp Lys Thr Phe Tyr Phe Asp Asp Ser Gly Val
1220 1225 1230

Met Lys Ser Gly Tyr Thr Glu Ile Asp Gly Lys Tyr Phe Tyr Phe

1235 1240 1245

Ala Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Ala Asp
1250 1255 1260

Gly Phe Lys Tyr Phe Ala His His Asp Glu Asp Leu Gly Asn Glu
1265 1270 1275

Glu Gly Glu Ala Leu Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn
1280 1285 1290

Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp
1295 1300 1305

Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr
1310 1315 1320

Ala Glu Ala Tyr Ile Gly Ile Ser Ile Ile Asn Asp Gly Lys Tyr
1325 1330 1335

Tyr Phe Asn Asp Ser Gly Ile Met Gln Ile Gly Phe Val Thr Ile
1340 1345 1350

Asn Asn Glu Val Phe Tyr Phe Ser Asp Ser Gly Ile Val Glu Ser
1355 1360 1365

Gly Met Gln Asn Ile Asp Asp Asn Tyr Phe Tyr Ile Asp Glu Asn
1370 1375 1380

Gly Leu Val Gln Ile Gly Val Phe Asp Thr Ser Asp Gly Tyr Lys
1385 1390 1395

Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn Ile Tyr Gly Gln
1400 1405 1410

Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu Asp Val Tyr
1415 1420 1425

Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile Tyr Asp
1430 1435 1440

Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asp Pro Glu Thr Lys
1445 1450 1455

Lys Ala Tyr Lys Gly Ile Asn Val Ile Asp Asp Ile Lys Tyr Tyr
1460 1465 1470

Phe Asp Glu Asn Gly Ile Met Arg Thr Gly Leu Ile Thr Phe Glu
1475 1480 1485

Asp Asn His Tyr Tyr Phe Asn Glu Asp Gly Ile Met Gln Tyr Gly

1490 1495 1500

Tyr Leu Asn Ile Glu Asp Lys Thr Phe Tyr Phe Ser Glu Asp Gly
1505 1510 1515

Ile Met Gln Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr
1520 1525 1530

Phe Ala His Gln Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser
1535 1540 1545

Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr
1550 1555 1560

Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly Ser Val Ile Ile Asp
1565 1570 1575

Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr Ala Gln Leu Val Ile
1580 1585 1590

Ser Glu
1595

<210> 18
<211> 2493
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 18

His His His His His His Ser His Met Ala Ser Asn Lys Glu Ile Leu
1 5 10 15

Ala Val Val Glu Ala Val Ser Asn Glu Lys Ala Leu Pro Arg Glu Lys
20 25 30

Ile Phe Glu Ala Leu Glu Ser Ala Leu Ala Thr Ala Thr Lys Lys Lys
35 40 45

Tyr Glu Gln Glu Ile Asp Val Arg Val Gln Ile Asp Arg Lys Ser Gly
50 55 60

Asp Phe Asp Thr Phe Arg Arg Trp Leu Val Val Asp Glu Val Thr Gln
65 70 75 80

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

Leu Asn Leu Gly Asp Tyr Val Glu Asp Gln Ile Glu Ser Val Thr Phe
100 105 110

```
Asp Arg Ile Thr Thr Gln Thr Ala Lys Gln Val Ile Val Gln Lys Val
        115                 120                 125

Arg Glu Ala Glu Arg Ala Met Val Val Asp Gln Phe Arg Glu His Glu
    130                 135                 140

Gly Glu Ile Ile Thr Gly Val Val Lys Lys Val Asn Arg Asp Asn Ile
145                 150                 155                 160

Ser Leu Asp Leu Gly Asn Asn Ala Glu Ala Val Ile Leu Arg Glu Asp
                165                 170                 175

Met Leu Pro Arg Glu Asn Phe Arg Pro Gly Asp Arg Val Arg Gly Val
            180                 185                 190

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

Arg Ser Lys Pro Glu Met Leu Ile Glu Leu Phe Arg Ile Glu Val Pro
    210                 215                 220

Glu Ile Gly Glu Glu Val Ile Glu Ile Lys Ala Ala Ala Arg Asp Pro
225                 230                 235                 240

Gly Ser Arg Ala Lys Ile Ala Val Lys Thr Asn Asp Lys Arg Ile Asp
                245                 250                 255

Pro Val Gly Ala Cys Val Gly Met Arg Gly Ala Arg Val Gln Ala Val
            260                 265                 270

Ser Thr Glu Leu Gly Gly Glu Arg Ile Asp Ile Val Leu Trp Asp Asp
        275                 280                 285

Asn Pro Ala Gln Phe Val Ile Asn Ala Met Ala Pro Ala Asp Val Ala
    290                 295                 300

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

Ala Gly Asn Leu Ala Gln Ala Ile Gly Arg Asn Gly Gln Asn Val Arg
                325                 330                 335

Leu Ala Ser Gln Leu Ser Gly Trp Glu Leu Asn Val Met Thr Val Asp
            340                 345                 350

Asp Leu Gln Ala Lys His Gln Ala Glu Ala His Ala Ala Ile Asp Thr
        355                 360                 365

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

```
Glu Glu Gly Phe Ser Thr Leu Glu Glu Leu Ala Tyr Val Pro Met Lys
385                 390                 395                 400

Glu Leu Leu Glu Ile Glu Gly Leu Asp Glu Pro Thr Val Glu Ala Leu
                405                 410                 415

Arg Glu Arg Ala Lys Asn Ala Leu Ala Thr Ile Ala Gln Ala Gln Glu
            420                 425                 430

Glu Ser Leu Gly Asp Asn Lys Pro Ala Asp Asp Leu Leu Asn Leu Glu
        435                 440                 445

Gly Val Asp Arg Asp Leu Ala Phe Lys Leu Ala Ala Arg Gly Val Cys
    450                 455                 460

Thr Leu Glu Asp Leu Ala Glu Gln Gly Ile Asp Asp Leu Ala Asp Ile
465                 470                 475                 480

Glu Gly Leu Thr Asp Glu Lys Ala Gly Ala Leu Ile Met Ala Ala Arg
                485                 490                 495

Asn Ile Cys Trp Phe Gly Asp Glu Ala Ser Gly Ala Leu Val Pro Arg
            500                 505                 510

Gly Ser Val Thr Ser Leu Tyr Lys Lys Ala Gly Ser Ala Ala Ala Pro
        515                 520                 525

Phe Thr Met Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe
    530                 535                 540

Asp Ser Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly
545                 550                 555                 560

Leu Ala Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser
                565                 570                 575

Val Ser Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile
            580                 585                 590

Glu Ser Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val
        595                 600                 605

Lys Asn Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn
    610                 615                 620

Leu Leu Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn
625                 630                 635                 640

Asn Leu Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn
                645                 650                 655
```

```
Asn Ser Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser
            660                 665                 670

Val Tyr Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His
        675                 680                 685

Ile Thr Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val
    690                 695                 700

Asn Gly Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val
705                 710                 715                 720

Asn Thr Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser
                725                 730                 735

Ser Asn Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln
            740                 745                 750

Leu Tyr Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser
        755                 760                 765

Ile Gln Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn
    770                 775                 780

Val Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
785                 790                 795                 800

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
                805                 810                 815

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu Ala
            820                 825                 830

Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile Val Gly
        835                 840                 845

Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala Gly Ile Ser
    850                 855                 860

Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile Leu His Asp Lys
865                 870                 875                 880

Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu Ser Glu Ser Lys Lys
                885                 890                 895

Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys Ile Leu Val Pro Ile Asp
            900                 905                 910

Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Lys Leu
        915                 920                 925
```

```
Gly Thr Cys Asn Ile Leu Ala Met Glu Gly Gly Ser Gly His Thr Val
    930                 935                 940

Thr Gly Asn Ile Asp His Phe Phe Ser Ser Pro Ser Ile Ser Ser His
945                 950                 955                 960

Ile Pro Ser Leu Ser Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn
                965                 970                 975

Leu Asp Phe Ser Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg
            980                 985                 990

Val Phe Trp Trp Glu Thr Gly Ala  Val Pro Gly Leu Arg  Ser Leu Glu
        995                 1000                1005

Asn Asp  Gly Thr Arg Leu Leu  Asp Ser Ile Arg Asp  Leu Tyr Pro
    1010                1015                1020

Gly Lys  Phe Tyr Trp Arg Phe  Tyr Ala Phe Phe Asp  Tyr Ala Ile
    1025                1030                1035

Thr Thr  Leu Lys Pro Val Tyr  Glu Asp Thr Asn Ile  Lys Ile Lys
    1040                1045                1050

Leu Asp  Lys Asp Thr Arg Asn  Phe Ile Met Pro Thr  Ile Thr Thr
    1055                1060                1065

Asn Glu  Ile Arg Asn Lys Leu  Ser Tyr Ser Phe Asp  Gly Ala Gly
    1070                1075                1080

Gly Thr  Tyr Ser Leu Leu Leu  Ser Ser Tyr Pro Ile  Ser Thr Asn
    1085                1090                1095

Ile Asn  Leu Ser Lys Asp Asp  Leu Trp Ile Phe Asn  Ile Asp Asn
    1100                1105                1110

Glu Val  Arg Glu Ile Ser Ile  Glu Asn Gly Thr Ile  Lys Lys Gly
    1115                1120                1125

Lys Leu  Ile Lys Asp Val Leu  Ser Lys Ile Asp Ile  Asn Lys Asn
    1130                1135                1140

Lys Leu  Ile Ile Gly Asn Gln  Thr Ile Asp Phe Ser  Gly Asp Ile
    1145                1150                1155

Asp Asn  Lys Asp Arg Tyr Ile  Phe Leu Thr Cys Glu  Leu Asp Asp
    1160                1165                1170

Lys Ile  Ser Leu Ile Ile Glu  Ile Asn Leu Val Ala  Lys Ser Tyr
    1175                1180                1185
```

```
Ser Leu  Leu Leu Ser Gly Asp  Lys Asn Tyr Leu Ile  Ser Asn Leu
    1190                 1195                 1200

Ser Asn  Ile Ile Glu Lys Ile  Asn Thr Leu Gly Leu  Asp Ser Lys
    1205                 1210                 1215

Asn Ile  Ala Tyr Asn Tyr Thr  Asp Glu Ser Asn Asn  Lys Tyr Phe
    1220                 1225                 1230

Gly Ala  Ile Ser Lys Thr Ser  Gln Lys Ser Ile Ile  His Tyr Lys
    1235                 1240                 1245

Lys Asp  Ser Lys Asn Ile Leu  Glu Phe Tyr Asn Asp  Ser Thr Leu
    1250                 1255                 1260

Glu Phe  Asn Ser Lys Asp Phe  Ile Ala Glu Asp Ile  Asn Val Phe
    1265                 1270                 1275

Met Lys  Asp Asp Ile Asn Thr  Ile Thr Gly Lys Tyr  Tyr Val Asp
    1280                 1285                 1290

Asn Asn  Thr Asp Lys Ser Ile  Asp Phe Ser Ile Ser  Leu Val Ser
    1295                 1300                 1305

Lys Asn  Gln Val Lys Val Asn  Gly Leu Tyr Leu Asn  Glu Ser Val
    1310                 1315                 1320

Tyr Ser  Ser Tyr Leu Asp Phe  Val Lys Asn Ser Asp  Gly His His
    1325                 1330                 1335

Asn Thr  Ser Asn Phe Met Asn  Leu Phe Leu Asp Asn  Ile Ser Phe
    1340                 1345                 1350

Trp Lys  Leu Phe Gly Phe Glu  Asn Ile Asn Phe Val  Ile Asp Lys
    1355                 1360                 1365

Tyr Phe  Thr Leu Val Gly Lys  Thr Asn Leu Gly Tyr  Val Glu Phe
    1370                 1375                 1380

Ile Cys  Asp Asn Asn Lys Asn  Ile Asp Ile Tyr Phe  Gly Glu Trp
    1385                 1390                 1395

Lys Thr  Ser Ser Ser Lys Ser  Thr Ile Phe Ser Gly  Asn Gly Arg
    1400                 1405                 1410

Asn Val  Val Val Glu Pro Ile  Tyr Asn Pro Asp Thr  Gly Glu Asp
    1415                 1420                 1425

Ile Ser  Thr Ser Leu Asp Phe  Ser Tyr Glu Pro Leu  Tyr Gly Ile
    1430                 1435                 1440
```

```
Asp Arg  Tyr Ile Asn Lys Val  Leu Ile Ala Pro Asp  Leu Tyr Thr
    1445                1450                1455

Ser Leu  Ile Asn Ile Asn Thr  Asn Tyr Tyr Ser Asn  Glu Tyr Tyr
    1460                1465                1470

Pro Glu  Ile Ile Val Leu Asn  Pro Asn Thr Phe His  Lys Lys Val
    1475                1480                1485

Asn Ile  Asn Leu Asp Ser Ser  Ser Phe Glu Tyr Lys  Trp Ser Thr
    1490                1495                1500

Glu Gly  Ser Asp Phe Ile Leu  Val Arg Tyr Leu Glu  Glu Ser Asn
    1505                1510                1515

Lys Lys  Ile Leu Gln Lys Ile  Arg Ile Lys Gly Ile  Leu Ser Asn
    1520                1525                1530

Thr Gln  Ser Phe Asn Lys Met  Ser Ile Asp Phe Lys  Asp Ile Lys
    1535                1540                1545

Lys Leu  Ser Leu Gly Tyr Ile  Met Ser Asn Phe Lys  Ser Phe Asn
    1550                1555                1560

Ser Glu  Asn Glu Leu Asp Arg  Asp His Leu Gly Phe  Lys Ile Ile
    1565                1570                1575

Asp Asn  Lys Thr Tyr Tyr Tyr  Asp Glu Asp Ser Lys  Leu Val Lys
    1580                1585                1590

Gly Leu  Ile Asn Ile Asn Asn  Ser Leu Phe Tyr Phe  Asp Pro Ile
    1595                1600                1605

Glu Phe  Asn Leu Val Thr Gly  Trp Gln Thr Ile Asn  Gly Lys Lys
    1610                1615                1620

Tyr Tyr  Phe Asp Ile Asn Thr  Gly Ala Ala Leu Ile  Ser Tyr Lys
    1625                1630                1635

Ile Ile  Asn Gly Lys His Phe  Tyr Phe Asn Asn Asp  Gly Val Met
    1640                1645                1650

Gln Leu  Gly Val Phe Lys Gly  Pro Asp Gly Phe Glu  Tyr Phe Ala
    1655                1660                1665

Pro Ala  Asn Thr Gln Asn Asn  Asn Ile Glu Gly Gln  Ala Ile Val
    1670                1675                1680

Tyr Gln  Ser Lys Phe Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe
    1685                1690                1695
```

```
Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn
    1700                1705                1710

Glu Lys  Tyr Tyr Phe Asn Pro  Asn Asn Ala Ile Ala  Ala Val Gly
    1715                1720                1725

Leu Gln  Val Ile Asp Asn Asn  Lys Tyr Tyr Phe Asn  Pro Asp Thr
    1730                1735                1740

Ala Ile  Ile Ser Lys Gly Trp  Gln Thr Val Asn Gly  Ser Arg Tyr
    1745                1750                1755

Tyr Phe  Asp Thr Asp Thr Ala  Ile Ala Phe Asn Gly  Tyr Lys Thr
    1760                1765                1770

Ile Asp  Gly Lys His Phe Tyr  Phe Asp Ser Asp Cys  Val Val Lys
    1775                1780                1785

Ile Gly  Val Phe Ser Thr Ser  Asn Gly Phe Glu Tyr  Phe Ala Pro
    1790                1795                1800

Ala Asn  Thr Tyr Asn Asn Asn  Ile Glu Gly Gln Ala  Ile Val Tyr
    1805                1810                1815

Gln Ser  Lys Phe Leu Thr Leu  Asn Gly Lys Lys Tyr  Tyr Phe Asp
    1820                1825                1830

Asn Asn  Ser Lys Ala Val Thr  Gly Trp Gln Thr Ile  Asp Ser Lys
    1835                1840                1845

Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Glu Ala Ala  Thr Gly Trp
    1850                1855                1860

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Thr  Asn Thr Ala
    1865                1870                1875

Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    1880                1885                1890

Phe Asn  Thr Asn Thr Ala Ile  Ala Ser Thr Gly Tyr  Thr Ile Ile
    1895                1900                1905

Asn Gly  Lys His Phe Tyr Phe  Asn Thr Asp Gly Ile  Met Gln Ile
    1910                1915                1920

Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1925                1930                1935

Asn Thr  Asp Ala Asn Asn Ile  Glu Gly Gln Ala Ile  Leu Tyr Gln
    1940                1945                1950
```

```
Asn Glu  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Gly Ser
    1955                1960                1965

Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile Ile Asn  Asn Lys Lys
    1970                1975                1980

Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala Ala Ile  His Leu Cys
    1985                1990                1995

Thr Ile  Asn Asn Asp Lys Tyr  Tyr Phe Ser Tyr Asp  Gly Ile Leu
    2000                2005                2010

Gln Asn  Gly Tyr Ile Thr Ile  Glu Arg Asn Asn Phe  Tyr Phe Asp
    2015                2020                2025

Ala Asn  Asn Glu Ser Lys Met  Val Thr Gly Val Phe  Lys Gly Pro
    2030                2035                2040

Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn Thr His  Asn Asn Asn
    2045                2050                2055

Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Asn Lys Phe  Leu Thr Leu
    2060                2065                2070

Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asp Ser Lys  Ala Val Thr
    2075                2080                2085

Gly Trp  Gln Thr Ile Asp Gly  Lys Lys Tyr Tyr Phe  Asn Leu Asn
    2090                2095                2100

Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys
    2105                2110                2115

Tyr Tyr  Phe Asn Leu Asn Thr  Ala Glu Ala Ala Thr  Gly Trp Gln
    2120                2125                2130

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Phe Ile
    2135                2140                2145

Ala Ser  Thr Gly Tyr Thr Ser  Ile Asn Gly Lys His  Phe Tyr Phe
    2150                2155                2160

Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val Phe Lys  Gly Pro Asn
    2165                2170                2175

Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr His Asn  Asn Asn Ile
    2180                2185                2190

Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Lys Phe Leu  Thr Leu Asn
    2195                2200                2205
```

```
Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser Lys Ala  Val Thr Gly
    2210                 2215                 2220

Leu Arg  Thr Ile Asp Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr
    2225                 2230                 2235

Ala Val  Ala Val Thr Gly Trp  Gln Thr Ile Asn Gly  Lys Lys Tyr
    2240                 2245                 2250

Tyr Phe  Asn Thr Asn Thr Ser  Ile Ala Ser Thr Gly  Tyr Thr Ile
    2255                 2260                 2265

Ile Ser  Gly Lys His Phe Tyr  Phe Asn Thr Asp Gly  Ile Met Gln
    2270                 2275                 2280

Ile Gly  Val Phe Lys Gly Pro  Asp Gly Phe Glu Tyr  Phe Ala Pro
    2285                 2290                 2295

Ala Asn  Thr Asp Ala Asn Asn  Ile Glu Gly Gln Ala  Ile Arg Tyr
    2300                 2305                 2310

Gln Asn  Arg Phe Leu Tyr Leu  His Asp Asn Ile Tyr  Tyr Phe Gly
    2315                 2320                 2325

Asn Asn  Ser Lys Ala Ala Thr  Gly Trp Val Thr Ile  Asp Gly Asn
    2330                 2335                 2340

Arg Tyr  Tyr Phe Glu Pro Asn  Thr Ala Met Gly Ala  Asn Gly Tyr
    2345                 2350                 2355

Lys Thr  Ile Asp Asn Lys Asn  Phe Tyr Phe Arg Asn  Gly Leu Pro
    2360                 2365                 2370

Gln Ile  Gly Val Phe Lys Gly  Ser Asn Gly Phe Glu  Tyr Phe Ala
    2375                 2380                 2385

Pro Ala  Asn Thr Asp Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Arg
    2390                 2395                 2400

Tyr Gln  Asn Arg Phe Leu His  Leu Leu Gly Lys Ile  Tyr Tyr Phe
    2405                 2410                 2415

Gly Asn  Asn Ser Lys Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly
    2420                 2425                 2430

Lys Val  Tyr Tyr Phe Met Pro  Asp Thr Ala Met Ala  Ala Ala Gly
    2435                 2440                 2445

Gly Leu  Phe Glu Ile Asp Gly  Val Ile Tyr Phe Phe  Gly Val Asp
    2450                 2455                 2460
```

Gly Val Lys Ala Pro Gly Ile Tyr Gly Gly Gly Ser Gly Gly Ser
2465 2470 2475

Leu Val Pro Arg Gly Ser Gly Gly Ser His His His His His His
2480 2485 2490

<210> 19
<211> 2472
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 19

His His His His His His Ser His Met Ala Ser Asn Lys Glu Ile Leu
1 5 10 15

Ala Val Val Glu Ala Val Ser Asn Glu Lys Ala Leu Pro Arg Glu Lys
20 25 30

Ile Phe Glu Ala Leu Glu Ser Ala Leu Ala Thr Ala Thr Lys Lys Lys
35 40 45

Tyr Glu Gln Glu Ile Asp Val Arg Val Gln Ile Asp Arg Lys Ser Gly
50 55 60

Asp Phe Asp Thr Phe Arg Arg Trp Leu Val Val Asp Glu Val Thr Gln
65 70 75 80

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

Leu Asn Leu Gly Asp Tyr Val Glu Asp Gln Ile Glu Ser Val Thr Phe
100 105 110

Asp Arg Ile Thr Thr Gln Thr Ala Lys Gln Val Ile Val Gln Lys Val
115 120 125

Arg Glu Ala Glu Arg Ala Met Val Val Asp Gln Phe Arg Glu His Glu
130 135 140

Gly Glu Ile Ile Thr Gly Val Val Lys Lys Val Asn Arg Asp Asn Ile
145 150 155 160

Ser Leu Asp Leu Gly Asn Asn Ala Glu Ala Val Ile Leu Arg Glu Asp
165 170 175

Met Leu Pro Arg Glu Asn Phe Arg Pro Gly Asp Arg Val Arg Gly Val
180 185 190

Leu Tyr Ser Val Arg Pro Glu Ala Arg Gly Ala Gln Leu Phe Val Thr

195 200 205

Arg Ser Lys Pro Glu Met Leu Ile Glu Leu Phe Arg Ile Glu Val Pro
210 215 220

Glu Ile Gly Glu Glu Val Ile Glu Ile Lys Ala Ala Ala Arg Asp Pro
225 230 235 240

Gly Ser Arg Ala Lys Ile Ala Val Lys Thr Asn Asp Lys Arg Ile Asp
245 250 255

Pro Val Gly Ala Cys Val Gly Met Arg Gly Ala Arg Val Gln Ala Val
260 265 270

Ser Thr Glu Leu Gly Gly Glu Arg Ile Asp Ile Val Leu Trp Asp Asp
275 280 285

Asn Pro Ala Gln Phe Val Ile Asn Ala Met Ala Pro Ala Asp Val Ala
290 295 300

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

Ala Gly Asn Leu Ala Gln Ala Ile Gly Arg Asn Gly Gln Asn Val Arg
325 330 335

Leu Ala Ser Gln Leu Ser Gly Trp Glu Leu Asn Val Met Thr Val Asp
340 345 350

Asp Leu Gln Ala Lys His Gln Ala Glu Ala His Ala Ala Ile Asp Thr
355 360 365

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

Glu Glu Gly Phe Ser Thr Leu Glu Glu Leu Ala Tyr Val Pro Met Lys
385 390 395 400

Glu Leu Leu Glu Ile Glu Gly Leu Asp Glu Pro Thr Val Glu Ala Leu
405 410 415

Arg Glu Arg Ala Lys Asn Ala Leu Ala Thr Ile Ala Gln Ala Gln Glu
420 425 430

Glu Ser Leu Gly Asp Asn Lys Pro Ala Asp Asp Leu Leu Asn Leu Glu
435 440 445

Gly Val Asp Arg Asp Leu Ala Phe Lys Leu Ala Ala Arg Gly Val Cys
450 455 460

Thr Leu Glu Asp Leu Ala Glu Gln Gly Ile Asp Asp Leu Ala Asp Ile

```
465                 470                 475                 480

Glu Gly Leu Thr Asp Glu Lys Ala Gly Ala Leu Ile Met Ala Ala Arg
                485                 490                 495

Asn Ile Cys Trp Phe Gly Asp Glu Ala Ser Gly Ala Leu Val Pro Arg
            500                 505                 510

Gly Ser Val Thr Ser Leu Tyr Lys Lys Ala Gly Ser Ala Ala Ala Pro
        515                 520                 525

Phe Thr Met Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe
    530                 535                 540

Asp Ser Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly
545                 550                 555                 560

Leu Ala Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser
                565                 570                 575

Val Ser Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile
            580                 585                 590

Glu Ser Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val
        595                 600                 605

Lys Asn Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn
    610                 615                 620

Leu Leu Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn
625                 630                 635                 640

Asn Leu Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn
                645                 650                 655

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

Val Tyr Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His
        675                 680                 685

Ile Thr Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val
    690                 695                 700

Asn Gly Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val
705                 710                 715                 720

Asn Thr Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser
                725                 730                 735

Ser Asn Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln
```

```
            740                 745                 750

Leu Tyr Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser
        755                 760                 765

Ile Gln Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn
    770                 775                 780

Val Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
785                 790                 795                 800

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
                805                 810                 815

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu Ala
            820                 825                 830

Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile Val Gly
        835                 840                 845

Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala Gly Ile Ser
    850                 855                 860

Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile Leu His Asp Lys
865                 870                 875                 880

Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu Ser Glu Ser Lys Lys
                885                 890                 895

Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys Ile Leu Val Pro Ile Asp
            900                 905                 910

Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Lys Leu
        915                 920                 925

Gly Thr Cys Asn Ile Leu Ala Met Glu Gly Gly Ser Gly His Thr Val
    930                 935                 940

Thr Gly Asn Ile Asp His Phe Phe Ser Ser Pro Ser Ile Ser Ser His
945                 950                 955                 960

Ile Pro Ser Leu Ser Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn
                965                 970                 975

Leu Asp Phe Ser Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg
            980                 985                 990

Val Phe Trp Trp Glu Thr Gly Ala  Val Pro Gly Leu Arg  Ser Leu Glu
        995                 1000                1005

Asn Asp  Gly Thr Arg Leu Leu  Asp Ser Ile Arg Asp  Leu Tyr Pro
```

1010 1015 1020

Gly Lys Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile
1025 1030 1035

Thr Thr Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys
1040 1045 1050

Leu Asp Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr
1055 1060 1065

Asn Glu Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly
1070 1075 1080

Gly Thr Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn
1085 1090 1095

Ile Asn Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn
1100 1105 1110

Glu Val Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly
1115 1120 1125

Lys Leu Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn
1130 1135 1140

Lys Leu Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile
1145 1150 1155

Asp Asn Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp
1160 1165 1170

Lys Ile Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr
1175 1180 1185

Ser Leu Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu
1190 1195 1200

Ser Asn Ile Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys
1205 1210 1215

Asn Ile Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe
1220 1225 1230

Gly Ala Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys
1235 1240 1245

Lys Asp Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu
1250 1255 1260

Glu Phe Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe

1265 1270 1275

Met Lys Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp
1280 1285 1290

Asn Asn Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser
1295 1300 1305

Lys Asn Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val
1310 1315 1320

Tyr Ser Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His
1325 1330 1335

Asn Thr Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe
1340 1345 1350

Trp Lys Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys
1355 1360 1365

Tyr Phe Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe
1370 1375 1380

Ile Cys Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp
1385 1390 1395

Lys Thr Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg
1400 1405 1410

Asn Val Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp
1415 1420 1425

Ile Ser Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile
1430 1435 1440

Asp Arg Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr
1445 1450 1455

Ser Leu Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr
1460 1465 1470

Pro Glu Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val
1475 1480 1485

Asn Ile Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr
1490 1495 1500

Glu Gly Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn
1505 1510 1515

Lys Lys Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn

1520 1525 1530

Thr Gln Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys
1535 1540 1545

Lys Leu Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn
1550 1555 1560

Ser Glu Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile
1565 1570 1575

Asp Asn Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys
1580 1585 1590

Gly Leu Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile
1595 1600 1605

Glu Phe Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys
1610 1615 1620

Tyr Tyr Phe Asp Ile Asn Thr Gly Ala Ala Leu Ile Ser Tyr Lys
1625 1630 1635

Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met
1640 1645 1650

Gln Leu Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala
1655 1660 1665

Pro Ala Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val
1670 1675 1680

Tyr Gln Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe
1685 1690 1695

Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn
1700 1705 1710

Glu Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly
1715 1720 1725

Leu Gln Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr
1730 1735 1740

Ala Ile Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr
1745 1750 1755

Tyr Phe Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr
1760 1765 1770

Ile Asp Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys

1775 1780 1785

Ile Gly Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro
1790 1795 1800

Ala Asn Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr
1805 1810 1815

Gln Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp
1820 1825 1830

Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys
1835 1840 1845

Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp
1850 1855 1860

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala
1865 1870 1875

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
1880 1885 1890

Phe Asn Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile
1895 1900 1905

Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile
1910 1915 1920

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala
1925 1930 1935

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln
1940 1945 1950

Asn Glu Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser
1955 1960 1965

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys
1970 1975 1980

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys
1985 1990 1995

Thr Ile Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu
2000 2005 2010

Gln Asn Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp
2015 2020 2025

Ala Asn Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro

2030 2035 2040

Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn
2045 2050 2055

Ile Glu Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu
2060 2065 2070

Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr
2075 2080 2085

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn
2090 2095 2100

Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys
2105 2110 2115

Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln
2120 2125 2130

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile
2135 2140 2145

Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe
2150 2155 2160

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn
2165 2170 2175

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile
2180 2185 2190

Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn
2195 2200 2205

Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly
2210 2215 2220

Leu Arg Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
2225 2230 2235

Ala Val Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr
2240 2245 2250

Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile
2255 2260 2265

Ile Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln
2270 2275 2280

Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro

2285 2290 2295

Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr
2300 2305 2310

Gln Asn Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly
2315 2320 2325

Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn
2330 2335 2340

Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr
2345 2350 2355

Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro
2360 2365 2370

Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala
2375 2380 2385

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
2390 2395 2400

Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe
2405 2410 2415

Gly Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly
2420 2425 2430

Lys Val Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly
2435 2440 2445

Gly Leu Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp
2450 2455 2460

Gly Val Lys Ala Pro Gly Ile Tyr Gly
2465 2470

<210> 20
<211> 2084
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 20

His His His His His His Ser His Met Ala Ser Asp Lys Ile Ile His
1 5 10 15

Leu Thr Asp Asp Ser Phe Asp Thr Asp Val Leu Lys Ala Asp Gly Ala
20 25 30

```
Ile Leu Val Asp Phe Trp Ala Glu Trp Cys Gly Pro Cys Lys Met Ile
        35                  40                  45

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

Val Ala Lys Leu Asn Ile Asp Gln Asn Pro Gly Thr Ala Pro Lys Tyr
65                  70                  75                  80

Gly Ile Arg Gly Ile Pro Thr Leu Leu Leu Phe Lys Asn Gly Glu Val
                85                  90                  95

Ala Ala Thr Lys Val Gly Ala Leu Ser Lys Gly Gln Leu Lys Glu Phe
            100                 105                 110

Leu Asp Ala Asn Leu Ala Arg Ala Leu Val Pro Arg Gly Ser Val Thr
        115                 120                 125

Ser Leu Tyr Lys Lys Ala Gly Ser Ala Ala Ala Pro Phe Thr Met Ile
    130                 135                 140

Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile Asp
145                 150                 155                 160

Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser Ile
                165                 170                 175

Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro Asp
            180                 185                 190

Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser Ile
        195                 200                 205

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

His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu Asn
225                 230                 235                 240

Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp Glu
                245                 250                 255

Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr Tyr
            260                 265                 270

Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val Glu
        275                 280                 285

Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys Glu
    290                 295                 300
```

```
Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn Leu
305                 310                 315                 320

Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu Asn
                325                 330                 335

Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys Asp
            340                 345                 350

Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala Gln
        355                 360                 365

Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu Val
    370                 375                 380

Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu Pro Thr
385                 390                 395                 400

Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp Gly Ile Asn
                405                 410                 415

Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His Asp Pro Leu Leu
            420                 425                 430

Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu Ala Ile Asn Met Ser
        435                 440                 445

Leu Ser Ile Ala Ala Thr Val Ala Ser Ile Val Gly Ile Gly Ala Glu
    450                 455                 460

Val Thr Ile Phe Leu Leu Pro Ile Ala Gly Ile Ser Ala Gly Ile Pro
465                 470                 475                 480

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

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

Lys Thr Glu Asp Asp Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile
        515                 520                 525

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

Ile Leu Ala Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile
545                 550                 555                 560

Asp His Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu
                565                 570                 575
```

```
Ser Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
            580                 585                 590

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

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr
    610                 615                 620

Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe Tyr Trp
625                 630                 635                 640

Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu Lys Pro Val
                645                 650                 655

Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys Asp Thr Arg Asn
            660                 665                 670

Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile Arg Asn Lys Leu Ser
        675                 680                 685

Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr Ser Leu Leu Leu Ser Ser
    690                 695                 700

Tyr Pro Ile Ser Thr Asn Ile Asn Leu Ser Lys Asp Asp Leu Trp Ile
705                 710                 715                 720

Phe Asn Ile Asp Asn Glu Val Arg Glu Ile Ser Ile Glu Asn Gly Thr
                725                 730                 735

Ile Lys Lys Gly Lys Leu Ile Lys Asp Val Leu Ser Lys Ile Asp Ile
            740                 745                 750

Asn Lys Asn Lys Leu Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly
        755                 760                 765

Asp Ile Asp Asn Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp
    770                 775                 780

Asp Lys Ile Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr
785                 790                 795                 800

Ser Leu Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser
                805                 810                 815

Asn Ile Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
            820                 825                 830

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
        835                 840                 845
```

```
Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser Lys
    850                 855                 860

Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn Ser Lys
865                 870                 875                 880

Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp Asp Ile Asn
                885                 890                 895

Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr Asp Lys Ser Ile
            900                 905                 910

Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln Val Lys Val Asn Gly
        915                 920                 925

Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser Tyr Leu Asp Phe Val Lys
    930                 935                 940

Asn Ser Asp Gly His His Asn Thr Ser Asn Phe Met Asn Leu Phe Leu
945                 950                 955                 960

Asp Asn Ile Ser Phe Trp Lys Leu Phe Gly Phe Glu Asn Ile Asn Phe
                965                 970                 975

Val Ile Asp Lys Tyr Phe Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr
            980                 985                 990

Val Glu Phe Ile Cys Asp Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly
        995                 1000                1005

Glu Trp  Lys Thr Ser Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn
    1010                1015                1020

Gly Arg  Asn Val Val Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly
    1025                1030                1035

Glu Asp  Ile Ser Thr Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr
    1040                1045                1050

Gly Ile  Asp Arg Tyr Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu
    1055                1060                1065

Tyr Thr  Ser Leu Ile Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu
    1070                1075                1080

Tyr Tyr  Pro Glu Ile Ile Val  Leu Asn Pro Asn Thr  Phe His Lys
    1085                1090                1095

Lys Val  Asn Ile Asn Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp
    1100                1105                1110
```

```
Ser Thr  Glu Gly Ser Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu
    1115                1120                1125

Ser Asn  Lys Lys Ile Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu
    1130                1135                1140

Ser Asn  Thr Gln Ser Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp
    1145                1150                1155

Ile Lys  Lys Leu Ser Leu Gly  Tyr Ile Met Ser Asn  Phe Lys Ser
    1160                1165                1170

Phe Asn  Ser Glu Asn Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys
    1175                1180                1185

Ile Ile  Asp Asn Lys Thr Tyr  Tyr Tyr Asp Glu Asp  Ser Lys Leu
    1190                1195                1200

Val Lys  Gly Leu Ile Asn Ile  Asn Asn Ser Leu Phe  Tyr Phe Asp
    1205                1210                1215

Pro Ile  Glu Phe Asn Leu Val  Thr Gly Trp Gln Thr  Ile Asn Gly
    1220                1225                1230

Lys Lys  Tyr Tyr Phe Asp Ile  Asn Thr Gly Ala Ala  Leu Ile Ser
    1235                1240                1245

Tyr Lys  Ile Ile Asn Gly Lys  His Phe Tyr Phe Asn  Asn Asp Gly
    1250                1255                1260

Val Met  Gln Leu Gly Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr
    1265                1270                1275

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

Ile Val  Tyr Gln Ser Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr
    1295                1300                1305

Tyr Phe  Asp Asn Asp Ser Lys  Ala Val Thr Gly Trp  Arg Ile Ile
    1310                1315                1320

Asn Asn  Glu Lys Tyr Tyr Phe  Asn Pro Asn Asn Ala  Ile Ala Ala
    1325                1330                1335

Val Gly  Leu Gln Val Ile Asp  Asn Asn Lys Tyr Tyr  Phe Asn Pro
    1340                1345                1350

Asp Thr  Ala Ile Ile Ser Lys  Gly Trp Gln Thr Val  Asn Gly Ser
    1355                1360                1365
```

```
Arg Tyr  Tyr Phe Asp Thr Asp  Thr Ala Ile Ala Phe  Asn Gly Tyr
    1370                1375                1380

Lys Thr  Ile Asp Gly Lys His  Phe Tyr Phe Asp Ser  Asp Cys Val
    1385                1390                1395

Val Lys  Ile Gly Val Phe Ser  Thr Ser Asn Gly Phe  Glu Tyr Phe
    1400                1405                1410

Ala Pro  Ala Asn Thr Tyr Asn  Asn Asn Ile Glu Gly  Gln Ala Ile
    1415                1420                1425

Val Tyr  Gln Ser Lys Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr
    1430                1435                1440

Phe Asp  Asn Asn Ser Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp
    1445                1450                1455

Ser Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr
    1460                1465                1470

Gly Trp  Gln Thr Ile Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn
    1475                1480                1485

Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys
    1490                1495                1500

Tyr Tyr  Phe Asn Thr Asn Thr  Ala Ile Ala Ser Thr  Gly Tyr Thr
    1505                1510                1515

Ile Ile  Asn Gly Lys His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met
    1520                1525                1530

Gln Ile  Gly Val Phe Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala
    1535                1540                1545

Pro Ala  Asn Thr Asp Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu
    1550                1555                1560

Tyr Gln  Asn Glu Phe Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe
    1565                1570                1575

Gly Ser  Asp Ser Lys Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn
    1580                1585                1590

Lys Lys  Tyr Tyr Phe Asn Pro  Asn Asn Ala Ile Ala  Ala Ile His
    1595                1600                1605

Leu Cys  Thr Ile Asn Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly
    1610                1615                1620
```

```
Ile Leu  Gln Asn Gly Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr
    1625                1630                1635

Phe Asp  Ala Asn Asn Glu Ser  Lys Met Val Thr Gly  Val Phe Lys
    1640                1645                1650

Gly Pro  Asn Gly Phe Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn
    1655                1660                1665

Asn Asn  Ile Glu Gly Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu
    1670                1675                1680

Thr Leu  Asn Gly Lys Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala
    1685                1690                1695

Val Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    1700                1705                1710

Leu Asn  Thr Ala Glu Ala Ala  Thr Gly Trp Gln Thr  Ile Asp Gly
    1715                1720                1725

Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala Glu Ala  Ala Thr Gly
    1730                1735                1740

Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr
    1745                1750                1755

Phe Ile  Ala Ser Thr Gly Tyr  Thr Ser Ile Asn Gly  Lys His Phe
    1760                1765                1770

Tyr Phe  Asn Thr Asp Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly
    1775                1780                1785

Pro Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala Asn Thr  His Asn Asn
    1790                1795                1800

Asn Ile  Glu Gly Gln Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr
    1805                1810                1815

Leu Asn  Gly Lys Lys Tyr Tyr  Phe Gly Ser Asp Ser  Lys Ala Val
    1820                1825                1830

Thr Gly  Leu Arg Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    1835                1840                1845

Asn Thr  Ala Val Ala Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys
    1850                1855                1860

Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr
    1865                1870                1875
```

```
Thr Ile  Ile Ser Gly Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile
    1880                1885                1890

Met Gln  Ile Gly Val Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe
    1895                1900                1905

Ala Pro  Ala Asn Thr Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile
    1910                1915                1920

Arg Tyr  Gln Asn Arg Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr
    1925                1930                1935

Phe Gly  Asn Asn Ser Lys Ala  Ala Thr Gly Trp Val  Thr Ile Asp
    1940                1945                1950

Gly Asn  Arg Tyr Tyr Phe Glu  Pro Asn Thr Ala Met  Gly Ala Asn
    1955                1960                1965

Gly Tyr  Lys Thr Ile Asp Asn  Lys Asn Phe Tyr Phe  Arg Asn Gly
    1970                1975                1980

Leu Pro  Gln Ile Gly Val Phe  Lys Gly Ser Asn Gly  Phe Glu Tyr
    1985                1990                1995

Phe Ala  Pro Ala Asn Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala
    2000                2005                2010

Ile Arg  Tyr Gln Asn Arg Phe  Leu His Leu Leu Gly  Lys Ile Tyr
    2015                2020                2025

Tyr Phe  Gly Asn Asn Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile
    2030                2035                2040

Asn Gly  Lys Val Tyr Tyr Phe  Met Pro Asp Thr Ala  Met Ala Ala
    2045                2050                2055

Ala Gly  Gly Leu Phe Glu Ile  Asp Gly Val Ile Tyr  Phe Phe Gly
    2060                2065                2070

Val Asp  Gly Val Lys Ala Pro  Gly Ile Tyr Gly
    2075                2080
```

<210> 21
<211> 1723
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 21

```
His His His His His His Ser His Met Ala Ser Asp Lys Ile Ile His
```

```
1               5                   10                  15

Leu Thr Asp Asp Ser Phe Asp Thr Asp Val Leu Lys Ala Asp Gly Ala
            20                  25                  30

Ile Leu Val Asp Phe Trp Ala Glu Trp Cys Gly Pro Cys Lys Met Ile
        35                  40                  45

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

Val Ala Lys Leu Asn Ile Asp Gln Asn Pro Gly Thr Ala Pro Lys Tyr
65                  70                  75                  80

Gly Ile Arg Gly Ile Pro Thr Leu Leu Leu Phe Lys Asn Gly Glu Val
                85                  90                  95

Ala Ala Thr Lys Val Gly Ala Leu Ser Lys Gly Gln Leu Lys Glu Phe
            100                 105                 110

Leu Asp Ala Asn Leu Ala Arg Ala Leu Val Pro Arg Gly Ser Val Thr
        115                 120                 125

Ser Leu Tyr Lys Lys Ala Gly Ser Ala Ala Ala Pro Phe Thr Met Glu
    130                 135                 140

Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys Ile Leu Val
145                 150                 155                 160

Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser
                165                 170                 175

Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met Glu Gly Gly Ser Gly
            180                 185                 190

His Thr Val Thr Gly Asn Ile Asp His Phe Phe Ser Ser Pro Ser Ile
        195                 200                 205

Ser Ser His Ile Pro Ser Leu Ser Ile Tyr Ser Ala Ile Gly Ile Glu
    210                 215                 220

Thr Glu Asn Leu Asp Phe Ser Lys Lys Ile Met Met Leu Pro Asn Ala
225                 230                 235                 240

Pro Ser Arg Val Phe Trp Trp Glu Thr Gly Ala Val Pro Gly Leu Arg
                245                 250                 255

Ser Leu Glu Asn Asp Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu
            260                 265                 270

Tyr Pro Gly Lys Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala
```

275 280 285

Ile Thr Thr Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys
290 295 300

Leu Asp Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn
305 310 315 320

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

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
340 345 350

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg Glu
355 360 365

Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile Lys Asp
370 375 380

Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile Ile Gly Asn
385 390 395 400

Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys Asp Arg Tyr Ile
405 410 415

Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser Leu Ile Ile Glu Ile
420 425 430

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

Tyr Leu Ile Ser Asn Leu Ser Asn Ile Ile Glu Lys Ile Asn Thr Leu
450 455 460

Gly Leu Asp Ser Lys Asn Ile Ala Tyr Asn Tyr Thr Asp Glu Ser Asn
465 470 475 480

Asn Lys Tyr Phe Gly Ala Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile
485 490 495

His Tyr Lys Lys Asp Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser
500 505 510

Thr Leu Glu Phe Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val
515 520 525

Phe Met Lys Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp
530 535 540

Asn Asn Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys

545 550 555 560

Asn Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
565 570 575

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
580 585 590

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu Phe
595 600 605

Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr Leu Val
610 615 620

Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp Asn Asn Lys
625 630 635 640

Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser Ser Ser Lys Ser
645 650 655

Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val Val Glu Pro Ile Tyr
660 665 670

Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr Ser Leu Asp Phe Ser Tyr
675 680 685

Glu Pro Leu Tyr Gly Ile Asp Arg Tyr Ile Asn Lys Val Leu Ile Ala
690 695 700

Pro Asp Leu Tyr Thr Ser Leu Ile Asn Ile Asn Thr Asn Tyr Tyr Ser
705 710 715 720

Asn Glu Tyr Tyr Pro Glu Ile Ile Val Leu Asn Pro Asn Thr Phe His
725 730 735

Lys Lys Val Asn Ile Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp
740 745 750

Ser Thr Glu Gly Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser
755 760 765

Asn Lys Lys Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn
770 775 780

Thr Gln Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys
785 790 795 800

Leu Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
805 810 815

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

820 825 830

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

Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn Leu Val
850 855 860

Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asp Ile Asn
865 870 875 880

Thr Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile Asn Gly Lys His Phe
885 890 895

Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly Val Phe Lys Gly Pro
900 905 910

Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Gln Asn Asn Asn Ile
915 920 925

Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe Leu Thr Leu Asn Gly
930 935 940

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Arg
945 950 955 960

Ile Ile Asn Asn Glu Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala
965 970 975

Ala Val Gly Leu Gln Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro
980 985 990

Asp Thr Ala Ile Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg
995 1000 1005

Tyr Tyr Phe Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys
1010 1015 1020

Thr Ile Asp Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val
1025 1030 1035

Lys Ile Gly Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala
1040 1045 1050

Pro Ala Asn Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val
1055 1060 1065

Tyr Gln Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe
1070 1075 1080

Asp Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser

1085 1090 1095

Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly
1100 1105 1110

Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
1115 1120 1125

Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr
1130 1135 1140

Tyr Phe Asn Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile
1145 1150 1155

Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln
1160 1165 1170

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

Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr
1190 1195 1200

Gln Asn Glu Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly
1205 1210 1215

Ser Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys
1220 1225 1230

Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu
1235 1240 1245

Cys Thr Ile Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile
1250 1255 1260

Leu Gln Asn Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe
1265 1270 1275

Asp Ala Asn Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly
1280 1285 1290

Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn
1295 1300 1305

Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr
1310 1315 1320

Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val
1325 1330 1335

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu

1340 1345 1350

Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys
1355 1360 1365

Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp
1370 1375 1380

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe
1385 1390 1395

Ile Ala Ser Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr
1400 1405 1410

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro
1415 1420 1425

Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn
1430 1435 1440

Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu
1445 1450 1455

Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr
1460 1465 1470

Gly Leu Arg Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn
1475 1480 1485

Thr Ala Val Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys
1490 1495 1500

Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr
1505 1510 1515

Ile Ile Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met
1520 1525 1530

Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala
1535 1540 1545

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
1550 1555 1560

Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe
1565 1570 1575

Gly Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly
1580 1585 1590

Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly

1595 1600 1605

Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu
1610 1615 1620

Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe
1625 1630 1635

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile
1640 1645 1650

Arg Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr
1655 1660 1665

Phe Gly Asn Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn
1670 1675 1680

Gly Lys Val Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala
1685 1690 1695

Gly Gly Leu Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val
1700 1705 1710

Asp Gly Val Lys Ala Pro Gly Ile Tyr Gly
1715 1720

<210> 22
<211> 2111
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 22

His His His His His His Ser His Met Ala Ser Asn Lys Glu Ile Leu
1 5 10 15

Ala Val Val Glu Ala Val Ser Asn Glu Lys Ala Leu Pro Arg Glu Lys
20 25 30

Ile Phe Glu Ala Leu Glu Ser Ala Leu Ala Thr Ala Thr Lys Lys Lys
35 40 45

Tyr Glu Gln Glu Ile Asp Val Arg Val Gln Ile Asp Arg Lys Ser Gly
50 55 60

Asp Phe Asp Thr Phe Arg Arg Trp Leu Val Val Asp Glu Val Thr Gln
65 70 75 80

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

```
Leu Asn Leu Gly Asp Tyr Val Glu Asp Gln Ile Glu Ser Val Thr Phe
            100                 105                 110

Asp Arg Ile Thr Thr Gln Thr Ala Lys Gln Val Ile Val Gln Lys Val
        115                 120                 125

Arg Glu Ala Glu Arg Ala Met Val Val Asp Gln Phe Arg Glu His Glu
    130                 135                 140

Gly Glu Ile Ile Thr Gly Val Val Lys Lys Val Asn Arg Asp Asn Ile
145                 150                 155                 160

Ser Leu Asp Leu Gly Asn Asn Ala Glu Ala Val Ile Leu Arg Glu Asp
                165                 170                 175

Met Leu Pro Arg Glu Asn Phe Arg Pro Gly Asp Arg Val Arg Gly Val
            180                 185                 190

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

Arg Ser Lys Pro Glu Met Leu Ile Glu Leu Phe Arg Ile Glu Val Pro
    210                 215                 220

Glu Ile Gly Glu Glu Val Ile Glu Ile Lys Ala Ala Ala Arg Asp Pro
225                 230                 235                 240

Gly Ser Arg Ala Lys Ile Ala Val Lys Thr Asn Asp Lys Arg Ile Asp
                245                 250                 255

Pro Val Gly Ala Cys Val Gly Met Arg Gly Ala Arg Val Gln Ala Val
            260                 265                 270

Ser Thr Glu Leu Gly Gly Glu Arg Ile Asp Ile Val Leu Trp Asp Asp
        275                 280                 285

Asn Pro Ala Gln Phe Val Ile Asn Ala Met Ala Pro Ala Asp Val Ala
    290                 295                 300

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

Ala Gly Asn Leu Ala Gln Ala Ile Gly Arg Asn Gly Gln Asn Val Arg
                325                 330                 335

Leu Ala Ser Gln Leu Ser Gly Trp Glu Leu Asn Val Met Thr Val Asp
            340                 345                 350

Asp Leu Gln Ala Lys His Gln Ala Glu Ala His Ala Ala Ile Asp Thr
        355                 360                 365
```

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

Glu Glu Gly Phe Ser Thr Leu Glu Glu Leu Ala Tyr Val Pro Met Lys
385                 390                 395                 400

Glu Leu Leu Glu Ile Glu Gly Leu Asp Glu Pro Thr Val Glu Ala Leu
                405                 410                 415

Arg Glu Arg Ala Lys Asn Ala Leu Ala Thr Ile Ala Gln Ala Gln Glu
            420                 425                 430

Glu Ser Leu Gly Asp Asn Lys Pro Ala Asp Asp Leu Leu Asn Leu Glu
        435                 440                 445

Gly Val Asp Arg Asp Leu Ala Phe Lys Leu Ala Ala Arg Gly Val Cys
    450                 455                 460

Thr Leu Glu Asp Leu Ala Glu Gln Gly Ile Asp Asp Leu Ala Asp Ile
465                 470                 475                 480

Glu Gly Leu Thr Asp Glu Lys Ala Gly Ala Leu Ile Met Ala Ala Arg
                485                 490                 495

Asn Ile Cys Trp Phe Gly Asp Glu Ala Ser Gly Ala Leu Val Pro Arg
            500                 505                 510

Gly Ser Val Thr Ser Leu Tyr Lys Lys Ala Gly Ser Ala Ala Ala Pro
        515                 520                 525

Phe Thr Met Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
    530                 535                 540

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
545                 550                 555                 560

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met Glu
                565                 570                 575

Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe Phe Ser
            580                 585                 590

Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile Tyr Ser Ala
        595                 600                 605

Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys Lys Ile Met Met
    610                 615                 620

Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp Glu Thr Gly Ala Val
625                 630                 635                 640
```

```
Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Arg Leu Leu Asp Ser
                645                 650                 655

Ile Arg Asp Leu Tyr Pro Gly Lys Phe Tyr Trp Arg Phe Tyr Ala Phe
            660                 665                 670

Phe Asp Tyr Ala Ile Thr Thr Leu Lys Pro Val Tyr Glu Asp Thr Asn
        675                 680                 685

Ile Lys Ile Lys Leu Asp Lys Asp Thr Arg Asn Phe Ile Met Pro Thr
    690                 695                 700

Ile Thr Thr Asn Glu Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly
705                 710                 715                 720

Ala Gly Gly Thr Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr
                725                 730                 735

Asn Ile Asn Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn
            740                 745                 750

Glu Val Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys
        755                 760                 765

Leu Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
    770                 775                 780

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
785                 790                 795                 800

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser Leu
                805                 810                 815

Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu Leu Ser
            820                 825                 830

Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Ile Ile Glu Lys
        835                 840                 845

Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala Tyr Asn Tyr Thr
    850                 855                 860

Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile Ser Lys Thr Ser Gln
865                 870                 875                 880

Lys Ser Ile Ile His Tyr Lys Lys Asp Ser Lys Asn Ile Leu Glu Phe
                885                 890                 895

Tyr Asn Asp Ser Thr Leu Glu Phe Asn Ser Lys Asp Phe Ile Ala Glu
            900                 905                 910
```

```
Asp Ile Asn Val Phe Met Lys Asp Asp Ile Asn Thr Ile Thr Gly Lys
        915                 920                 925

Tyr Tyr Val Asp Asn Asn Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser
    930                 935                 940

Leu Val Ser Lys Asn Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu
945                 950                 955                 960

Ser Val Tyr Ser Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His
                965                 970                 975

His Asn Thr Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe
            980                 985                 990

Trp Lys Leu Phe Gly Phe Glu Asn  Ile Asn Phe Val Ile  Asp Lys Tyr
        995                 1000                1005

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

Cys Asp  Asn Asn Lys Asn Ile  Asp Ile Tyr Phe Gly  Glu Trp Lys
    1025                1030                1035

Thr Ser  Ser Ser Lys Ser Thr  Ile Phe Ser Gly Asn  Gly Arg Asn
    1040                1045                1050

Val Val  Val Glu Pro Ile Tyr  Asn Pro Asp Thr Gly  Glu Asp Ile
    1055                1060                1065

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

Arg Tyr  Ile Asn Lys Val Leu  Ile Ala Pro Asp Leu  Tyr Thr Ser
    1085                1090                1095

Leu Ile  Asn Ile Asn Thr Asn  Tyr Tyr Ser Asn Glu  Tyr Tyr Pro
    1100                1105                1110

Glu Ile  Ile Val Leu Asn Pro  Asn Thr Phe His Lys  Lys Val Asn
    1115                1120                1125

Ile Asn  Leu Asp Ser Ser Ser  Phe Glu Tyr Lys Trp  Ser Thr Glu
    1130                1135                1140

Gly Ser  Asp Phe Ile Leu Val  Arg Tyr Leu Glu Glu  Ser Asn Lys
    1145                1150                1155

Lys Ile  Leu Gln Lys Ile Arg  Ile Lys Gly Ile Leu  Ser Asn Thr
    1160                1165                1170
```

```
Gln Ser  Phe Asn Lys Met Ser  Ile Asp Phe Lys Asp  Ile Lys Lys
    1175                1180                1185

Leu Ser  Leu Gly Tyr Ile Met  Ser Asn Phe Lys Ser  Phe Asn Ser
    1190                1195                1200

Glu Asn  Glu Leu Asp Arg Asp  His Leu Gly Phe Lys  Ile Ile Asp
    1205                1210                1215

Asn Lys  Thr Tyr Tyr Tyr Asp  Glu Asp Ser Lys Leu  Val Lys Gly
    1220                1225                1230

Leu Ile  Asn Ile Asn Asn Ser  Leu Phe Tyr Phe Asp  Pro Ile Glu
    1235                1240                1245

Phe Asn  Leu Val Thr Gly Trp  Gln Thr Ile Asn Gly  Lys Lys Tyr
    1250                1255                1260

Tyr Phe  Asp Ile Asn Thr Gly  Ala Ala Leu Ile Ser  Tyr Lys Ile
    1265                1270                1275

Ile Asn  Gly Lys His Phe Tyr  Phe Asn Asn Asp Gly  Val Met Gln
    1280                1285                1290

Leu Gly  Val Phe Lys Gly Pro  Asp Gly Phe Glu Tyr  Phe Ala Pro
    1295                1300                1305

Ala Asn  Thr Gln Asn Asn Asn  Ile Glu Gly Gln Ala  Ile Val Tyr
    1310                1315                1320

Gln Ser  Lys Phe Leu Thr Leu  Asn Gly Lys Lys Tyr  Tyr Phe Asp
    1325                1330                1335

Asn Asp  Ser Lys Ala Val Thr  Gly Trp Arg Ile Ile  Asn Asn Glu
    1340                1345                1350

Lys Tyr  Tyr Phe Asn Pro Asn  Asn Ala Ile Ala Ala  Val Gly Leu
    1355                1360                1365

Gln Val  Ile Asp Asn Asn Lys  Tyr Tyr Phe Asn Pro  Asp Thr Ala
    1370                1375                1380

Ile Ile  Ser Lys Gly Trp Gln  Thr Val Asn Gly Ser  Arg Tyr Tyr
    1385                1390                1395

Phe Asp  Thr Asp Thr Ala Ile  Ala Phe Asn Gly Tyr  Lys Thr Ile
    1400                1405                1410

Asp Gly  Lys His Phe Tyr Phe  Asp Ser Asp Cys Val  Val Lys Ile
    1415                1420                1425
```

```
Gly Val  Phe Ser Thr Ser Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1430                1435                1440

Asn Thr  Tyr Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1445                1450                1455

Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1460                1465                1470

Asn Ser  Lys Ala Val Thr Gly  Trp Gln Thr Ile Asp  Ser Lys Lys
    1475                1480                1485

Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala Ala Thr  Gly Trp Gln
    1490                1495                1500

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Glu
    1505                1510                1515

Ala Ala  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    1520                1525                1530

Asn Thr  Asn Thr Ala Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Asn
    1535                1540                1545

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    1550                1555                1560

Val Phe  Lys Gly Pro Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    1565                1570                1575

Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala Ile Leu  Tyr Gln Asn
    1580                1585                1590

Glu Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Gly Ser Asp
    1595                1600                1605

Ser Lys  Ala Val Thr Gly Trp  Arg Ile Ile Asn Asn  Lys Lys Tyr
    1610                1615                1620

Tyr Phe  Asn Pro Asn Asn Ala  Ile Ala Ala Ile His  Leu Cys Thr
    1625                1630                1635

Ile Asn  Asn Asp Lys Tyr Tyr  Phe Ser Tyr Asp Gly  Ile Leu Gln
    1640                1645                1650

Asn Gly  Tyr Ile Thr Ile Glu  Arg Asn Asn Phe Tyr  Phe Asp Ala
    1655                1660                1665

Asn Asn  Glu Ser Lys Met Val  Thr Gly Val Phe Lys  Gly Pro Asn
    1670                1675                1680
```

```
Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr His Asn  Asn Asn Ile
    1685                 1690                 1695

Glu Gly  Gln Ala Ile Val Tyr  Gln Asn Lys Phe Leu  Thr Leu Asn
    1700                 1705                 1710

Gly Lys  Lys Tyr Tyr Phe Asp  Asn Asp Ser Lys Ala  Val Thr Gly
    1715                 1720                 1725

Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr Phe Asn  Leu Asn Thr
    1730                 1735                 1740

Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile Asp Gly  Lys Lys Tyr
    1745                 1750                 1755

Tyr Phe  Asn Leu Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    1760                 1765                 1770

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Phe Ile Ala
    1775                 1780                 1785

Ser Thr  Gly Tyr Thr Ser Ile  Asn Gly Lys His Phe  Tyr Phe Asn
    1790                 1795                 1800

Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe Lys Gly  Pro Asn Gly
    1805                 1810                 1815

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu
    1820                 1825                 1830

Gly Gln  Ala Ile Leu Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly
    1835                 1840                 1845

Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys Ala Val  Thr Gly Leu
    1850                 1855                 1860

Arg Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Thr  Asn Thr Ala
    1865                 1870                 1875

Val Ala  Val Thr Gly Trp Gln  Thr Ile Asn Gly Lys  Lys Tyr Tyr
    1880                 1885                 1890

Phe Asn  Thr Asn Thr Ser Ile  Ala Ser Thr Gly Tyr  Thr Ile Ile
    1895                 1900                 1905

Ser Gly  Lys His Phe Tyr Phe  Asn Thr Asp Gly Ile  Met Gln Ile
    1910                 1915                 1920

Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1925                 1930                 1935
```

```
Asn Thr  Asp Ala Asn Asn Ile  Glu Gly Gln Ala Ile  Arg Tyr Gln
    1940                1945                1950

Asn Arg  Phe Leu Tyr Leu His  Asp Asn Ile Tyr Tyr  Phe Gly Asn
    1955                1960                1965

Asn Ser  Lys Ala Ala Thr Gly  Trp Val Thr Ile Asp  Gly Asn Arg
    1970                1975                1980

Tyr Tyr  Phe Glu Pro Asn Thr  Ala Met Gly Ala Asn  Gly Tyr Lys
    1985                1990                1995

Thr Ile  Asp Asn Lys Asn Phe  Tyr Phe Arg Asn Gly  Leu Pro Gln
    2000                2005                2010

Ile Gly  Val Phe Lys Gly Ser  Asn Gly Phe Glu Tyr  Phe Ala Pro
    2015                2020                2025

Ala Asn  Thr Asp Ala Asn Asn  Ile Glu Gly Gln Ala  Ile Arg Tyr
    2030                2035                2040

Gln Asn  Arg Phe Leu His Leu  Leu Gly Lys Ile Tyr  Tyr Phe Gly
    2045                2050                2055

Asn Asn  Ser Lys Ala Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys
    2060                2065                2070

Val Tyr  Tyr Phe Met Pro Asp  Thr Ala Met Ala Ala  Ala Gly Gly
    2075                2080                2085

Leu Phe  Glu Ile Asp Gly Val  Ile Tyr Phe Phe Gly  Val Asp Gly
    2090                2095                2100

Val Lys  Ala Pro Gly Ile Tyr  Gly
    2105                2110
```

<210> 23
<211> 2138
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 23

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

Ala Val Val Glu Ala Val Ser Asn Glu Lys Ala Leu Pro Arg Glu Lys
            20                  25                  30

Ile Phe Glu Ala Leu Glu Ser Ala Leu Ala Thr Ala Thr Lys Lys Lys
```

```
        35                  40                  45

Tyr Glu Gln Glu Ile Asp Val Arg Val Gln Ile Asp Arg Lys Ser Gly
    50                  55                  60

Asp Phe Asp Thr Phe Arg Arg Trp Leu Val Val Asp Glu Val Thr Gln
65                  70                  75                  80

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

Leu Asn Leu Gly Asp Tyr Val Glu Asp Gln Ile Glu Ser Val Thr Phe
            100                 105                 110

Asp Arg Ile Thr Thr Gln Thr Ala Lys Gln Val Ile Val Gln Lys Val
        115                 120                 125

Arg Glu Ala Glu Arg Ala Met Val Val Asp Gln Phe Arg Glu His Glu
    130                 135                 140

Gly Glu Ile Ile Thr Gly Val Val Lys Lys Val Asn Arg Asp Asn Ile
145                 150                 155                 160

Ser Leu Asp Leu Gly Asn Asn Ala Glu Ala Val Ile Leu Arg Glu Asp
                165                 170                 175

Met Leu Pro Arg Glu Asn Phe Arg Pro Gly Asp Arg Val Arg Gly Val
            180                 185                 190

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

Arg Ser Lys Pro Glu Met Leu Ile Glu Leu Phe Arg Ile Glu Val Pro
    210                 215                 220

Glu Ile Gly Glu Glu Val Ile Glu Ile Lys Ala Ala Ala Arg Asp Pro
225                 230                 235                 240

Gly Ser Arg Ala Lys Ile Ala Val Lys Thr Asn Asp Lys Arg Ile Asp
                245                 250                 255

Pro Val Gly Ala Cys Val Gly Met Arg Gly Ala Arg Val Gln Ala Val
            260                 265                 270

Ser Thr Glu Leu Gly Gly Glu Arg Ile Asp Ile Val Leu Trp Asp Asp
        275                 280                 285

Asn Pro Ala Gln Phe Val Ile Asn Ala Met Ala Pro Ala Asp Val Ala
    290                 295                 300

Ser Ile Val Val Asp Glu Asp Lys His Thr Met Asp Ile Ala Val Glu
```

305 310 315 320

Ala Gly Asn Leu Ala Gln Ala Ile Gly Arg Asn Gly Gln Asn Val Arg
325 330 335

Leu Ala Ser Gln Leu Ser Gly Trp Glu Leu Asn Val Met Thr Val Asp
340 345 350

Asp Leu Gln Ala Lys His Gln Ala Glu Ala His Ala Ala Ile Asp Thr
355 360 365

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

Glu Glu Gly Phe Ser Thr Leu Glu Glu Leu Ala Tyr Val Pro Met Lys
385 390 395 400

Glu Leu Leu Glu Ile Glu Gly Leu Asp Glu Pro Thr Val Glu Ala Leu
405 410 415

Arg Glu Arg Ala Lys Asn Ala Leu Ala Thr Ile Ala Gln Ala Gln Glu
420 425 430

Glu Ser Leu Gly Asp Asn Lys Pro Ala Asp Asp Leu Leu Asn Leu Glu
435 440 445

Gly Val Asp Arg Asp Leu Ala Phe Lys Leu Ala Ala Arg Gly Val Cys
450 455 460

Thr Leu Glu Asp Leu Ala Glu Gln Gly Ile Asp Asp Leu Ala Asp Ile
465 470 475 480

Glu Gly Leu Thr Asp Glu Lys Ala Gly Ala Leu Ile Met Ala Ala Arg
485 490 495

Asn Ile Cys Trp Phe Gly Asp Glu Ala Ser Gly Ala Leu Val Pro Arg
500 505 510

Gly Ser Val Thr Ser Leu Tyr Lys Lys Ala Gly Ser Ala Ala Ala Pro
515 520 525

Phe Thr Met Ser Ile Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser
530 535 540

Phe Asn Pro Lys Glu Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro
545 550 555 560

Glu Leu Ser Thr Leu Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser
565 570 575

Asp Ile Glu Leu Glu Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn

580 585 590

Val Ile Ser Asn Ile Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu
595 600 605

Ala Lys Asn Leu Thr Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe
610 615 620

Lys Leu Ile Glu Ser Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln
625 630 635 640

Asn Glu Leu Glu Asp Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu
645 650 655

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

Ser Ile Phe Val Glu Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn
675 680 685

His Ile Thr Glu Glu Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr
690 695 700

Val Asn Gly Lys Leu Val Lys Lys Val Asn Leu Asp Thr Thr His Glu
705 710 715 720

Val Asn Thr Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr
725 730 735

Asn Ser Ser Lys Glu Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val
740 745 750

Gln Val Tyr Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp
755 760 765

Ala Ala Lys Val Val Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile
770 775 780

Asp Leu Leu Pro Thr Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile
785 790 795 800

Ile Asp Gly Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr
805 810 815

Ser Asp Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met
820 825 830

Ala Val Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
835 840 845

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile

```
    850                 855                 860

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg Asp
865                 870                 875                 880

Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu Val Glu
                885                 890                 895

Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met Met Pro Gln
            900                 905                 910

Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Val
        915                 920                 925

Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly Gly Ser Gly His Thr
    930                 935                 940

Val Thr Asp Asp Ile Asp His Phe Phe Ser Ala Pro Ser Ile Thr Tyr
945                 950                 955                 960

Arg Glu Pro His Leu Ser Ile Tyr Asp Val Leu Glu Val Gln Lys Glu
                965                 970                 975

Glu Leu Asp Leu Ser Lys Asp Leu Met Val Leu Pro Asn Ala Pro Asn
            980                 985                 990

Arg Val Phe Ala Trp Glu Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu
        995                 1000                1005

Glu Asn  Asp Gly Thr Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr
    1010                1015                1020

Glu Gly  Glu Phe Tyr Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala
    1025                1030                1035

Leu Ile  Thr Thr Leu Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg
    1040                1045                1050

Ile Asn  Leu Asp Ser Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile
    1055                1060                1065

Thr Thr  Glu Tyr Ile Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly
    1070                1075                1080

Ser Gly  Gly Thr Tyr Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly
    1085                1090                1095

Ile Asn  Ile Glu Leu Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val
    1100                1105                1110

Asp Asn  Val Val Arg Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys
```

1115 1120 1125

Lys Gly Asp Leu Ile Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu
1130 1135 1140

Glu Asn Lys Ile Ile Leu Asn Ser His Glu Ile Asn Phe Ser Gly
1145 1150 1155

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

Leu Glu Gly Ile Asn Ala Ile Ile Glu Val Asp Leu Leu Ser Lys
1175 1180 1185

Ser Tyr Lys Leu Leu Ile Ser Gly Glu Leu Lys Ile Leu Met Leu
1190 1195 1200

Asn Ser Asn His Ile Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn
1205 1210 1215

Ser Glu Leu Gln Lys Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu
1220 1225 1230

Gly Lys Glu Asn Gly Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu
1235 1240 1245

Phe Val Ser Glu Leu Pro Asp Val Val Leu Ile Ser Lys Val Tyr
1250 1255 1260

Met Asp Asp Ser Lys Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu
1265 1270 1275

Lys Asp Val Lys Val Ile Thr Lys Asp Asn Val Asn Ile Leu Thr
1280 1285 1290

Gly Tyr Tyr Leu Lys Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr
1295 1300 1305

Leu Gln Asp Glu Lys Thr Ile Lys Leu Asn Ser Val His Leu Asp
1310 1315 1320

Glu Ser Gly Val Ala Glu Ile Leu Lys Phe Met Asn Arg Lys Gly
1325 1330 1335

Asn Thr Asn Thr Ser Asp Ser Leu Met Ser Phe Leu Glu Ser Met
1340 1345 1350

Asn Ile Lys Ser Ile Phe Val Asn Phe Leu Gln Ser Asn Ile Lys
1355 1360 1365

Phe Ile Leu Asp Ala Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile

1370 1375 1380

Gly Gln Phe Glu Phe Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro
1385 1390 1395

Tyr Phe Ile Lys Phe Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr
1400 1405 1410

Val Gly Asn Arg Gln Asn Met Ile Val Glu Pro Asn Tyr Asp Leu
1415 1420 1425

Asp Asp Ser Gly Asp Ile Ser Ser Thr Val Ile Asn Phe Ser Gln
1430 1435 1440

Lys Tyr Leu Tyr Gly Ile Asp Ser Cys Val Asn Lys Val Val Ile
1445 1450 1455

Ser Pro Asn Ile Tyr Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr
1460 1465 1470

Glu Thr Asn Asn Thr Tyr Pro Glu Val Ile Val Leu Asp Ala Asn
1475 1480 1485

Tyr Ile Asn Glu Lys Ile Asn Val Asn Ile Asn Asp Leu Ser Ile
1490 1495 1500

Arg Tyr Val Trp Ser Asn Asp Gly Asn Asp Phe Ile Leu Met Ser
1505 1510 1515

Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys Ile Arg Phe Val
1520 1525 1530

Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn
1535 1540 1545

Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile Leu Ser
1550 1555 1560

Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu
1565 1570 1575

Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe
1580 1585 1590

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr
1595 1600 1605

Tyr Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr
1610 1615 1620

Val Gly Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala

1625 1630 1635

Ala Ser Ile Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe
1640 1645 1650

Asn Gln Ser Gly Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp
1655 1660 1665

Gly Phe Lys Tyr Phe Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu
1670 1675 1680

Glu Gly Glu Ala Ile Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu
1685 1690 1695

Asn Ile Tyr Tyr Phe Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp
1700 1705 1710

Lys Glu Leu Asp Gly Glu Met His Tyr Phe Ser Pro Glu Thr Gly
1715 1720 1725

Lys Ala Phe Lys Gly Leu Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr
1730 1735 1740

Phe Asn Ser Asp Gly Val Met Gln Lys Gly Phe Val Ser Ile Asn
1745 1750 1755

Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val Met Lys Val Gly
1760 1765 1770

Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala Glu Asn Gly
1775 1780 1785

Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr
1790 1795 1800

Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu
1805 1810 1815

Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr
1820 1825 1830

Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu
1835 1840 1845

Asp Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr
1850 1855 1860

Ile Gly Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp
1865 1870 1875

Asp Gly Ile Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val

1880 1885 1890

Phe Tyr Phe Ser Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn
1895 1900 1905

Ile Asp Asp Asn Tyr Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln
1910 1915 1920

Ile Gly Val Phe Asp Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro
1925 1930 1935

Ala Asn Thr Val Asn Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr
1940 1945 1950

Ser Gly Leu Val Arg Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu
1955 1960 1965

Thr Tyr Thr Ile Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu
1970 1975 1980

Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys
1985 1990 1995

Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys
2000 2005 2010

Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr
2015 2020 2025

Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile
2030 2035 2040

Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln Ile
2045 2050 2055

Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
2060 2065 2070

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr
2075 2080 2085

Gly Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu
2090 2095 2100

Tyr Ile Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr
2105 2110 2115

Tyr Phe Asp Pro Asp Thr Ala Gln Leu Val Ile Ser Glu Gly His
2120 2125 2130

His His His His His His

2135

<210> 24
<211> 2131
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 24

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

Ala Val Val Glu Ala Val Ser Asn Glu Lys Ala Leu Pro Arg Glu Lys
            20                  25                  30

Ile Phe Glu Ala Leu Glu Ser Ala Leu Ala Thr Ala Thr Lys Lys Lys
        35                  40                  45

Tyr Glu Gln Glu Ile Asp Val Arg Val Gln Ile Asp Arg Lys Ser Gly
    50                  55                  60

Asp Phe Asp Thr Phe Arg Arg Trp Leu Val Val Asp Glu Val Thr Gln
65                  70                  75                  80

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

Leu Asn Leu Gly Asp Tyr Val Glu Asp Gln Ile Glu Ser Val Thr Phe
            100                 105                 110

Asp Arg Ile Thr Thr Gln Thr Ala Lys Gln Val Ile Val Gln Lys Val
        115                 120                 125

Arg Glu Ala Glu Arg Ala Met Val Val Asp Gln Phe Arg Glu His Glu
    130                 135                 140

Gly Glu Ile Ile Thr Gly Val Val Lys Lys Val Asn Arg Asp Asn Ile
145                 150                 155                 160

Ser Leu Asp Leu Gly Asn Asn Ala Glu Ala Val Ile Leu Arg Glu Asp
                165                 170                 175

Met Leu Pro Arg Glu Asn Phe Arg Pro Gly Asp Arg Val Arg Gly Val
            180                 185                 190

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

Arg Ser Lys Pro Glu Met Leu Ile Glu Leu Phe Arg Ile Glu Val Pro
    210                 215                 220
```

```
Glu Ile Gly Glu Glu Val Ile Glu Ile Lys Ala Ala Ala Arg Asp Pro
225                 230                 235                 240

Gly Ser Arg Ala Lys Ile Ala Val Lys Thr Asn Asp Lys Arg Ile Asp
                245                 250                 255

Pro Val Gly Ala Cys Val Gly Met Arg Gly Ala Arg Val Gln Ala Val
            260                 265                 270

Ser Thr Glu Leu Gly Gly Glu Arg Ile Asp Ile Val Leu Trp Asp Asp
        275                 280                 285

Asn Pro Ala Gln Phe Val Ile Asn Ala Met Ala Pro Ala Asp Val Ala
    290                 295                 300

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

Ala Gly Asn Leu Ala Gln Ala Ile Gly Arg Asn Gly Gln Asn Val Arg
                325                 330                 335

Leu Ala Ser Gln Leu Ser Gly Trp Glu Leu Asn Val Met Thr Val Asp
            340                 345                 350

Asp Leu Gln Ala Lys His Gln Ala Glu Ala His Ala Ala Ile Asp Thr
        355                 360                 365

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

Glu Glu Gly Phe Ser Thr Leu Glu Glu Leu Ala Tyr Val Pro Met Lys
385                 390                 395                 400

Glu Leu Leu Glu Ile Glu Gly Leu Asp Glu Pro Thr Val Glu Ala Leu
                405                 410                 415

Arg Glu Arg Ala Lys Asn Ala Leu Ala Thr Ile Ala Gln Ala Gln Glu
            420                 425                 430

Glu Ser Leu Gly Asp Asn Lys Pro Ala Asp Asp Leu Leu Asn Leu Glu
        435                 440                 445

Gly Val Asp Arg Asp Leu Ala Phe Lys Leu Ala Ala Arg Gly Val Cys
    450                 455                 460

Thr Leu Glu Asp Leu Ala Glu Gln Gly Ile Asp Asp Leu Ala Asp Ile
465                 470                 475                 480

Glu Gly Leu Thr Asp Glu Lys Ala Gly Ala Leu Ile Met Ala Ala Arg
                485                 490                 495
```

```
Asn Ile Cys Trp Phe Gly Asp Glu Ala Ser Gly Ala Leu Val Pro Arg
            500                 505                 510

Gly Ser Val Thr Ser Leu Tyr Lys Lys Ala Gly Ser Ala Ala Ala Pro
        515                 520                 525

Phe Thr Met Ser Ile Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser
    530                 535                 540

Phe Asn Pro Lys Glu Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro
545                 550                 555                 560

Glu Leu Ser Thr Leu Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser
                565                 570                 575

Asp Ile Glu Leu Glu Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn
            580                 585                 590

Val Ile Ser Asn Ile Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu
        595                 600                 605

Ala Lys Asn Leu Thr Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe
    610                 615                 620

Lys Leu Ile Glu Ser Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln
625                 630                 635                 640

Asn Glu Leu Glu Asp Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu
                645                 650                 655

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

Ser Ile Phe Val Glu Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn
        675                 680                 685

His Ile Thr Glu Glu Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr
    690                 695                 700

Val Asn Gly Lys Leu Val Lys Lys Val Asn Leu Asp Thr Thr His Glu
705                 710                 715                 720

Val Asn Thr Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr
                725                 730                 735

Asn Ser Ser Lys Glu Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val
            740                 745                 750

Gln Val Tyr Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp
        755                 760                 765
```

```
Ala Ala Lys Val Val Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile
    770                 775                 780

Asp Leu Leu Pro Thr Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile
785                 790                 795                 800

Ile Asp Gly Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr
                805                 810                 815

Ser Asp Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met
            820                 825                 830

Ala Val Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
        835                 840                 845

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
    850                 855                 860

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg Asp
865                 870                 875                 880

Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu Val Glu
                885                 890                 895

Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met Met Pro Gln
            900                 905                 910

Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Val
        915                 920                 925

Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly Gly Ser Gly His Thr
    930                 935                 940

Val Thr Asp Asp Ile Asp His Phe Phe Ser Ala Pro Ser Ile Thr Tyr
945                 950                 955                 960

Arg Glu Pro His Leu Ser Ile Tyr Asp Val Leu Glu Val Gln Lys Glu
                965                 970                 975

Glu Leu Asp Leu Ser Lys Asp Leu Met Val Leu Pro Asn Ala Pro Asn
            980                 985                 990

Arg Val Phe Ala Trp Glu Thr Gly  Trp Thr Pro Gly Leu  Arg Ser Leu
        995                 1000                1005

Glu Asn  Asp Gly Thr Lys Leu  Leu Asp Arg Ile Arg  Asp Asn Tyr
    1010                1015                1020

Glu Gly  Glu Phe Tyr Trp Arg  Tyr Phe Ala Phe Ile  Ala Asp Ala
    1025                1030                1035
```

```
Leu Ile  Thr Thr Leu Lys Pro  Arg Tyr Glu Asp Thr  Asn Ile Arg
    1040                1045                1050

Ile Asn  Leu Asp Ser Asn Thr  Arg Ser Phe Ile Val  Pro Ile Ile
    1055                1060                1065

Thr Thr  Glu Tyr Ile Arg Glu  Lys Leu Ser Tyr Ser  Phe Tyr Gly
    1070                1075                1080

Ser Gly  Gly Thr Tyr Ala Leu  Ser Leu Ser Gln Tyr  Asn Met Gly
    1085                1090                1095

Ile Asn  Ile Glu Leu Ser Glu  Ser Asp Val Trp Ile  Ile Asp Val
    1100                1105                1110

Asp Asn  Val Val Arg Asp Val  Thr Ile Glu Ser Asp  Lys Ile Lys
    1115                1120                1125

Lys Gly  Asp Leu Ile Glu Gly  Ile Leu Ser Thr Leu  Ser Ile Glu
    1130                1135                1140

Glu Asn  Lys Ile Ile Leu Asn  Ser His Glu Ile Asn  Phe Ser Gly
    1145                1150                1155

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

Leu Glu  Gly Ile Asn Ala Ile  Ile Glu Val Asp Leu  Leu Ser Lys
    1175                1180                1185

Ser Tyr  Lys Leu Leu Ile Ser  Gly Glu Leu Lys Ile  Leu Met Leu
    1190                1195                1200

Asn Ser  Asn His Ile Gln Gln  Lys Ile Asp Tyr Ile  Gly Phe Asn
    1205                1210                1215

Ser Glu  Leu Gln Lys Asn Ile  Pro Tyr Ser Phe Val  Asp Ser Glu
    1220                1225                1230

Gly Lys  Glu Asn Gly Phe Ile  Asn Gly Ser Thr Lys  Glu Gly Leu
    1235                1240                1245

Phe Val  Ser Glu Leu Pro Asp  Val Val Leu Ile Ser  Lys Val Tyr
    1250                1255                1260

Met Asp  Asp Ser Lys Pro Ser  Phe Gly Tyr Tyr Ser  Asn Asn Leu
    1265                1270                1275

Lys Asp  Val Lys Val Ile Thr  Lys Asp Asn Val Asn  Ile Leu Thr
    1280                1285                1290
```

```
Gly Tyr  Tyr Leu Lys Asp Asp  Ile Lys Ile Ser Leu  Ser Leu Thr
    1295                 1300                 1305

Leu Gln  Asp Glu Lys Thr Ile  Lys Leu Asn Ser Val  His Leu Asp
    1310                 1315                 1320

Glu Ser  Gly Val Ala Glu Ile  Leu Lys Phe Met Asn  Arg Lys Gly
    1325                 1330                 1335

Asn Thr  Asn Thr Ser Asp Ser  Leu Met Ser Phe Leu  Glu Ser Met
    1340                 1345                 1350

Asn Ile  Lys Ser Ile Phe Val  Asn Phe Leu Gln Ser  Asn Ile Lys
    1355                 1360                 1365

Phe Ile  Leu Asp Ala Asn Phe  Ile Ile Ser Gly Thr  Thr Ser Ile
    1370                 1375                 1380

Gly Gln  Phe Glu Phe Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro
    1385                 1390                 1395

Tyr Phe  Ile Lys Phe Asn Thr  Leu Glu Thr Asn Tyr  Thr Leu Tyr
    1400                 1405                 1410

Val Gly  Asn Arg Gln Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu
    1415                 1420                 1425

Asp Asp  Ser Gly Asp Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln
    1430                 1435                 1440

Lys Tyr  Leu Tyr Gly Ile Asp  Ser Cys Val Asn Lys  Val Val Ile
    1445                 1450                 1455

Ser Pro  Asn Ile Tyr Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr
    1460                 1465                 1470

Glu Thr  Asn Asn Thr Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn
    1475                 1480                 1485

Tyr Ile  Asn Glu Lys Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile
    1490                 1495                 1500

Arg Tyr  Val Trp Ser Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser
    1505                 1510                 1515

Thr Ser  Glu Glu Asn Lys Val  Ser Gln Val Lys Ile  Arg Phe Val
    1520                 1525                 1530

Asn Val  Phe Lys Asp Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn
    1535                 1540                 1545
```

```
Phe Ser  Asp Lys Gln Asp Val  Pro Val Ser Glu Ile  Ile Leu Ser
    1550                1555                1560

Phe Thr  Pro Ser Tyr Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu
    1565                1570                1575

Gly Leu  Val Ser Leu Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe
    1580                1585                1590

Gly Met  Met Val Ser Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr
    1595                1600                1605

Tyr Phe  Lys Pro Pro Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr
    1610                1615                1620

Val Gly  Asp Asp Lys Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala
    1625                1630                1635

Ala Ser  Ile Gly Glu Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe
    1640                1645                1650

Asn Gln  Ser Gly Val Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp
    1655                1660                1665

Gly Phe  Lys Tyr Phe Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu
    1670                1675                1680

Glu Gly  Glu Ala Ile Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu
    1685                1690                1695

Asn Ile  Tyr Tyr Phe Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp
    1700                1705                1710

Lys Glu  Leu Asp Gly Glu Met  His Tyr Phe Ser Pro  Glu Thr Gly
    1715                1720                1725

Lys Ala  Phe Lys Gly Leu Asn  Gln Ile Gly Asp Tyr  Lys Tyr Tyr
    1730                1735                1740

Phe Asn  Ser Asp Gly Val Met  Gln Lys Gly Phe Val  Ser Ile Asn
    1745                1750                1755

Asp Asn  Lys His Tyr Phe Asp  Asp Ser Gly Val Met  Lys Val Gly
    1760                1765                1770

Tyr Thr  Glu Ile Asp Gly Lys  His Phe Tyr Phe Ala  Glu Asn Gly
    1775                1780                1785

Glu Met  Gln Ile Gly Val Phe  Asn Thr Glu Asp Gly  Phe Lys Tyr
    1790                1795                1800
```

```
Phe Ala  His His Asn Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Glu
    1805                 1810                 1815

Ile Ser  Tyr Ser Gly Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr
    1820                 1825                 1830

Phe Asp  Asp Ser Phe Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu
    1835                 1840                 1845

Asp Gly  Ser Lys Tyr Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr
    1850                 1855                 1860

Ile Gly  Leu Ser Leu Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp
    1865                 1870                 1875

Asp Gly  Ile Met Gln Val Gly  Phe Val Thr Ile Asn  Asp Lys Val
    1880                 1885                 1890

Phe Tyr  Phe Ser Asp Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn
    1895                 1900                 1905

Ile Asp  Asp Asn Tyr Phe Tyr  Ile Asp Asp Asn Gly  Ile Val Gln
    1910                 1915                 1920

Ile Gly  Val Phe Asp Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro
    1925                 1930                 1935

Ala Asn  Thr Val Asn Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr
    1940                 1945                 1950

Ser Gly  Leu Val Arg Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu
    1955                 1960                 1965

Thr Tyr  Thr Ile Glu Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu
    1970                 1975                 1980

Ser Asp  Lys Tyr Tyr Phe Asn  Pro Glu Thr Lys Lys  Ala Cys Lys
    1985                 1990                 1995

Gly Ile  Asn Leu Ile Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Lys
    2000                 2005                 2010

Gly Ile  Met Arg Thr Gly Leu  Ile Ser Phe Glu Asn  Asn Asn Tyr
    2015                 2020                 2025

Tyr Phe  Asn Glu Asn Gly Glu  Met Gln Phe Gly Tyr  Ile Asn Ile
    2030                 2035                 2040

Glu Asp  Lys Met Phe Tyr Phe  Gly Glu Asp Gly Val  Met Gln Ile
    2045                 2050                 2055
```

Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln
2060 2065 2070

Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr
2075 2080 2085

Gly Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu
2090 2095 2100

Tyr Ile Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr
2105 2110 2115

Tyr Phe Asp Pro Asp Thr Ala Gln Leu Val Ile Ser Glu
2120 2125 2130

<210> 25
<211> 1743
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 25

His His His His His His Ser His Met Ala Ser Asp Lys Ile Ile His
1 5 10 15

Leu Thr Asp Asp Ser Phe Asp Thr Asp Val Leu Lys Ala Asp Gly Ala
20 25 30

Ile Leu Val Asp Phe Trp Ala Glu Trp Cys Gly Pro Cys Lys Met Ile
35 40 45

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

Val Ala Lys Leu Asn Ile Asp Gln Asn Pro Gly Thr Ala Pro Lys Tyr
65 70 75 80

Gly Ile Arg Gly Ile Pro Thr Leu Leu Leu Phe Lys Asn Gly Glu Val
85 90 95

Ala Ala Thr Lys Val Gly Ala Leu Ser Lys Gly Gln Leu Lys Glu Phe
100 105 110

Leu Asp Ala Asn Leu Ala Arg Ala Leu Val Pro Arg Gly Ser Val Thr
115 120 125

Ser Leu Tyr Lys Lys Ala Gly Ser Ala Ala Ala Pro Phe Thr Met Ser
130 135 140

Ile Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys

145 150 155 160

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

Leu Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu
180 185 190

Glu Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn
195 200 205

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

Thr Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu
225 230 235 240

Ser Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu
245 250 255

Asp Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly
260 265 270

Phe Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val
275 280 285

Glu Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu
290 295 300

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

Leu Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu
325 330 335

Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys
340 345 350

Glu Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala
355 360 365

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

Val Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro
385 390 395 400

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

Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro Leu

```
            420                 425                 430

Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val Asn Leu
        435                 440                 445

Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly Ile Ala Ser
    450                 455                 460

Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile Ser Ala Gly Ile
465                 470                 475                 480

Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg Asp Lys Ala Thr Lys
                485                 490                 495

Val Val Asp Tyr Phe Lys His Val Ser Leu Val Glu Thr Glu Gly Val
            500                 505                 510

Phe Thr Leu Leu Asp Asp Lys Ile Met Met Pro Gln Asp Asp Leu Val
        515                 520                 525

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

Glu Ile Trp Arg Met Glu Gly Gly Ser Gly His Thr Val Thr Asp Asp
545                 550                 555                 560

Ile Asp His Phe Phe Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His
                565                 570                 575

Leu Ser Ile Tyr Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu
            580                 585                 590

Ser Lys Asp Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala
        595                 600                 605

Trp Glu Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
    610                 615                 620

Thr Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr
625                 630                 635                 640

Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys
                645                 650                 655

Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn Thr
            660                 665                 670

Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg Glu Lys
        675                 680                 685

Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala Leu Ser Leu
```

690 695 700

Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser Glu Ser Asp Val
705 710 715 720

Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp Val Thr Ile Glu Ser
725 730 735

Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu Gly Ile Leu Ser Thr Leu
740 745 750

Ser Ile Glu Glu Asn Lys Ile Ile Leu Asn Ser His Glu Ile Asn Phe
755 760 765

Ser Gly Glu Val Asn Gly Ser Asn Gly Phe Val Ser Leu Thr Phe Ser
770 775 780

Ile Leu Glu Gly Ile Asn Ala Ile Ile Glu Val Asp Leu Leu Ser Lys
785 790 795 800

Ser Tyr Lys Leu Leu Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn
805 810 815

Ser Asn His Ile Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu
820 825 830

Leu Gln Lys Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu
835 840 845

Asn Gly Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu
850 855 860

Leu Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys
865 870 875 880

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

Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp Asp
900 905 910

Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr Ile Lys
915 920 925

Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu Ile Leu Lys
930 935 940

Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp Ser Leu Met Ser
945 950 955 960

Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe Val Asn Phe Leu Gln

965 970 975

Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn Phe Ile Ile Ser Gly Thr
980 985 990

Thr Ser Ile Gly Gln Phe Glu Phe Ile Cys Asp Glu Asn Asp Asn Ile
995 1000 1005

Gln Pro Tyr Phe Ile Lys Phe Asn Thr Leu Glu Thr Asn Tyr Thr
1010 1015 1020

Leu Tyr Val Gly Asn Arg Gln Asn Met Ile Val Glu Pro Asn Tyr
1025 1030 1035

Asp Leu Asp Asp Ser Gly Asp Ile Ser Ser Thr Val Ile Asn Phe
1040 1045 1050

Ser Gln Lys Tyr Leu Tyr Gly Ile Asp Ser Cys Val Asn Lys Val
1055 1060 1065

Val Ile Ser Pro Asn Ile Tyr Thr Asp Glu Ile Asn Ile Thr Pro
1070 1075 1080

Val Tyr Glu Thr Asn Asn Thr Tyr Pro Glu Val Ile Val Leu Asp
1085 1090 1095

Ala Asn Tyr Ile Asn Glu Lys Ile Asn Val Asn Ile Asn Asp Leu
1100 1105 1110

Ser Ile Arg Tyr Val Trp Ser Asn Asp Gly Asn Asp Phe Ile Leu
1115 1120 1125

Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys Ile Arg
1130 1135 1140

Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu Ser
1145 1150 1155

Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
1160 1165 1170

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr
1175 1180 1185

Asp Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn
1190 1195 1200

Asn Phe Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser
1205 1210 1215

Leu Tyr Tyr Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe

1220 1225 1230

Val Thr Val Gly Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly
1235 1240 1245

Gly Ala Ala Ser Ile Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr
1250 1255 1260

Tyr Phe Asn Gln Ser Gly Val Leu Gln Thr Gly Val Phe Ser Thr
1265 1270 1275

Glu Asp Gly Phe Lys Tyr Phe Ala Pro Ala Asn Thr Leu Asp Glu
1280 1285 1290

Asn Leu Glu Gly Glu Ala Ile Asp Phe Thr Gly Lys Leu Ile Ile
1295 1300 1305

Asp Glu Asn Ile Tyr Tyr Phe Asp Asp Asn Tyr Arg Gly Ala Val
1310 1315 1320

Glu Trp Lys Glu Leu Asp Gly Glu Met His Tyr Phe Ser Pro Glu
1325 1330 1335

Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile Gly Asp Tyr Lys
1340 1345 1350

Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly Phe Val Ser
1355 1360 1365

Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val Met Lys
1370 1375 1380

Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala Glu
1385 1390 1395

Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe
1400 1405 1410

Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly
1415 1420 1425

Glu Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile
1430 1435 1440

Tyr Tyr Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp
1445 1450 1455

Leu Glu Asp Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu
1460 1465 1470

Ala Tyr Ile Gly Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe

1475 1480 1485

Asn Asp Asp Gly Ile Met Gln Val Gly Phe Val Thr Ile Asn Asp
1490 1495 1500

Lys Val Phe Tyr Phe Ser Asp Ser Gly Ile Ile Glu Ser Gly Val
1505 1510 1515

Gln Asn Ile Asp Asp Asn Tyr Phe Tyr Ile Asp Asp Asn Gly Ile
1520 1525 1530

Val Gln Ile Gly Val Phe Asp Thr Ser Asp Gly Tyr Lys Tyr Phe
1535 1540 1545

Ala Pro Ala Asn Thr Val Asn Asp Asn Ile Tyr Gly Gln Ala Val
1550 1555 1560

Glu Tyr Ser Gly Leu Val Arg Val Gly Glu Asp Val Tyr Tyr Phe
1565 1570 1575

Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile Tyr Asp Met Glu
1580 1585 1590

Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr Lys Lys Ala
1595 1600 1605

Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr Phe Asp
1610 1615 1620

Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn Asn
1625 1630 1635

Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
1640 1645 1650

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met
1655 1660 1665

Gln Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala
1670 1675 1680

His Gln Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn
1685 1690 1695

Tyr Thr Gly Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr
1700 1705 1710

Asp Glu Tyr Ile Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu
1715 1720 1725

Glu Tyr Tyr Phe Asp Pro Asp Thr Ala Gln Leu Val Ile Ser Glu

1730 1735 1740

<210> 26
<211> 1751
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 26

His His His His His His Ser His Met Ala Ser Asn Lys Glu Ile Leu
1 5 10 15

Ala Val Val Glu Ala Val Ser Asn Glu Lys Ala Leu Pro Arg Glu Lys
20 25 30

Ile Phe Glu Ala Leu Glu Ser Ala Leu Ala Thr Ala Thr Lys Lys Lys
35 40 45

Tyr Glu Gln Glu Ile Asp Val Arg Val Gln Ile Asp Arg Lys Ser Gly
50 55 60

Asp Phe Asp Thr Phe Arg Arg Trp Leu Val Val Asp Glu Val Thr Gln
65 70 75 80

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

Leu Asn Leu Gly Asp Tyr Val Glu Asp Gln Ile Glu Ser Val Thr Phe
100 105 110

Asp Arg Ile Thr Thr Gln Thr Ala Lys Gln Val Ile Val Gln Lys Val
115 120 125

Arg Glu Ala Glu Arg Ala Met Val Val Asp Gln Phe Arg Glu His Glu
130 135 140

Gly Glu Ile Ile Thr Gly Val Val Lys Lys Val Asn Arg Asp Asn Ile
145 150 155 160

Ser Leu Asp Leu Gly Asn Asn Ala Glu Ala Val Ile Leu Arg Glu Asp
165 170 175

Met Leu Pro Arg Glu Asn Phe Arg Pro Gly Asp Arg Val Arg Gly Val
180 185 190

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

Arg Ser Lys Pro Glu Met Leu Ile Glu Leu Phe Arg Ile Glu Val Pro
210 215 220

```
Glu Ile Gly Glu Glu Val Ile Glu Ile Lys Ala Ala Ala Arg Asp Pro
225                 230                 235                 240

Gly Ser Arg Ala Lys Ile Ala Val Lys Thr Asn Asp Lys Arg Ile Asp
                245                 250                 255

Pro Val Gly Ala Cys Val Gly Met Arg Gly Ala Arg Val Gln Ala Val
            260                 265                 270

Ser Thr Glu Leu Gly Gly Glu Arg Ile Asp Ile Val Leu Trp Asp Asp
        275                 280                 285

Asn Pro Ala Gln Phe Val Ile Asn Ala Met Ala Pro Ala Asp Val Ala
    290                 295                 300

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

Ala Gly Asn Leu Ala Gln Ala Ile Gly Arg Asn Gly Gln Asn Val Arg
                325                 330                 335

Leu Ala Ser Gln Leu Ser Gly Trp Glu Leu Asn Val Met Thr Val Asp
            340                 345                 350

Asp Leu Gln Ala Lys His Gln Ala Glu Ala His Ala Ala Ile Asp Thr
        355                 360                 365

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

Glu Glu Gly Phe Ser Thr Leu Glu Glu Leu Ala Tyr Val Pro Met Lys
385                 390                 395                 400

Glu Leu Leu Glu Ile Glu Gly Leu Asp Glu Pro Thr Val Glu Ala Leu
                405                 410                 415

Arg Glu Arg Ala Lys Asn Ala Leu Ala Thr Ile Ala Gln Ala Gln Glu
            420                 425                 430

Glu Ser Leu Gly Asp Asn Lys Pro Ala Asp Asp Leu Leu Asn Leu Glu
        435                 440                 445

Gly Val Asp Arg Asp Leu Ala Phe Lys Leu Ala Ala Arg Gly Val Cys
    450                 455                 460

Thr Leu Glu Asp Leu Ala Glu Gln Gly Ile Asp Asp Leu Ala Asp Ile
465                 470                 475                 480

Glu Gly Leu Thr Asp Glu Lys Ala Gly Ala Leu Ile Met Ala Ala Arg
                485                 490                 495
```

```
Asn Ile Cys Trp Phe Gly Asp Glu Ala Ser Gly Ala Leu Val Pro Arg
            500                 505                 510

Gly Ser Val Thr Ser Leu Tyr Lys Lys Ala Gly Ser Ala Ala Gly Gly
        515                 520                 525

Ser Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
    530                 535                 540

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly Gly
545                 550                 555                 560

Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser Ala Pro
                565                 570                 575

Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp Val Leu Glu
            580                 585                 590

Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu Met Val Leu Pro
        595                 600                 605

Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr Gly Trp Thr Pro Gly
    610                 615                 620

Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys Leu Leu Asp Arg Ile Arg
625                 630                 635                 640

Asp Asn Tyr Glu Gly Glu Phe Tyr Trp Arg Tyr Phe Ala Phe Ile Ala
                645                 650                 655

Asp Ala Leu Ile Thr Thr Leu Lys Pro Arg Tyr Glu Asp Thr Asn Ile
            660                 665                 670

Arg Ile Asn Leu Asp Ser Asn Thr Arg Ser Phe Ile Val Pro Ile Ile
        675                 680                 685

Thr Thr Glu Tyr Ile Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser
    690                 695                 700

Gly Gly Thr Tyr Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn
705                 710                 715                 720

Ile Glu Leu Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val
                725                 730                 735

Val Arg Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu
            740                 745                 750

Ile Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile
        755                 760                 765
```

```
Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
    770                 775                 780

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala Ile
785                 790                 795                 800

Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile Ser Gly
                805                 810                 815

Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln Gln Lys Ile
            820                 825                 830

Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn Ile Pro Tyr Ser
        835                 840                 845

Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe Ile Asn Gly Ser Thr
    850                 855                 860

Lys Glu Gly Leu Phe Val Ser Glu Leu Pro Asp Val Val Leu Ile Ser
865                 870                 875                 880

Lys Val Tyr Met Asp Asp Ser Lys Pro Ser Phe Gly Tyr Tyr Ser Asn
                885                 890                 895

Asn Leu Lys Asp Val Lys Val Ile Thr Lys Asp Asn Val Asn Ile Leu
            900                 905                 910

Thr Gly Tyr Tyr Leu Lys Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr
        915                 920                 925

Leu Gln Asp Glu Lys Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu
    930                 935                 940

Ser Gly Val Ala Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr
945                 950                 955                 960

Asn Thr Ser Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys
                965                 970                 975

Ser Ile Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp
            980                 985                 990

Ala Asn Phe Ile Ile Ser Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe
        995                 1000                1005

Ile Cys  Asp Glu Asn Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe
    1010                1015                1020

Asn Thr  Leu Glu Thr Asn Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln
    1025                1030                1035
```

```
Asn Met  Ile Val Glu Pro Asn  Tyr Asp Leu Asp Asp  Ser Gly Asp
    1040                1045                1050

Ile Ser  Ser Thr Val Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly
    1055                1060                1065

Ile Asp  Ser Cys Val Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr
    1070                1075                1080

Thr Asp  Glu Ile Asn Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Thr
    1085                1090                1095

Tyr Pro  Glu Val Ile Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys
    1100                1105                1110

Ile Asn  Val Asn Ile Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser
    1115                1120                1125

Asn Asp  Gly Asn Asp Phe Ile  Leu Met Ser Thr Ser  Glu Glu Asn
    1130                1135                1140

Lys Val  Ser Gln Val Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp
    1145                1150                1155

Lys Thr  Leu Ala Asn Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln
    1160                1165                1170

Asp Val  Pro Val Ser Glu Ile  Ile Leu Ser Phe Thr  Pro Ser Tyr
    1175                1180                1185

Tyr Glu  Asp Gly Leu Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu
    1190                1195                1200

Tyr Asn  Glu Lys Phe Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser
    1205                1210                1215

Gly Leu  Ile Tyr Ile Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro
    1220                1225                1230

Val Asn  Asn Leu Ile Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys
    1235                1240                1245

Tyr Tyr  Phe Asn Pro Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu
    1250                1255                1260

Thr Ile  Ile Asp Asp Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val
    1265                1270                1275

Leu Gln  Thr Gly Val Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1280                1285                1290
```

```
Ala Pro  Ala Asn Thr Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile
    1295                 1300                 1305

Asp Phe  Thr Gly Lys Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe
    1310                 1315                 1320

Asp Asp  Asn Tyr Arg Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly
    1325                 1330                 1335

Glu Met  His Tyr Phe Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly
    1340                 1345                 1350

Leu Asn  Gln Ile Gly Asp Tyr  Lys Tyr Tyr Phe Asn  Ser Asp Gly
    1355                 1360                 1365

Val Met  Gln Lys Gly Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr
    1370                 1375                 1380

Phe Asp  Asp Ser Gly Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp
    1385                 1390                 1395

Gly Lys  His Phe Tyr Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly
    1400                 1405                 1410

Val Phe  Asn Thr Glu Asp Gly  Phe Lys Tyr Phe Ala  His His Asn
    1415                 1420                 1425

Glu Asp  Leu Gly Asn Glu Glu  Gly Glu Glu Ile Ser  Tyr Ser Gly
    1430                 1435                 1440

Ile Leu  Asn Phe Asn Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe
    1445                 1450                 1455

Thr Ala  Val Val Gly Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr
    1460                 1465                 1470

Tyr Phe  Asp Glu Asp Thr Ala  Glu Ala Tyr Ile Gly  Leu Ser Leu
    1475                 1480                 1485

Ile Asn  Asp Gly Gln Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln
    1490                 1495                 1500

Val Gly  Phe Val Thr Ile Asn  Asp Lys Val Phe Tyr  Phe Ser Asp
    1505                 1510                 1515

Ser Gly  Ile Ile Glu Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr
    1520                 1525                 1530

Phe Tyr  Ile Asp Asp Asn Gly  Ile Val Gln Ile Gly  Val Phe Asp
    1535                 1540                 1545
```

```
Thr Ser  Asp Gly Tyr Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn
    1550                1555                1560

Asp Asn  Ile Tyr Gly Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg
    1565                1570                1575

Val Gly  Glu Asp Val Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu
    1580                1585                1590

Thr Gly  Trp Ile Tyr Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr
    1595                1600                1605

Phe Asn  Pro Glu Thr Lys Lys  Ala Cys Lys Gly Ile  Asn Leu Ile
    1610                1615                1620

Asp Asp  Ile Lys Tyr Tyr Phe  Asp Glu Lys Gly Ile  Met Arg Thr
    1625                1630                1635

Gly Leu  Ile Ser Phe Glu Asn  Asn Asn Tyr Tyr Phe  Asn Glu Asn
    1640                1645                1650

Gly Glu  Met Gln Phe Gly Tyr  Ile Asn Ile Glu Asp  Lys Met Phe
    1655                1660                1665

Tyr Phe  Gly Glu Asp Gly Val  Met Gln Ile Gly Val  Phe Asn Thr
    1670                1675                1680

Pro Asp  Gly Phe Lys Tyr Phe  Ala His Gln Asn Thr  Leu Asp Glu
    1685                1690                1695

Asn Phe  Glu Gly Glu Ser Ile  Asn Tyr Thr Gly Trp  Leu Asp Leu
    1700                1705                1710

Asp Glu  Lys Arg Tyr Tyr Phe  Thr Asp Glu Tyr Ile  Ala Ala Thr
    1715                1720                1725

Gly Ser  Val Ile Ile Asp Gly  Glu Glu Tyr Tyr Phe  Asp Pro Asp
    1730                1735                1740

Thr Ala  Gln Leu Val Ile Ser  Glu
    1745                1750
```

<210> 27
<211> 1363
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 27

```
His His His His His His Ser His Met Ala Ser Asp Lys Ile Ile His
```

1 5 10 15

Leu Thr Asp Asp Ser Phe Asp Thr Asp Val Leu Lys Ala Asp Gly Ala
20 25 30

Ile Leu Val Asp Phe Trp Ala Glu Trp Cys Gly Pro Cys Lys Met Ile
35 40 45

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

Val Ala Lys Leu Asn Ile Asp Gln Asn Pro Gly Thr Ala Pro Lys Tyr
65 70 75 80

Gly Ile Arg Gly Ile Pro Thr Leu Leu Leu Phe Lys Asn Gly Glu Val
85 90 95

Ala Ala Thr Lys Val Gly Ala Leu Ser Lys Gly Gln Leu Lys Glu Phe
100 105 110

Leu Asp Ala Asn Leu Ala Arg Ala Leu Val Pro Arg Gly Ser Val Thr
115 120 125

Ser Leu Tyr Lys Lys Ala Gly Ser Ala Ala Gly Gly Ser Met Pro Gln
130 135 140

Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Val
145 150 155 160

Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly Gly Ser Gly His Thr
165 170 175

Val Thr Asp Asp Ile Asp His Phe Phe Ser Ala Pro Ser Ile Thr Tyr
180 185 190

Arg Glu Pro His Leu Ser Ile Tyr Asp Val Leu Glu Val Gln Lys Glu
195 200 205

Glu Leu Asp Leu Ser Lys Asp Leu Met Val Leu Pro Asn Ala Pro Asn
210 215 220

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

Glu Asn Asp Gly Thr Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu
245 250 255

Gly Glu Phe Tyr Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile
260 265 270

Thr Thr Leu Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu

```
        275                 280                 285

Asp Ser Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr
    290                 295                 300

Ile Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
305                 310                 315                 320

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
                325                 330                 335

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp Val
            340                 345                 350

Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu Gly Ile
        355                 360                 365

Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu Asn Ser His
    370                 375                 380

Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn Gly Phe Val Ser
385                 390                 395                 400

Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala Ile Ile Glu Val Asp
                405                 410                 415

Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile Ser Gly Glu Leu Lys Ile
            420                 425                 430

Leu Met Leu Asn Ser Asn His Ile Gln Gln Lys Ile Asp Tyr Ile Gly
        435                 440                 445

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

Glu Gly Lys Glu Asn Gly Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu
465                 470                 475                 480

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

Asp Asp Ser Lys Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp
            500                 505                 510

Val Lys Val Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr
        515                 520                 525

Leu Lys Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu
    530                 535                 540

Lys Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
```

545 550 555 560

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
565 570 575

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe Val
580 585 590

Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn Phe Ile
595 600 605

Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile Cys Asp Glu
610 615 620

Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn Thr Leu Glu Thr
625 630 635 640

Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn Met Ile Val Glu Pro
645 650 655

Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile Ser Ser Thr Val Ile Asn
660 665 670

Phe Ser Gln Lys Tyr Leu Tyr Gly Ile Asp Ser Cys Val Asn Lys Val
675 680 685

Val Ile Ser Pro Asn Ile Tyr Thr Asp Glu Ile Asn Ile Thr Pro Val
690 695 700

Tyr Glu Thr Asn Asn Thr Tyr Pro Glu Val Ile Val Leu Asp Ala Asn
705 710 715 720

Tyr Ile Asn Glu Lys Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg
725 730 735

Tyr Val Trp Ser Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser
740 745 750

Glu Glu Asn Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe
755 760 765

Lys Asp Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys
770 775 780

Gln Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
785 790 795 800

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
805 810 815

Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly Leu

820 825 830

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

Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr Tyr Phe Asn
850 855 860

Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr Ile Ile Asp Asp
865 870 875 880

Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu Gln Thr Gly Val Phe
885 890 895

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

Glu Asn Leu Glu Gly Glu Ala Ile Asp Phe Thr Gly Lys Leu Ile Ile
915 920 925

Asp Glu Asn Ile Tyr Tyr Phe Asp Asp Asn Tyr Arg Gly Ala Val Glu
930 935 940

Trp Lys Glu Leu Asp Gly Glu Met His Tyr Phe Ser Pro Glu Thr Gly
945 950 955 960

Lys Ala Phe Lys Gly Leu Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe
965 970 975

Asn Ser Asp Gly Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn
980 985 990

Lys His Tyr Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu
995 1000 1005

Ile Asp Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln
1010 1015 1020

Ile Gly Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His
1025 1030 1035

His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr
1040 1045 1050

Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp
1055 1060 1065

Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser
1070 1075 1080

Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu

1085 1090 1095

Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile
1100 1105 1110

Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe
1115 1120 1125

Ser Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp
1130 1135 1140

Asn Tyr Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val
1145 1150 1155

Phe Asp Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr
1160 1165 1170

Val Asn Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu
1175 1180 1185

Val Arg Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr
1190 1195 1200

Ile Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys
1205 1210 1215

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

Leu Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met
1235 1240 1245

Arg Thr Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn
1250 1255 1260

Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys
1265 1270 1275

Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe
1280 1285 1290

Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu
1295 1300 1305

Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu
1310 1315 1320

Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala
1325 1330 1335

Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp

1340 1345 1350

Pro Asp Thr Ala Gln Leu Val Ile Ser Glu
1355 1360

<210> 28
<211> 2504
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 28

His His His His His His His His His Gly Gly Ser Gly Gly Ser Gly
1 5 10 15

Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly
20 25 30

Ser Gly Gly Ser Gly Gly Ser His Met Ala Ser Asn Lys Glu Ile Leu
35 40 45

Ala Val Val Glu Ala Val Ser Asn Glu Lys Ala Leu Pro Arg Glu Lys
50 55 60

Ile Phe Glu Ala Leu Glu Ser Ala Leu Ala Thr Ala Thr Lys Lys Lys
65 70 75 80

Tyr Glu Gln Glu Ile Asp Val Arg Val Gln Ile Asp Arg Lys Ser Gly
85 90 95

Asp Phe Asp Thr Phe Arg Arg Trp Leu Val Val Asp Glu Val Thr Gln
100 105 110

Pro Thr Lys Glu Ile Thr Leu Glu Ala Ala Arg Tyr Glu Asp Glu Ser
115 120 125

Leu Asn Leu Gly Asp Tyr Val Glu Asp Gln Ile Glu Ser Val Thr Phe
130 135 140

Asp Arg Ile Thr Thr Gln Thr Ala Lys Gln Val Ile Val Gln Lys Val
145 150 155 160

Arg Glu Ala Glu Arg Ala Met Val Val Asp Gln Phe Arg Glu His Glu
165 170 175

Gly Glu Ile Ile Thr Gly Val Val Lys Lys Val Asn Arg Asp Asn Ile
180 185 190

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

```
Met Leu Pro Arg Glu Asn Phe Arg Pro Gly Asp Arg Val Arg Gly Val
    210                 215                 220

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

Arg Ser Lys Pro Glu Met Leu Ile Glu Leu Phe Arg Ile Glu Val Pro
                245                 250                 255

Glu Ile Gly Glu Glu Val Ile Glu Ile Lys Ala Ala Ala Arg Asp Pro
            260                 265                 270

Gly Ser Arg Ala Lys Ile Ala Val Lys Thr Asn Asp Lys Arg Ile Asp
        275                 280                 285

Pro Val Gly Ala Cys Val Gly Met Arg Gly Ala Arg Val Gln Ala Val
    290                 295                 300

Ser Thr Glu Leu Gly Gly Glu Arg Ile Asp Ile Val Leu Trp Asp Asp
305                 310                 315                 320

Asn Pro Ala Gln Phe Val Ile Asn Ala Met Ala Pro Ala Asp Val Ala
                325                 330                 335

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

Ala Gly Asn Leu Ala Gln Ala Ile Gly Arg Asn Gly Gln Asn Val Arg
        355                 360                 365

Leu Ala Ser Gln Leu Ser Gly Trp Glu Leu Asn Val Met Thr Val Asp
    370                 375                 380

Asp Leu Gln Ala Lys His Gln Ala Glu Ala His Ala Ala Ile Asp Thr
385                 390                 395                 400

Phe Thr Lys Tyr Leu Asp Ile Asp Glu Asp Phe Ala Thr Val Leu Val
                405                 410                 415

Glu Glu Gly Phe Ser Thr Leu Glu Glu Leu Ala Tyr Val Pro Met Lys
            420                 425                 430

Glu Leu Leu Glu Ile Glu Gly Leu Asp Glu Pro Thr Val Glu Ala Leu
        435                 440                 445

Arg Glu Arg Ala Lys Asn Ala Leu Ala Thr Ile Ala Gln Ala Gln Glu
    450                 455                 460

Glu Ser Leu Gly Asp Asn Lys Pro Ala Asp Asp Leu Leu Asn Leu Glu
465                 470                 475                 480
```

```
Gly Val Asp Arg Asp Leu Ala Phe Lys Leu Ala Ala Arg Gly Val Cys
                485                 490                 495

Thr Leu Glu Asp Leu Ala Glu Gln Gly Ile Asp Asp Leu Ala Asp Ile
            500                 505                 510

Glu Gly Leu Thr Asp Glu Lys Ala Gly Ala Leu Ile Met Ala Ala Arg
        515                 520                 525

Asn Ile Cys Trp Phe Gly Asp Glu Ala Ser Gly Ala Leu Val Pro Arg
    530                 535                 540

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

Phe Thr Met Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe
                565                 570                 575

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

Leu Ala Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser
        595                 600                 605

Val Ser Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile
    610                 615                 620

Glu Ser Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val
625                 630                 635                 640

Lys Asn Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn
                645                 650                 655

Leu Leu Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn
            660                 665                 670

Asn Leu Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn
        675                 680                 685

Asn Ser Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser
    690                 695                 700

Val Tyr Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His
705                 710                 715                 720

Ile Thr Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val
                725                 730                 735

Asn Gly Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val
            740                 745                 750
```

```
Asn Thr Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser
        755                 760                 765

Ser Asn Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln
    770                 775                 780

Leu Tyr Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser
785                 790                 795                 800

Ile Gln Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn
                805                 810                 815

Val Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
            820                 825                 830

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
        835                 840                 845

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu Ala
    850                 855                 860

Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile Val Gly
865                 870                 875                 880

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

Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile Leu His Asp Lys
            900                 905                 910

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

Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys Ile Leu Val Pro Ile Asp
    930                 935                 940

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

Gly Thr Cys Asn Ile Leu Ala Met Glu Gly Gly Ser Gly His Thr Val
                965                 970                 975

Thr Gly Asn Ile Asp His Phe Phe Ser Ser Pro Ser Ile Ser Ser His
            980                 985                 990

Ile Pro Ser Leu Ser Ile Tyr Ser  Ala Ile Gly Ile Glu  Thr Glu Asn
        995                 1000                1005

Leu Asp  Phe Ser Lys Lys Ile  Met Met Leu Pro Asn  Ala Pro Ser
    1010                1015                1020
```

```
Arg Val  Phe Trp Trp Glu Thr  Gly Ala Val Pro Gly  Leu Arg Ser
    1025                1030                1035

Leu Glu  Asn Asp Gly Thr Arg  Leu Leu Asp Ser Ile  Arg Asp Leu
    1040                1045                1050

Tyr Pro  Gly Lys Phe Tyr Trp  Arg Phe Tyr Ala Phe  Phe Asp Tyr
    1055                1060                1065

Ala Ile  Thr Thr Leu Lys Pro  Val Tyr Glu Asp Thr  Asn Ile Lys
    1070                1075                1080

Ile Lys  Leu Asp Lys Asp Thr  Arg Asn Phe Ile Met  Pro Thr Ile
    1085                1090                1095

Thr Thr  Asn Glu Ile Arg Asn  Lys Leu Ser Tyr Ser  Phe Asp Gly
    1100                1105                1110

Ala Gly  Gly Thr Tyr Ser Leu  Leu Leu Ser Ser Tyr  Pro Ile Ser
    1115                1120                1125

Thr Asn  Ile Asn Leu Ser Lys  Asp Asp Leu Trp Ile  Phe Asn Ile
    1130                1135                1140

Asp Asn  Glu Val Arg Glu Ile  Ser Ile Glu Asn Gly  Thr Ile Lys
    1145                1150                1155

Lys Gly  Lys Leu Ile Lys Asp  Val Leu Ser Lys Ile  Asp Ile Asn
    1160                1165                1170

Lys Asn  Lys Leu Ile Ile Gly  Asn Gln Thr Ile Asp  Phe Ser Gly
    1175                1180                1185

Asp Ile  Asp Asn Lys Asp Arg  Tyr Ile Phe Leu Thr  Cys Glu Leu
    1190                1195                1200

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

Ser Tyr  Ser Leu Leu Leu Ser  Gly Asp Lys Asn Tyr  Leu Ile Ser
    1220                1225                1230

Asn Leu  Ser Asn Ile Ile Glu  Lys Ile Asn Thr Leu  Gly Leu Asp
    1235                1240                1245

Ser Lys  Asn Ile Ala Tyr Asn  Tyr Thr Asp Glu Ser  Asn Asn Lys
    1250                1255                1260

Tyr Phe  Gly Ala Ile Ser Lys  Thr Ser Gln Lys Ser  Ile Ile His
    1265                1270                1275
```

```
Tyr Lys  Lys Asp Ser Lys Asn  Ile Leu Glu Phe Tyr  Asn Asp Ser
    1280                 1285                 1290

Thr Leu  Glu Phe Asn Ser Lys  Asp Phe Ile Ala Glu  Asp Ile Asn
    1295                 1300                 1305

Val Phe  Met Lys Asp Asp Ile  Asn Thr Ile Thr Gly  Lys Tyr Tyr
    1310                 1315                 1320

Val Asp  Asn Asn Thr Asp Lys  Ser Ile Asp Phe Ser  Ile Ser Leu
    1325                 1330                 1335

Val Ser  Lys Asn Gln Val Lys  Val Asn Gly Leu Tyr  Leu Asn Glu
    1340                 1345                 1350

Ser Val  Tyr Ser Ser Tyr Leu  Asp Phe Val Lys Asn  Ser Asp Gly
    1355                 1360                 1365

His His  Asn Thr Ser Asn Phe  Met Asn Leu Phe Leu  Asp Asn Ile
    1370                 1375                 1380

Ser Phe  Trp Lys Leu Phe Gly  Phe Glu Asn Ile Asn  Phe Val Ile
    1385                 1390                 1395

Asp Lys  Tyr Phe Thr Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val
    1400                 1405                 1410

Glu Phe  Ile Cys Asp Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly
    1415                 1420                 1425

Glu Trp  Lys Thr Ser Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn
    1430                 1435                 1440

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

Glu Asp  Ile Ser Thr Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr
    1460                 1465                 1470

Gly Ile  Asp Arg Tyr Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu
    1475                 1480                 1485

Tyr Thr  Ser Leu Ile Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu
    1490                 1495                 1500

Tyr Tyr  Pro Glu Ile Ile Val  Leu Asn Pro Asn Thr  Phe His Lys
    1505                 1510                 1515

Lys Val  Asn Ile Asn Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp
    1520                 1525                 1530
```

```
Ser Thr  Glu Gly Ser Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu
    1535                1540                1545

Ser Asn  Lys Lys Ile Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu
    1550                1555                1560

Ser Asn  Thr Gln Ser Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp
    1565                1570                1575

Ile Lys  Lys Leu Ser Leu Gly  Tyr Ile Met Ser Asn  Phe Lys Ser
    1580                1585                1590

Phe Asn  Ser Glu Asn Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys
    1595                1600                1605

Ile Ile  Asp Asn Lys Thr Tyr  Tyr Tyr Asp Glu Asp  Ser Lys Leu
    1610                1615                1620

Val Lys  Gly Leu Ile Asn Ile  Asn Asn Ser Leu Phe  Tyr Phe Asp
    1625                1630                1635

Pro Ile  Glu Phe Asn Leu Val  Thr Gly Trp Gln Thr  Ile Asn Gly
    1640                1645                1650

Lys Lys  Tyr Tyr Phe Asp Ile  Asn Thr Gly Ala Ala  Leu Ile Ser
    1655                1660                1665

Tyr Lys  Ile Ile Asn Gly Lys  His Phe Tyr Phe Asn  Asn Asp Gly
    1670                1675                1680

Val Met  Gln Leu Gly Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr
    1685                1690                1695

Phe Ala  Pro Ala Asn Thr Gln  Asn Asn Asn Ile Glu  Gly Gln Ala
    1700                1705                1710

Ile Val  Tyr Gln Ser Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr
    1715                1720                1725

Tyr Phe  Asp Asn Asp Ser Lys  Ala Val Thr Gly Trp  Arg Ile Ile
    1730                1735                1740

Asn Asn  Glu Lys Tyr Tyr Phe  Asn Pro Asn Asn Ala  Ile Ala Ala
    1745                1750                1755

Val Gly  Leu Gln Val Ile Asp  Asn Asn Lys Tyr Tyr  Phe Asn Pro
    1760                1765                1770

Asp Thr  Ala Ile Ile Ser Lys  Gly Trp Gln Thr Val  Asn Gly Ser
    1775                1780                1785
```

```
Arg Tyr  Tyr Phe Asp Thr Asp  Thr Ala Ile Ala Phe  Asn Gly Tyr
    1790                 1795                 1800

Lys Thr  Ile Asp Gly Lys His  Phe Tyr Phe Asp Ser  Asp Cys Val
    1805                 1810                 1815

Val Lys  Ile Gly Val Phe Ser  Thr Ser Asn Gly Phe  Glu Tyr Phe
    1820                 1825                 1830

Ala Pro  Ala Asn Thr Tyr Asn  Asn Asn Ile Glu Gly  Gln Ala Ile
    1835                 1840                 1845

Val Tyr  Gln Ser Lys Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr
    1850                 1855                 1860

Phe Asp  Asn Asn Ser Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp
    1865                 1870                 1875

Ser Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr
    1880                 1885                 1890

Gly Trp  Gln Thr Ile Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn
    1895                 1900                 1905

Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys
    1910                 1915                 1920

Tyr Tyr  Phe Asn Thr Asn Thr  Ala Ile Ala Ser Thr  Gly Tyr Thr
    1925                 1930                 1935

Ile Ile  Asn Gly Lys His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met
    1940                 1945                 1950

Gln Ile  Gly Val Phe Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala
    1955                 1960                 1965

Pro Ala  Asn Thr Asp Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu
    1970                 1975                 1980

Tyr Gln  Asn Glu Phe Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe
    1985                 1990                 1995

Gly Ser  Asp Ser Lys Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn
    2000                 2005                 2010

Lys Lys  Tyr Tyr Phe Asn Pro  Asn Asn Ala Ile Ala  Ala Ile His
    2015                 2020                 2025

Leu Cys  Thr Ile Asn Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly
    2030                 2035                 2040
```

```
Ile Leu  Gln Asn Gly Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr
    2045                2050                2055

Phe Asp  Ala Asn Asn Glu Ser  Lys Met Val Thr Gly  Val Phe Lys
    2060                2065                2070

Gly Pro  Asn Gly Phe Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn
    2075                2080                2085

Asn Asn  Ile Glu Gly Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu
    2090                2095                2100

Thr Leu  Asn Gly Lys Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala
    2105                2110                2115

Val Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2120                2125                2130

Leu Asn  Thr Ala Glu Ala Ala  Thr Gly Trp Gln Thr  Ile Asp Gly
    2135                2140                2145

Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala Glu Ala  Ala Thr Gly
    2150                2155                2160

Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr
    2165                2170                2175

Phe Ile  Ala Ser Thr Gly Tyr  Thr Ser Ile Asn Gly  Lys His Phe
    2180                2185                2190

Tyr Phe  Asn Thr Asp Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly
    2195                2200                2205

Pro Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala Asn Thr  His Asn Asn
    2210                2215                2220

Asn Ile  Glu Gly Gln Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr
    2225                2230                2235

Leu Asn  Gly Lys Lys Tyr Tyr  Phe Gly Ser Asp Ser  Lys Ala Val
    2240                2245                2250

Thr Gly  Leu Arg Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    2255                2260                2265

Asn Thr  Ala Val Ala Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys
    2270                2275                2280

Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr
    2285                2290                2295
```

```
Thr Ile  Ile Ser Gly Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile
    2300                2305                2310

Met Gln  Ile Gly Val Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe
    2315                2320                2325

Ala Pro  Ala Asn Thr Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile
    2330                2335                2340

Arg Tyr  Gln Asn Arg Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr
    2345                2350                2355

Phe Gly  Asn Asn Ser Lys Ala  Ala Thr Gly Trp Val  Thr Ile Asp
    2360                2365                2370

Gly Asn  Arg Tyr Tyr Phe Glu  Pro Asn Thr Ala Met  Gly Ala Asn
    2375                2380                2385

Gly Tyr  Lys Thr Ile Asp Asn  Lys Asn Phe Tyr Phe  Arg Asn Gly
    2390                2395                2400

Leu Pro  Gln Ile Gly Val Phe  Lys Gly Ser Asn Gly  Phe Glu Tyr
    2405                2410                2415

Phe Ala  Pro Ala Asn Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala
    2420                2425                2430

Ile Arg  Tyr Gln Asn Arg Phe  Leu His Leu Leu Gly  Lys Ile Tyr
    2435                2440                2445

Tyr Phe  Gly Asn Asn Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile
    2450                2455                2460

Asn Gly  Lys Val Tyr Tyr Phe  Met Pro Asp Thr Ala  Met Ala Ala
    2465                2470                2475

Ala Gly  Gly Leu Phe Glu Ile  Asp Gly Val Ile Tyr  Phe Phe Gly
    2480                2485                2490

Val Asp  Gly Val Lys Ala Pro  Gly Ile Tyr Gly
    2495                2500
```

<210> 29
<211> 2511
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 29

```
His His His His His His His His His His Gly Gly Ser Leu Ala Glu
```

1 5 10 15

Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala
20 25 30

Ala Ala Lys Glu Ala Ala Ala Lys Ala Ala Ala Gly Gly Ser His Met
35 40 45

Ala Ser Asn Lys Glu Ile Leu Ala Val Val Glu Ala Val Ser Asn Glu
50 55 60

Lys Ala Leu Pro Arg Glu Lys Ile Phe Glu Ala Leu Glu Ser Ala Leu
65 70 75 80

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

Gln Ile Asp Arg Lys Ser Gly Asp Phe Asp Thr Phe Arg Arg Trp Leu
100 105 110

Val Val Asp Glu Val Thr Gln Pro Thr Lys Glu Ile Thr Leu Glu Ala
115 120 125

Ala Arg Tyr Glu Asp Glu Ser Leu Asn Leu Gly Asp Tyr Val Glu Asp
130 135 140

Gln Ile Glu Ser Val Thr Phe Asp Arg Ile Thr Thr Gln Thr Ala Lys
145 150 155 160

Gln Val Ile Val Gln Lys Val Arg Glu Ala Glu Arg Ala Met Val Val
165 170 175

Asp Gln Phe Arg Glu His Glu Gly Glu Ile Ile Thr Gly Val Val Lys
180 185 190

Lys Val Asn Arg Asp Asn Ile Ser Leu Asp Leu Gly Asn Asn Ala Glu
195 200 205

Ala Val Ile Leu Arg Glu Asp Met Leu Pro Arg Glu Asn Phe Arg Pro
210 215 220

Gly Asp Arg Val Arg Gly Val Leu Tyr Ser Val Arg Pro Glu Ala Arg
225 230 235 240

Gly Ala Gln Leu Phe Val Thr Arg Ser Lys Pro Glu Met Leu Ile Glu
245 250 255

Leu Phe Arg Ile Glu Val Pro Glu Ile Gly Glu Glu Val Ile Glu Ile
260 265 270

Lys Ala Ala Ala Arg Asp Pro Gly Ser Arg Ala Lys Ile Ala Val Lys

275 280 285

Thr Asn Asp Lys Arg Ile Asp Pro Val Gly Ala Cys Val Gly Met Arg
290 295 300

Gly Ala Arg Val Gln Ala Val Ser Thr Glu Leu Gly Gly Glu Arg Ile
305 310 315 320

Asp Ile Val Leu Trp Asp Asp Asn Pro Ala Gln Phe Val Ile Asn Ala
325 330 335

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

Thr Met Asp Ile Ala Val Glu Ala Gly Asn Leu Ala Gln Ala Ile Gly
355 360 365

Arg Asn Gly Gln Asn Val Arg Leu Ala Ser Gln Leu Ser Gly Trp Glu
370 375 380

Leu Asn Val Met Thr Val Asp Asp Leu Gln Ala Lys His Gln Ala Glu
385 390 395 400

Ala His Ala Ala Ile Asp Thr Phe Thr Lys Tyr Leu Asp Ile Asp Glu
405 410 415

Asp Phe Ala Thr Val Leu Val Glu Glu Gly Phe Ser Thr Leu Glu Glu
420 425 430

Leu Ala Tyr Val Pro Met Lys Glu Leu Leu Glu Ile Glu Gly Leu Asp
435 440 445

Glu Pro Thr Val Glu Ala Leu Arg Glu Arg Ala Lys Asn Ala Leu Ala
450 455 460

Thr Ile Ala Gln Ala Gln Glu Glu Ser Leu Gly Asp Asn Lys Pro Ala
465 470 475 480

Asp Asp Leu Leu Asn Leu Glu Gly Val Asp Arg Asp Leu Ala Phe Lys
485 490 495

Leu Ala Ala Arg Gly Val Cys Thr Leu Glu Asp Leu Ala Glu Gln Gly
500 505 510

Ile Asp Asp Leu Ala Asp Ile Glu Gly Leu Thr Asp Glu Lys Ala Gly
515 520 525

Ala Leu Ile Met Ala Ala Arg Asn Ile Cys Trp Phe Gly Asp Glu Ala
530 535 540

Ser Gly Ala Leu Val Pro Arg Gly Ser Val Thr Ser Leu Tyr Lys Lys

545 550 555 560

Ala Gly Ser Ala Ala Ala Pro Phe Thr Met Ile Met Ser Asp Leu Ser
565 570 575

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

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

Thr Leu Leu Leu Asp Ala Ser Val Ser Pro Asp Thr Lys Phe Ile Leu
610 615 620

Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser Ile Gly Asp Tyr Ile Tyr
625 630 635 640

Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile Ile His Asn Ser Ile Asp
645 650 655

Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu Asn Val Ser Asp Glu Leu
660 665 670

Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp Glu Lys Tyr Leu Ile Ser
675 680 685

Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr Tyr Ser Val Arg Phe Ile
690 695 700

Asn Lys Ser Asn Gly Glu Ser Val Tyr Val Glu Thr Glu Lys Glu Ile
705 710 715 720

Phe Ser Lys Tyr Ser Glu His Ile Thr Lys Glu Ile Ser Thr Ile Lys
725 730 735

Asn Ser Ile Ile Thr Asp Val Asn Gly Asn Leu Leu Asp Asn Ile Gln
740 745 750

Leu Asp His Thr Ser Gln Val Asn Thr Leu Asn Ala Ala Phe Phe Ile
755 760 765

Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys Asp Val Leu Asn Asp Leu
770 775 780

Ser Thr Ser Val Lys Val Gln Leu Tyr Ala Gln Leu Phe Ser Thr Gly
785 790 795 800

Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu Val Asn Leu Ile Ser Asn
805 810 815

Ala Val Asn Asp Thr Ile Asn Val Leu Pro Thr Ile Thr Glu Gly Ile

820 825 830

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

Lys Glu Leu Leu Asp Glu His Asp Pro Leu Leu Lys Lys Glu Leu Glu
850 855 860

Ala Lys Val Gly Val Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala
865 870 875 880

Thr Val Ala Ser Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu
885 890 895

Leu Pro Ile Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn
900 905 910

Glu Leu Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn
915 920 925

His Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
930 935 940

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
945 950 955 960

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met Glu
965 970 975

Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe Phe Ser
980 985 990

Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile Tyr Ser Ala
995 1000 1005

Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys Lys Ile Met
1010 1015 1020

Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp Glu Thr Gly
1025 1030 1035

Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Arg Leu
1040 1045 1050

Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe Tyr Trp Arg
1055 1060 1065

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

Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys Asp Thr Arg

1085 1090 1095

Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile Arg Asn Lys
1100 1105 1110

Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr Ser Leu Leu
1115 1120 1125

Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu Ser Lys Asp
1130 1135 1140

Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg Glu Ile Ser
1145 1150 1155

Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile Lys Asp Val
1160 1165 1170

Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile Ile Gly Asn
1175 1180 1185

Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys Asp Arg Tyr
1190 1195 1200

Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser Leu Ile Ile
1205 1210 1215

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

Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Ile Ile Glu Lys
1235 1240 1245

Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala Tyr Asn Tyr
1250 1255 1260

Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile Ser Lys Thr
1265 1270 1275

Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser Lys Asn Ile
1280 1285 1290

Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn Ser Lys Asp
1295 1300 1305

Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp Asp Ile Asn
1310 1315 1320

Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr Asp Lys Ser
1325 1330 1335

Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln Val Lys Val

1340 1345 1350

Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser Tyr Leu Asp
1355 1360 1365

Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser Asn Phe Met
1370 1375 1380

Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu Phe Gly Phe
1385 1390 1395

Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr Leu Val Gly
1400 1405 1410

Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp Asn Asn Lys
1415 1420 1425

Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser Ser Ser Lys
1430 1435 1440

Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val Val Glu Pro
1445 1450 1455

Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr Ser Leu Asp
1460 1465 1470

Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr Ile Asn Lys
1475 1480 1485

Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile Asn Ile Asn
1490 1495 1500

Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile Ile Val Leu
1505 1510 1515

Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn Leu Asp Ser
1520 1525 1530

Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser Asp Phe Ile
1535 1540 1545

Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile Leu Gln Lys
1550 1555 1560

Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser Phe Asn Lys
1565 1570 1575

Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser Leu Gly Tyr
1580 1585 1590

Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn Glu Leu Asp

1595 1600 1605

Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys Thr Tyr Tyr
1610 1615 1620

Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile Asn Ile Asn
1625 1630 1635

Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn Leu Val Thr
1640 1645 1650

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asp Ile Asn
1655 1660 1665

Thr Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile Asn Gly Lys His
1670 1675 1680

Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly Val Phe Lys
1685 1690 1695

Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Gln Asn
1700 1705 1710

Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe Leu
1715 1720 1725

Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala
1730 1735 1740

Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr Tyr Phe Asn
1745 1750 1755

Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val Ile Asp Asn
1760 1765 1770

Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile Ser Lys Gly
1775 1780 1785

Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp Thr Asp Thr
1790 1795 1800

Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly Lys His Phe
1805 1810 1815

Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val Phe Ser Thr
1820 1825 1830

Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn Asn
1835 1840 1845

Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe Leu Thr

1850 1855 1860

Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser Lys Ala Val
1865 1870 1875

Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Thr
1880 1885 1890

Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys
1895 1900 1905

Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp
1910 1915 1920

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala
1925 1930 1935

Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr
1940 1945 1950

Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro
1955 1960 1965

Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn
1970 1975 1980

Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe Leu Thr Leu
1985 1990 1995

Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr
2000 2005 2010

Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe Asn Pro Asn
2015 2020 2025

Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn Asn Asp Lys
2030 2035 2040

Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly Tyr Ile Thr
2045 2050 2055

Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn Glu Ser Lys
2060 2065 2070

Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
2075 2080 2085

Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln Ala Ile
2090 2095 2100

Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr

2105 2110 2115

Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp
2120 2125 2130

Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr
2135 2140 2145

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn
2150 2155 2160

Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys
2165 2170 2175

Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly Tyr Thr
2180 2185 2190

Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met
2195 2200 2205

Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala
2210 2215 2220

Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln Ala Ile Leu
2225 2230 2235

Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe
2240 2245 2250

Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp Gly
2255 2260 2265

Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr Gly
2270 2275 2280

Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
2285 2290 2295

Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His Phe
2300 2305 2310

Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly
2315 2320 2325

Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn
2330 2335 2340

Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr
2345 2350 2355

Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala

2360 2365 2370

Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro
2375 2380 2385

Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp Asn Lys
2390 2395 2400

Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val Phe Lys
2405 2410 2415

Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala
2420 2425 2430

Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu
2435 2440 2445

His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala
2450 2455 2460

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met
2465 2470 2475

Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu Ile Asp
2480 2485 2490

Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Pro Gly
2495 2500 2505

Ile Tyr Gly
2510

<210> 30
<211> 2492
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 30

His His His His His His Ser His Met Ala Ser Asn Lys Glu Ile Leu
1 5 10 15

Ala Val Val Glu Ala Val Ser Asn Glu Lys Ala Leu Pro Arg Glu Lys
20 25 30

Ile Phe Glu Ala Leu Glu Ser Ala Leu Ala Thr Ala Thr Lys Lys Lys
35 40 45

Tyr Glu Gln Glu Ile Asp Val Arg Val Gln Ile Asp Arg Lys Ser Gly
50 55 60

```
Asp Phe Asp Thr Phe Arg Arg Trp Leu Val Val Asp Glu Val Thr Gln
65                  70                  75                  80

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

Leu Asn Leu Gly Asp Tyr Val Glu Asp Gln Ile Glu Ser Val Thr Phe
            100                 105                 110

Asp Arg Ile Thr Thr Gln Thr Ala Lys Gln Val Ile Val Gln Lys Val
        115                 120                 125

Arg Glu Ala Glu Arg Ala Met Val Val Asp Gln Phe Arg Glu His Glu
    130                 135                 140

Gly Glu Ile Ile Thr Gly Val Val Lys Lys Val Asn Arg Asp Asn Ile
145                 150                 155                 160

Ser Leu Asp Leu Gly Asn Asn Ala Glu Ala Val Ile Leu Arg Glu Asp
                165                 170                 175

Met Leu Pro Arg Glu Asn Phe Arg Pro Gly Asp Arg Val Arg Gly Val
            180                 185                 190

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

Arg Ser Lys Pro Glu Met Leu Ile Glu Leu Phe Arg Ile Glu Val Pro
    210                 215                 220

Glu Ile Gly Glu Glu Val Ile Glu Ile Lys Ala Ala Ala Arg Asp Pro
225                 230                 235                 240

Gly Ser Arg Ala Lys Ile Ala Val Lys Thr Asn Asp Lys Arg Ile Asp
                245                 250                 255

Pro Val Gly Ala Cys Val Gly Met Arg Gly Ala Arg Val Gln Ala Val
            260                 265                 270

Ser Thr Glu Leu Gly Gly Glu Arg Ile Asp Ile Val Leu Trp Asp Asp
        275                 280                 285

Asn Pro Ala Gln Phe Val Ile Asn Ala Met Ala Pro Ala Asp Val Ala
    290                 295                 300

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

Ala Gly Asn Leu Ala Gln Ala Ile Gly Arg Asn Gly Gln Asn Val Arg
                325                 330                 335
```

```
Leu Ala Ser Gln Leu Ser Gly Trp Glu Leu Asn Val Met Thr Val Asp
            340                 345                 350

Asp Leu Gln Ala Lys His Gln Ala Glu Ala His Ala Ala Ile Asp Thr
        355                 360                 365

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

Glu Glu Gly Phe Ser Thr Leu Glu Glu Leu Ala Tyr Val Pro Met Lys
385                 390                 395                 400

Glu Leu Leu Glu Ile Glu Gly Leu Asp Glu Pro Thr Val Glu Ala Leu
                405                 410                 415

Arg Glu Arg Ala Lys Asn Ala Leu Ala Thr Ile Ala Gln Ala Gln Glu
            420                 425                 430

Glu Ser Leu Gly Asp Asn Lys Pro Ala Asp Asp Leu Leu Asn Leu Glu
        435                 440                 445

Gly Val Asp Arg Asp Leu Ala Phe Lys Leu Ala Ala Arg Gly Val Cys
    450                 455                 460

Thr Leu Glu Asp Leu Ala Glu Gln Gly Ile Asp Asp Leu Ala Asp Ile
465                 470                 475                 480

Glu Gly Leu Thr Asp Glu Lys Ala Gly Ala Leu Ile Met Ala Ala Arg
                485                 490                 495

Asn Ile Cys Trp Phe Gly Asp Glu Ala Ser Gly Ala Leu Gly Gly Ser
            500                 505                 510

Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly
        515                 520                 525

Gly Ser Gly Gly Ser Gly Gly Ser Leu Val Pro Arg Gly Ser Gly Ser
    530                 535                 540

Ala Ala Ala Pro Phe Thr Met Ile Met Ser Asp Leu Ser Ser Lys Glu
545                 550                 555                 560

Tyr Ile Phe Phe Asp Ser Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys
                565                 570                 575

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

Leu Asp Ala Ser Val Ser Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu
        595                 600                 605
```

```
Lys Leu Asn Ile Glu Ser Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys
    610                 615                 620

Leu Glu Pro Val Lys Asn Ile Ile His Asn Ser Ile Asp Asp Leu Ile
625                 630                 635                 640

Asp Glu Phe Asn Leu Leu Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu
                645                 650                 655

Lys Lys Leu Asn Asn Leu Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp
            660                 665                 670

Ile Ser Lys Asn Asn Ser Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser
        675                 680                 685

Asn Gly Glu Ser Val Tyr Val Glu Thr Glu Lys Glu Ile Phe Ser Lys
    690                 695                 700

Tyr Ser Glu His Ile Thr Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile
705                 710                 715                 720

Ile Thr Asp Val Asn Gly Asn Leu Leu Asp Asn Ile Gln Leu Asp His
                725                 730                 735

Thr Ser Gln Val Asn Thr Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu
            740                 745                 750

Ile Asp Tyr Ser Ser Asn Lys Asp Val Leu Asn Asp Leu Ser Thr Ser
        755                 760                 765

Val Lys Val Gln Leu Tyr Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr
    770                 775                 780

Ile Tyr Asp Ser Ile Gln Leu Val Asn Leu Ile Ser Asn Ala Val Asn
785                 790                 795                 800

Asp Thr Ile Asn Val Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val
                805                 810                 815

Ser Thr Ile Leu Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu
            820                 825                 830

Leu Asp Glu His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val
        835                 840                 845

Gly Val Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala
    850                 855                 860

Ser Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile
865                 870                 875                 880
```

```
Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile
                885                 890                 895

Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu Ser
            900                 905                 910

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

Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn
    930                 935                 940

Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met Glu Gly Gly Ser
945                 950                 955                 960

Gly His Thr Val Thr Gly Asn Ile Asp His Phe Phe Ser Ser Pro Ser
                965                 970                 975

Ile Ser Ser His Ile Pro Ser Leu Ser Ile Tyr Ser Ala Ile Gly Ile
            980                 985                 990

Glu Thr Glu Asn Leu Asp Phe Ser  Lys Lys Ile Met Met  Leu Pro Asn
        995                 1000                1005

Ala Pro  Ser Arg Val Phe Trp  Trp Glu Thr Gly Ala  Val Pro Gly
    1010                1015                1020

Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Arg Leu Leu  Asp Ser Ile
    1025                1030                1035

Arg Asp  Leu Tyr Pro Gly Lys  Phe Tyr Trp Arg Phe  Tyr Ala Phe
    1040                1045                1050

Phe Asp  Tyr Ala Ile Thr Thr  Leu Lys Pro Val Tyr  Glu Asp Thr
    1055                1060                1065

Asn Ile  Lys Ile Lys Leu Asp  Lys Asp Thr Arg Asn  Phe Ile Met
    1070                1075                1080

Pro Thr  Ile Thr Thr Asn Glu  Ile Arg Asn Lys Leu  Ser Tyr Ser
    1085                1090                1095

Phe Asp  Gly Ala Gly Gly Thr  Tyr Ser Leu Leu Leu  Ser Ser Tyr
    1100                1105                1110

Pro Ile  Ser Thr Asn Ile Asn  Leu Ser Lys Asp Asp  Leu Trp Ile
    1115                1120                1125

Phe Asn  Ile Asp Asn Glu Val  Arg Glu Ile Ser Ile  Glu Asn Gly
    1130                1135                1140
```

```
Thr Ile  Lys Lys Gly Lys Leu  Ile Lys Asp Val Leu  Ser Lys Ile
    1145                1150                1155

Asp Ile  Asn Lys Asn Lys Leu  Ile Ile Gly Asn Gln  Thr Ile Asp
    1160                1165                1170

Phe Ser  Gly Asp Ile Asp Asn  Lys Asp Arg Tyr Ile  Phe Leu Thr
    1175                1180                1185

Cys Glu  Leu Asp Asp Lys Ile  Ser Leu Ile Ile Glu  Ile Asn Leu
    1190                1195                1200

Val Ala  Lys Ser Tyr Ser Leu  Leu Leu Ser Gly Asp  Lys Asn Tyr
    1205                1210                1215

Leu Ile  Ser Asn Leu Ser Asn  Ile Ile Glu Lys Ile  Asn Thr Leu
    1220                1225                1230

Gly Leu  Asp Ser Lys Asn Ile  Ala Tyr Asn Tyr Thr  Asp Glu Ser
    1235                1240                1245

Asn Asn  Lys Tyr Phe Gly Ala  Ile Ser Lys Thr Ser  Gln Lys Ser
    1250                1255                1260

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

Asn Asp  Ser Thr Leu Glu Phe  Asn Ser Lys Asp Phe  Ile Ala Glu
    1280                1285                1290

Asp Ile  Asn Val Phe Met Lys  Asp Asp Ile Asn Thr  Ile Thr Gly
    1295                1300                1305

Lys Tyr  Tyr Val Asp Asn Asn  Thr Asp Lys Ser Ile  Asp Phe Ser
    1310                1315                1320

Ile Ser  Leu Val Ser Lys Asn  Gln Val Lys Val Asn  Gly Leu Tyr
    1325                1330                1335

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

Ser Asp  Gly His His Asn Thr  Ser Asn Phe Met Asn  Leu Phe Leu
    1355                1360                1365

Asp Asn  Ile Ser Phe Trp Lys  Leu Phe Gly Phe Glu  Asn Ile Asn
    1370                1375                1380

Phe Val  Ile Asp Lys Tyr Phe  Thr Leu Val Gly Lys  Thr Asn Leu
    1385                1390                1395
```

```
Gly Tyr  Val Glu Phe Ile Cys  Asp Asn Asn Lys Asn  Ile Asp Ile
    1400                1405                1410

Tyr Phe  Gly Glu Trp Lys Thr  Ser Ser Ser Lys Ser  Thr Ile Phe
    1415                1420                1425

Ser Gly  Asn Gly Arg Asn Val  Val Val Glu Pro Ile  Tyr Asn Pro
    1430                1435                1440

Asp Thr  Gly Glu Asp Ile Ser  Thr Ser Leu Asp Phe  Ser Tyr Glu
    1445                1450                1455

Pro Leu  Tyr Gly Ile Asp Arg  Tyr Ile Asn Lys Val  Leu Ile Ala
    1460                1465                1470

Pro Asp  Leu Tyr Thr Ser Leu  Ile Asn Ile Asn Thr  Asn Tyr Tyr
    1475                1480                1485

Ser Asn  Glu Tyr Tyr Pro Glu  Ile Ile Val Leu Asn  Pro Asn Thr
    1490                1495                1500

Phe His  Lys Lys Val Asn Ile  Asn Leu Asp Ser Ser  Ser Phe Glu
    1505                1510                1515

Tyr Lys  Trp Ser Thr Glu Gly  Ser Asp Phe Ile Leu  Val Arg Tyr
    1520                1525                1530

Leu Glu  Glu Ser Asn Lys Lys  Ile Leu Gln Lys Ile  Arg Ile Lys
    1535                1540                1545

Gly Ile  Leu Ser Asn Thr Gln  Ser Phe Asn Lys Met  Ser Ile Asp
    1550                1555                1560

Phe Lys  Asp Ile Lys Lys Leu  Ser Leu Gly Tyr Ile  Met Ser Asn
    1565                1570                1575

Phe Lys  Ser Phe Asn Ser Glu  Asn Glu Leu Asp Arg  Asp His Leu
    1580                1585                1590

Gly Phe  Lys Ile Ile Asp Asn  Lys Thr Tyr Tyr Tyr  Asp Glu Asp
    1595                1600                1605

Ser Lys  Leu Val Lys Gly Leu  Ile Asn Ile Asn Asn  Ser Leu Phe
    1610                1615                1620

Tyr Phe  Asp Pro Ile Glu Phe  Asn Leu Val Thr Gly  Trp Gln Thr
    1625                1630                1635

Ile Asn  Gly Lys Lys Tyr Tyr  Phe Asp Ile Asn Thr  Gly Ala Ala
    1640                1645                1650
```

```
Leu Ile  Ser Tyr Lys Ile Ile  Asn Gly Lys His Phe  Tyr Phe Asn
    1655                1660                1665

Asn Asp  Gly Val Met Gln Leu  Gly Val Phe Lys Gly  Pro Asp Gly
    1670                1675                1680

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Gln Asn Asn  Asn Ile Glu
    1685                1690                1695

Gly Gln  Ala Ile Val Tyr Gln  Ser Lys Phe Leu Thr  Leu Asn Gly
    1700                1705                1710

Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp
    1715                1720                1725

Arg Ile  Ile Asn Asn Glu Lys  Tyr Tyr Phe Asn Pro  Asn Asn Ala
    1730                1735                1740

Ile Ala  Ala Val Gly Leu Gln  Val Ile Asp Asn Asn  Lys Tyr Tyr
    1745                1750                1755

Phe Asn  Pro Asp Thr Ala Ile  Ile Ser Lys Gly Trp  Gln Thr Val
    1760                1765                1770

Asn Gly  Ser Arg Tyr Tyr Phe  Asp Thr Asp Thr Ala  Ile Ala Phe
    1775                1780                1785

Asn Gly  Tyr Lys Thr Ile Asp  Gly Lys His Phe Tyr  Phe Asp Ser
    1790                1795                1800

Asp Cys  Val Val Lys Ile Gly  Val Phe Ser Thr Ser  Asn Gly Phe
    1805                1810                1815

Glu Tyr  Phe Ala Pro Ala Asn  Thr Tyr Asn Asn Asn  Ile Glu Gly
    1820                1825                1830

Gln Ala  Ile Val Tyr Gln Ser  Lys Phe Leu Thr Leu  Asn Gly Lys
    1835                1840                1845

Lys Tyr  Tyr Phe Asp Asn Asn  Ser Lys Ala Val Thr  Gly Trp Gln
    1850                1855                1860

Thr Ile  Asp Ser Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Glu
    1865                1870                1875

Ala Ala  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    1880                1885                1890

Asn Thr  Asn Thr Ala Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp
    1895                1900                1905
```

```
Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr Ala Ile  Ala Ser Thr
    1910                 1915                 1920

Gly Tyr  Thr Ile Ile Asn Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    1925                 1930                 1935

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu
    1940                 1945                 1950

Tyr Phe  Ala Pro Ala Asn Thr  Asp Ala Asn Asn Ile  Glu Gly Gln
    1955                 1960                 1965

Ala Ile  Leu Tyr Gln Asn Glu  Phe Leu Thr Leu Asn  Gly Lys Lys
    1970                 1975                 1980

Tyr Tyr  Phe Gly Ser Asp Ser  Lys Ala Val Thr Gly  Trp Arg Ile
    1985                 1990                 1995

Ile Asn  Asn Lys Lys Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala
    2000                 2005                 2010

Ala Ile  His Leu Cys Thr Ile  Asn Asn Asp Lys Tyr  Tyr Phe Ser
    2015                 2020                 2025

Tyr Asp  Gly Ile Leu Gln Asn  Gly Tyr Ile Thr Ile  Glu Arg Asn
    2030                 2035                 2040

Asn Phe  Tyr Phe Asp Ala Asn  Asn Glu Ser Lys Met  Val Thr Gly
    2045                 2050                 2055

Val Phe  Lys Gly Pro Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    2060                 2065                 2070

Thr His  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Asn
    2075                 2080                 2085

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asp
    2090                 2095                 2100

Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile Asp Gly  Lys Lys Tyr
    2105                 2110                 2115

Tyr Phe  Asn Leu Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    2120                 2125                 2130

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Leu Asn Thr  Ala Glu Ala
    2135                 2140                 2145

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    2150                 2155                 2160
```

```
Thr Asn  Thr Phe Ile Ala Ser  Thr Gly Tyr Thr Ser  Ile Asn Gly
    2165                2170                2175

Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val
    2180                2185                2190

Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    2195                2200                2205

His Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Leu Tyr  Gln Asn Lys
    2210                2215                2220

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Gly  Ser Asp Ser
    2225                2230                2235

Lys Ala  Val Thr Gly Leu Arg  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    2240                2245                2250

Phe Asn  Thr Asn Thr Ala Val  Ala Val Thr Gly Trp  Gln Thr Ile
    2255                2260                2265

Asn Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ser  Ile Ala Ser
    2270                2275                2280

Thr Gly  Tyr Thr Ile Ile Ser  Gly Lys His Phe Tyr  Phe Asn Thr
    2285                2290                2295

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asp Gly Phe
    2300                2305                2310

Glu Tyr  Phe Ala Pro Ala Asn  Thr Asp Ala Asn Asn  Ile Glu Gly
    2315                2320                2325

Gln Ala  Ile Arg Tyr Gln Asn  Arg Phe Leu Tyr Leu  His Asp Asn
    2330                2335                2340

Ile Tyr  Tyr Phe Gly Asn Asn  Ser Lys Ala Ala Thr  Gly Trp Val
    2345                2350                2355

Thr Ile  Asp Gly Asn Arg Tyr  Tyr Phe Glu Pro Asn  Thr Ala Met
    2360                2365                2370

Gly Ala  Asn Gly Tyr Lys Thr  Ile Asp Asn Lys Asn  Phe Tyr Phe
    2375                2380                2385

Arg Asn  Gly Leu Pro Gln Ile  Gly Val Phe Lys Gly  Ser Asn Gly
    2390                2395                2400

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp Ala Asn  Asn Ile Glu
    2405                2410                2415
```

Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu His Leu Leu Gly
2420 2425 2430

Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Val Thr Gly Trp
2435 2440 2445

Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro Asp Thr Ala
2450 2455 2460

Met Ala Ala Ala Gly Gly Leu Phe Glu Ile Asp Gly Val Ile Tyr
2465 2470 2475

Phe Phe Gly Val Asp Gly Val Lys Ala Pro Gly Ile Tyr Gly
2480 2485 2490

<210> 31
<211> 2498
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 31

His His His His His His Ser His Met Ala Ser Asn Lys Glu Ile Leu
1 5 10 15

Ala Val Val Glu Ala Val Ser Asn Glu Lys Ala Leu Pro Arg Glu Lys
20 25 30

Ile Phe Glu Ala Leu Glu Ser Ala Leu Ala Thr Ala Thr Lys Lys Lys
35 40 45

Tyr Glu Gln Glu Ile Asp Val Arg Val Gln Ile Asp Arg Lys Ser Gly
50 55 60

Asp Phe Asp Thr Phe Arg Arg Trp Leu Val Val Asp Glu Val Thr Gln
65 70 75 80

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

Leu Asn Leu Gly Asp Tyr Val Glu Asp Gln Ile Glu Ser Val Thr Phe
100 105 110

Asp Arg Ile Thr Thr Gln Thr Ala Lys Gln Val Ile Val Gln Lys Val
115 120 125

Arg Glu Ala Glu Arg Ala Met Val Val Asp Gln Phe Arg Glu His Glu
130 135 140

Gly Glu Ile Ile Thr Gly Val Val Lys Lys Val Asn Arg Asp Asn Ile

145 150 155 160

Ser Leu Asp Leu Gly Asn Asn Ala Glu Ala Val Ile Leu Arg Glu Asp
165 170 175

Met Leu Pro Arg Glu Asn Phe Arg Pro Gly Asp Arg Val Arg Gly Val
180 185 190

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

Arg Ser Lys Pro Glu Met Leu Ile Glu Leu Phe Arg Ile Glu Val Pro
210 215 220

Glu Ile Gly Glu Glu Val Ile Glu Ile Lys Ala Ala Ala Arg Asp Pro
225 230 235 240

Gly Ser Arg Ala Lys Ile Ala Val Lys Thr Asn Asp Lys Arg Ile Asp
245 250 255

Pro Val Gly Ala Cys Val Gly Met Arg Gly Ala Arg Val Gln Ala Val
260 265 270

Ser Thr Glu Leu Gly Gly Glu Arg Ile Asp Ile Val Leu Trp Asp Asp
275 280 285

Asn Pro Ala Gln Phe Val Ile Asn Ala Met Ala Pro Ala Asp Val Ala
290 295 300

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

Ala Gly Asn Leu Ala Gln Ala Ile Gly Arg Asn Gly Gln Asn Val Arg
325 330 335

Leu Ala Ser Gln Leu Ser Gly Trp Glu Leu Asn Val Met Thr Val Asp
340 345 350

Asp Leu Gln Ala Lys His Gln Ala Glu Ala His Ala Ala Ile Asp Thr
355 360 365

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

Glu Glu Gly Phe Ser Thr Leu Glu Glu Leu Ala Tyr Val Pro Met Lys
385 390 395 400

Glu Leu Leu Glu Ile Glu Gly Leu Asp Glu Pro Thr Val Glu Ala Leu
405 410 415

Arg Glu Arg Ala Lys Asn Ala Leu Ala Thr Ile Ala Gln Ala Gln Glu

420 425 430

Glu Ser Leu Gly Asp Asn Lys Pro Ala Asp Asp Leu Leu Asn Leu Glu
435 440 445

Gly Val Asp Arg Asp Leu Ala Phe Lys Leu Ala Ala Arg Gly Val Cys
450 455 460

Thr Leu Glu Asp Leu Ala Glu Gln Gly Ile Asp Asp Leu Ala Asp Ile
465 470 475 480

Glu Gly Leu Thr Asp Glu Lys Ala Gly Ala Leu Ile Met Ala Ala Arg
485 490 495

Asn Ile Cys Trp Phe Gly Asp Glu Ala Ser Gly Ala Leu Leu Ala Glu
500 505 510

Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala
515 520 525

Ala Ala Lys Glu Ala Ala Ala Lys Ala Ala Ala Gly Gly Ser Leu Val
530 535 540

Pro Arg Gly Ser Gly Ser Ala Ala Ala Pro Phe Thr Met Ile Met Ser
545 550 555 560

Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile Asp Asn Lys
565 570 575

Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser Ile Ser Glu
580 585 590

Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro Asp Thr Lys
595 600 605

Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser Ile Gly Asp
610 615 620

Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile Ile His Asn
625 630 635 640

Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu Asn Val Ser
645 650 655

Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp Glu Lys Tyr
660 665 670

Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr Tyr Ser Val
675 680 685

Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val Glu Thr Glu

690 695 700

Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys Glu Ile Ser
705 710 715 720

Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn Leu Leu Asp
725 730 735

Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu Asn Ala Ala
740 745 750

Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys Asp Val Leu
755 760 765

Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala Gln Leu Phe
770 775 780

Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu Val Asn Leu
785 790 795 800

Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu Pro Thr Ile Thr
805 810 815

Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp Gly Ile Asn Leu Gly
820 825 830

Ala Ala Ile Lys Glu Leu Leu Asp Glu His Asp Pro Leu Leu Lys Lys
835 840 845

Glu Leu Glu Ala Lys Val Gly Val Leu Ala Ile Asn Met Ser Leu Ser
850 855 860

Ile Ala Ala Thr Val Ala Ser Ile Val Gly Ile Gly Ala Glu Val Thr
865 870 875 880

Ile Phe Leu Leu Pro Ile Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu
885 890 895

Val Asn Asn Glu Leu Ile Leu His Asp Lys Ala Thr Ser Val Val Asn
900 905 910

Tyr Phe Asn His Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr
915 920 925

Glu Asp Asp Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu
930 935 940

Ile Asp Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu
945 950 955 960

Ala Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His

965 970 975

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
980 985 990

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

Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp Glu
1010 1015 1020

Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr
1025 1030 1035

Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe Tyr
1040 1045 1050

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

Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys Asp
1070 1075 1080

Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile Arg
1085 1090 1095

Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr Ser
1100 1105 1110

Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu Ser
1115 1120 1125

Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg Glu
1130 1135 1140

Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile Lys
1145 1150 1155

Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile Ile
1160 1165 1170

Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys Asp
1175 1180 1185

Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser Leu
1190 1195 1200

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

Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Ile Ile

1220 1225 1230

Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala Tyr
1235 1240 1245

Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile Ser
1250 1255 1260

Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser Lys
1265 1270 1275

Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn Ser
1280 1285 1290

Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp Asp
1295 1300 1305

Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr Asp
1310 1315 1320

Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln Val
1325 1330 1335

Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser Tyr
1340 1345 1350

Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser Asn
1355 1360 1365

Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu Phe
1370 1375 1380

Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr Leu
1385 1390 1395

Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp Asn
1400 1405 1410

Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser Ser
1415 1420 1425

Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val Val
1430 1435 1440

Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr Ser
1445 1450 1455

Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr Ile
1460 1465 1470

Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile Asn

1475 1480 1485

Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile Ile
1490 1495 1500

Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn Leu
1505 1510 1515

Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser Asp
1520 1525 1530

Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile Leu
1535 1540 1545

Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser Phe
1550 1555 1560

Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser Leu
1565 1570 1575

Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn Glu
1580 1585 1590

Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys Thr
1595 1600 1605

Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile Asn
1610 1615 1620

Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn Leu
1625 1630 1635

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asp
1640 1645 1650

Ile Asn Thr Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile Asn Gly
1655 1660 1665

Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly Val
1670 1675 1680

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
1685 1690 1695

Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
1700 1705 1710

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser
1715 1720 1725

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr Tyr

1730 1735 1740

Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val Ile
1745 1750 1755

Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile Ser
1760 1765 1770

Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp Thr
1775 1780 1785

Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly Lys
1790 1795 1800

His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val Phe
1805 1810 1815

Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Tyr
1820 1825 1830

Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe
1835 1840 1845

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser Lys
1850 1855 1860

Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe
1865 1870 1875

Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
1880 1885 1890

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr
1895 1900 1905

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn
1910 1915 1920

Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His
1925 1930 1935

Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys
1940 1945 1950

Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala
1955 1960 1965

Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe Leu
1970 1975 1980

Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala

1985 1990 1995

Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe Asn
2000 2005 2010

Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn Asn
2015 2020 2025

Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly Tyr
2030 2035 2040

Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn Glu
2045 2050 2055

Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
2060 2065 2070

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
2075 2080 2085

Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
2090 2095 2100

Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln Thr
2105 2110 2115

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala
2120 2125 2130

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
2135 2140 2145

Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly
2150 2155 2160

Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly
2165 2170 2175

Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly
2180 2185 2190

Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr
2195 2200 2205

Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln Ala
2210 2215 2220

Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr
2225 2230 2235

Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile

2240 2245 2250

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val
2255 2260 2265

Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr
2270 2275 2280

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys
2285 2290 2295

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
2300 2305 2310

Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2315 2320 2325

Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe
2330 2335 2340

Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys
2345 2350 2355

Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe
2360 2365 2370

Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp
2375 2380 2385

Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val
2390 2395 2400

Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2405 2410 2415

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2420 2425 2430

Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser
2435 2440 2445

Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr
2450 2455 2460

Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu
2465 2470 2475

Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
2480 2485 2490

Pro Gly Ile Tyr Gly

2495

<210> 32
<211> 2143
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 32

His His His His His His His His His Gly Gly Ser Gly Gly Ser Gly
1 5 10 15

Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly
20 25 30

Ser Gly Gly Ser Gly Gly Ser His Met Ala Ser Asn Lys Glu Ile Leu
35 40 45

Ala Val Val Glu Ala Val Ser Asn Glu Lys Ala Leu Pro Arg Glu Lys
50 55 60

Ile Phe Glu Ala Leu Glu Ser Ala Leu Ala Thr Ala Thr Lys Lys Lys
65 70 75 80

Tyr Glu Gln Glu Ile Asp Val Arg Val Gln Ile Asp Arg Lys Ser Gly
85 90 95

Asp Phe Asp Thr Phe Arg Arg Trp Leu Val Val Asp Glu Val Thr Gln
100 105 110

Pro Thr Lys Glu Ile Thr Leu Glu Ala Ala Arg Tyr Glu Asp Glu Ser
115 120 125

Leu Asn Leu Gly Asp Tyr Val Glu Asp Gln Ile Glu Ser Val Thr Phe
130 135 140

Asp Arg Ile Thr Thr Gln Thr Ala Lys Gln Val Ile Val Gln Lys Val
145 150 155 160

Arg Glu Ala Glu Arg Ala Met Val Val Asp Gln Phe Arg Glu His Glu
165 170 175

Gly Glu Ile Ile Thr Gly Val Val Lys Lys Val Asn Arg Asp Asn Ile
180 185 190

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

Met Leu Pro Arg Glu Asn Phe Arg Pro Gly Asp Arg Val Arg Gly Val
210 215 220

```
Leu Tyr Ser Val Arg Pro Glu Ala Arg Gly Ala Gln Leu Phe Val Thr
225                 230                 235                 240

Arg Ser Lys Pro Glu Met Leu Ile Glu Leu Phe Arg Ile Glu Val Pro
                245                 250                 255

Glu Ile Gly Glu Glu Val Ile Glu Ile Lys Ala Ala Ala Arg Asp Pro
            260                 265                 270

Gly Ser Arg Ala Lys Ile Ala Val Lys Thr Asn Asp Lys Arg Ile Asp
        275                 280                 285

Pro Val Gly Ala Cys Val Gly Met Arg Gly Ala Arg Val Gln Ala Val
    290                 295                 300

Ser Thr Glu Leu Gly Gly Glu Arg Ile Asp Ile Val Leu Trp Asp Asp
305                 310                 315                 320

Asn Pro Ala Gln Phe Val Ile Asn Ala Met Ala Pro Ala Asp Val Ala
                325                 330                 335

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

Ala Gly Asn Leu Ala Gln Ala Ile Gly Arg Asn Gly Gln Asn Val Arg
        355                 360                 365

Leu Ala Ser Gln Leu Ser Gly Trp Glu Leu Asn Val Met Thr Val Asp
    370                 375                 380

Asp Leu Gln Ala Lys His Gln Ala Glu Ala His Ala Ala Ile Asp Thr
385                 390                 395                 400

Phe Thr Lys Tyr Leu Asp Ile Asp Glu Asp Phe Ala Thr Val Leu Val
                405                 410                 415

Glu Glu Gly Phe Ser Thr Leu Glu Glu Leu Ala Tyr Val Pro Met Lys
            420                 425                 430

Glu Leu Leu Glu Ile Glu Gly Leu Asp Glu Pro Thr Val Glu Ala Leu
        435                 440                 445

Arg Glu Arg Ala Lys Asn Ala Leu Ala Thr Ile Ala Gln Ala Gln Glu
    450                 455                 460

Glu Ser Leu Gly Asp Asn Lys Pro Ala Asp Asp Leu Leu Asn Leu Glu
465                 470                 475                 480

Gly Val Asp Arg Asp Leu Ala Phe Lys Leu Ala Ala Arg Gly Val Cys
                485                 490                 495
```

```
Thr Leu Glu Asp Leu Ala Glu Gln Gly Ile Asp Asp Leu Ala Asp Ile
            500                 505                 510

Glu Gly Leu Thr Asp Glu Lys Ala Gly Ala Leu Ile Met Ala Ala Arg
        515                 520                 525

Asn Ile Cys Trp Phe Gly Asp Glu Ala Ser Gly Ala Leu Val Pro Arg
    530                 535                 540

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

Phe Thr Met Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
                565                 570                 575

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
            580                 585                 590

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met Glu
        595                 600                 605

Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe Phe Ser
    610                 615                 620

Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile Tyr Ser Ala
625                 630                 635                 640

Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys Lys Ile Met Met
                645                 650                 655

Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp Glu Thr Gly Ala Val
            660                 665                 670

Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Arg Leu Leu Asp Ser
        675                 680                 685

Ile Arg Asp Leu Tyr Pro Gly Lys Phe Tyr Trp Arg Phe Tyr Ala Phe
    690                 695                 700

Phe Asp Tyr Ala Ile Thr Thr Leu Lys Pro Val Tyr Glu Asp Thr Asn
705                 710                 715                 720

Ile Lys Ile Lys Leu Asp Lys Asp Thr Arg Asn Phe Ile Met Pro Thr
                725                 730                 735

Ile Thr Thr Asn Glu Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly
            740                 745                 750

Ala Gly Gly Thr Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr
        755                 760                 765
```

```
Asn Ile Asn Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn
    770                 775                 780

Glu Val Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys
785                 790                 795                 800

Leu Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
                805                 810                 815

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
            820                 825                 830

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser Leu
        835                 840                 845

Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu Leu Ser
    850                 855                 860

Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Ile Ile Glu Lys
865                 870                 875                 880

Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala Tyr Asn Tyr Thr
                885                 890                 895

Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile Ser Lys Thr Ser Gln
            900                 905                 910

Lys Ser Ile Ile His Tyr Lys Lys Asp Ser Lys Asn Ile Leu Glu Phe
        915                 920                 925

Tyr Asn Asp Ser Thr Leu Glu Phe Asn Ser Lys Asp Phe Ile Ala Glu
    930                 935                 940

Asp Ile Asn Val Phe Met Lys Asp Asp Ile Asn Thr Ile Thr Gly Lys
945                 950                 955                 960

Tyr Tyr Val Asp Asn Asn Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser
                965                 970                 975

Leu Val Ser Lys Asn Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu
            980                 985                 990

Ser Val Tyr Ser Ser Tyr Leu Asp  Phe Val Lys Asn Ser  Asp Gly His
        995                 1000                1005

His Asn  Thr Ser Asn Phe Met  Asn Leu Phe Leu Asp  Asn Ile Ser
    1010                1015                1020

Phe Trp  Lys Leu Phe Gly Phe  Glu Asn Ile Asn Phe  Val Ile Asp
    1025                1030                1035
```

```
Lys Tyr  Phe Thr Leu Val Gly  Lys Thr Asn Leu Gly  Tyr Val Glu
    1040                1045                1050

Phe Ile  Cys Asp Asn Asn Lys  Asn Ile Asp Ile Tyr  Phe Gly Glu
    1055                1060                1065

Trp Lys  Thr Ser Ser Ser Lys  Ser Thr Ile Phe Ser  Gly Asn Gly
    1070                1075                1080

Arg Asn  Val Val Val Glu Pro  Ile Tyr Asn Pro Asp  Thr Gly Glu
    1085                1090                1095

Asp Ile  Ser Thr Ser Leu Asp  Phe Ser Tyr Glu Pro  Leu Tyr Gly
    1100                1105                1110

Ile Asp  Arg Tyr Ile Asn Lys  Val Leu Ile Ala Pro  Asp Leu Tyr
    1115                1120                1125

Thr Ser  Leu Ile Asn Ile Asn  Thr Asn Tyr Tyr Ser  Asn Glu Tyr
    1130                1135                1140

Tyr Pro  Glu Ile Ile Val Leu  Asn Pro Asn Thr Phe  His Lys Lys
    1145                1150                1155

Val Asn  Ile Asn Leu Asp Ser  Ser Ser Phe Glu Tyr  Lys Trp Ser
    1160                1165                1170

Thr Glu  Gly Ser Asp Phe Ile  Leu Val Arg Tyr Leu  Glu Glu Ser
    1175                1180                1185

Asn Lys  Lys Ile Leu Gln Lys  Ile Arg Ile Lys Gly  Ile Leu Ser
    1190                1195                1200

Asn Thr  Gln Ser Phe Asn Lys  Met Ser Ile Asp Phe  Lys Asp Ile
    1205                1210                1215

Lys Lys  Leu Ser Leu Gly Tyr  Ile Met Ser Asn Phe  Lys Ser Phe
    1220                1225                1230

Asn Ser  Glu Asn Glu Leu Asp  Arg Asp His Leu Gly  Phe Lys Ile
    1235                1240                1245

Ile Asp  Asn Lys Thr Tyr Tyr  Tyr Asp Glu Asp Ser  Lys Leu Val
    1250                1255                1260

Lys Gly  Leu Ile Asn Ile Asn  Asn Ser Leu Phe Tyr  Phe Asp Pro
    1265                1270                1275

Ile Glu  Phe Asn Leu Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys
    1280                1285                1290
```

```
Lys Tyr  Tyr Phe Asp Ile Asn  Thr Gly Ala Ala Leu  Ile Ser Tyr
    1295                 1300                 1305

Lys Ile  Ile Asn Gly Lys His  Phe Tyr Phe Asn Asn  Asp Gly Val
    1310                 1315                 1320

Met Gln  Leu Gly Val Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe
    1325                 1330                 1335

Ala Pro  Ala Asn Thr Gln Asn  Asn Asn Ile Glu Gly  Gln Ala Ile
    1340                 1345                 1350

Val Tyr  Gln Ser Lys Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr
    1355                 1360                 1365

Phe Asp  Asn Asp Ser Lys Ala  Val Thr Gly Trp Arg  Ile Ile Asn
    1370                 1375                 1380

Asn Glu  Lys Tyr Tyr Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Val
    1385                 1390                 1395

Gly Leu  Gln Val Ile Asp Asn  Asn Lys Tyr Tyr Phe  Asn Pro Asp
    1400                 1405                 1410

Thr Ala  Ile Ile Ser Lys Gly  Trp Gln Thr Val Asn  Gly Ser Arg
    1415                 1420                 1425

Tyr Tyr  Phe Asp Thr Asp Thr  Ala Ile Ala Phe Asn  Gly Tyr Lys
    1430                 1435                 1440

Thr Ile  Asp Gly Lys His Phe  Tyr Phe Asp Ser Asp  Cys Val Val
    1445                 1450                 1455

Lys Ile  Gly Val Phe Ser Thr  Ser Asn Gly Phe Glu  Tyr Phe Ala
    1460                 1465                 1470

Pro Ala  Asn Thr Tyr Asn Asn  Asn Ile Glu Gly Gln  Ala Ile Val
    1475                 1480                 1485

Tyr Gln  Ser Lys Phe Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe
    1490                 1495                 1500

Asp Asn  Asn Ser Lys Ala Val  Thr Gly Trp Gln Thr  Ile Asp Ser
    1505                 1510                 1515

Lys Lys  Tyr Tyr Phe Asn Thr  Asn Thr Ala Glu Ala  Ala Thr Gly
    1520                 1525                 1530

Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr
    1535                 1540                 1545
```

```
Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile Asp Gly  Lys Lys Tyr
    1550                1555                1560

Tyr Phe  Asn Thr Asn Thr Ala  Ile Ala Ser Thr Gly  Tyr Thr Ile
    1565                1570                1575

Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr Asp Gly  Ile Met Gln
    1580                1585                1590

Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe Glu Tyr  Phe Ala Pro
    1595                1600                1605

Ala Asn  Thr Asp Ala Asn Asn  Ile Glu Gly Gln Ala  Ile Leu Tyr
    1610                1615                1620

Gln Asn  Glu Phe Leu Thr Leu  Asn Gly Lys Lys Tyr  Tyr Phe Gly
    1625                1630                1635

Ser Asp  Ser Lys Ala Val Thr  Gly Trp Arg Ile Ile  Asn Asn Lys
    1640                1645                1650

Lys Tyr  Tyr Phe Asn Pro Asn  Asn Ala Ile Ala Ala  Ile His Leu
    1655                1660                1665

Cys Thr  Ile Asn Asn Asp Lys  Tyr Tyr Phe Ser Tyr  Asp Gly Ile
    1670                1675                1680

Leu Gln  Asn Gly Tyr Ile Thr  Ile Glu Arg Asn Asn  Phe Tyr Phe
    1685                1690                1695

Asp Ala  Asn Asn Glu Ser Lys  Met Val Thr Gly Val  Phe Lys Gly
    1700                1705                1710

Pro Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala Asn Thr  His Asn Asn
    1715                1720                1725

Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln Asn Lys  Phe Leu Thr
    1730                1735                1740

Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn Asp Ser  Lys Ala Val
    1745                1750                1755

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Leu
    1760                1765                1770

Asn Thr  Ala Glu Ala Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys
    1775                1780                1785

Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Glu Ala Ala  Thr Gly Trp
    1790                1795                1800
```

```
Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Thr  Asn Thr Phe
    1805                 1810                 1815

Ile Ala  Ser Thr Gly Tyr Thr  Ser Ile Asn Gly Lys  His Phe Tyr
    1820                 1825                 1830

Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly Val Phe  Lys Gly Pro
    1835                 1840                 1845

Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn Thr His  Asn Asn Asn
    1850                 1855                 1860

Ile Glu  Gly Gln Ala Ile Leu  Tyr Gln Asn Lys Phe  Leu Thr Leu
    1865                 1870                 1875

Asn Gly  Lys Lys Tyr Tyr Phe  Gly Ser Asp Ser Lys  Ala Val Thr
    1880                 1885                 1890

Gly Leu  Arg Thr Ile Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn
    1895                 1900                 1905

Thr Ala  Val Ala Val Thr Gly  Trp Gln Thr Ile Asn  Gly Lys Lys
    1910                 1915                 1920

Tyr Tyr  Phe Asn Thr Asn Thr  Ser Ile Ala Ser Thr  Gly Tyr Thr
    1925                 1930                 1935

Ile Ile  Ser Gly Lys His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met
    1940                 1945                 1950

Gln Ile  Gly Val Phe Lys Gly  Pro Asp Gly Phe Glu  Tyr Phe Ala
    1955                 1960                 1965

Pro Ala  Asn Thr Asp Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Arg
    1970                 1975                 1980

Tyr Gln  Asn Arg Phe Leu Tyr  Leu His Asp Asn Ile  Tyr Tyr Phe
    1985                 1990                 1995

Gly Asn  Asn Ser Lys Ala Ala  Thr Gly Trp Val Thr  Ile Asp Gly
    2000                 2005                 2010

Asn Arg  Tyr Tyr Phe Glu Pro  Asn Thr Ala Met Gly  Ala Asn Gly
    2015                 2020                 2025

Tyr Lys  Thr Ile Asp Asn Lys  Asn Phe Tyr Phe Arg  Asn Gly Leu
    2030                 2035                 2040

Pro Gln  Ile Gly Val Phe Lys  Gly Ser Asn Gly Phe  Glu Tyr Phe
    2045                 2050                 2055
```

```
Ala Pro  Ala Asn Thr Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile
    2060                 2065                 2070

Arg Tyr  Gln Asn Arg Phe Leu  His Leu Leu Gly Lys  Ile Tyr Tyr
    2075                 2080                 2085

Phe Gly  Asn Asn Ser Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asn
    2090                 2095                 2100

Gly Lys  Val Tyr Tyr Phe Met  Pro Asp Thr Ala Met  Ala Ala Ala
    2105                 2110                 2115

Gly Gly  Leu Phe Glu Ile Asp  Gly Val Ile Tyr Phe  Phe Gly Val
    2120                 2125                 2130

Asp Gly  Val Lys Ala Pro Gly  Ile Tyr Gly
    2135                 2140
```

<210> 33
<211> 2150
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 33

```
His His His His His His His His His His Gly Gly Ser Leu Ala Glu
1               5                   10                  15

Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala
            20                  25                  30

Ala Ala Lys Glu Ala Ala Ala Lys Ala Ala Ala Gly Gly Ser His Met
        35                  40                  45

Ala Ser Asn Lys Glu Ile Leu Ala Val Val Glu Ala Val Ser Asn Glu
    50                  55                  60

Lys Ala Leu Pro Arg Glu Lys Ile Phe Glu Ala Leu Glu Ser Ala Leu
65                  70                  75                  80

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

Gln Ile Asp Arg Lys Ser Gly Asp Phe Asp Thr Phe Arg Arg Trp Leu
            100                 105                 110

Val Val Asp Glu Val Thr Gln Pro Thr Lys Glu Ile Thr Leu Glu Ala
        115                 120                 125

Ala Arg Tyr Glu Asp Glu Ser Leu Asn Leu Gly Asp Tyr Val Glu Asp
```

```
    130                 135                 140

Gln Ile Glu Ser Val Thr Phe Asp Arg Ile Thr Thr Gln Thr Ala Lys
145                 150                 155                 160

Gln Val Ile Val Gln Lys Val Arg Glu Ala Glu Arg Ala Met Val Val
                165                 170                 175

Asp Gln Phe Arg Glu His Glu Gly Glu Ile Ile Thr Gly Val Val Lys
            180                 185                 190

Lys Val Asn Arg Asp Asn Ile Ser Leu Asp Leu Gly Asn Asn Ala Glu
        195                 200                 205

Ala Val Ile Leu Arg Glu Asp Met Leu Pro Arg Glu Asn Phe Arg Pro
    210                 215                 220

Gly Asp Arg Val Arg Gly Val Leu Tyr Ser Val Arg Pro Glu Ala Arg
225                 230                 235                 240

Gly Ala Gln Leu Phe Val Thr Arg Ser Lys Pro Glu Met Leu Ile Glu
                245                 250                 255

Leu Phe Arg Ile Glu Val Pro Glu Ile Gly Glu Glu Val Ile Glu Ile
            260                 265                 270

Lys Ala Ala Ala Arg Asp Pro Gly Ser Arg Ala Lys Ile Ala Val Lys
        275                 280                 285

Thr Asn Asp Lys Arg Ile Asp Pro Val Gly Ala Cys Val Gly Met Arg
    290                 295                 300

Gly Ala Arg Val Gln Ala Val Ser Thr Glu Leu Gly Gly Glu Arg Ile
305                 310                 315                 320

Asp Ile Val Leu Trp Asp Asp Asn Pro Ala Gln Phe Val Ile Asn Ala
                325                 330                 335

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

Thr Met Asp Ile Ala Val Glu Ala Gly Asn Leu Ala Gln Ala Ile Gly
        355                 360                 365

Arg Asn Gly Gln Asn Val Arg Leu Ala Ser Gln Leu Ser Gly Trp Glu
    370                 375                 380

Leu Asn Val Met Thr Val Asp Asp Leu Gln Ala Lys His Gln Ala Glu
385                 390                 395                 400

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

405 410 415

Asp Phe Ala Thr Val Leu Val Glu Glu Gly Phe Ser Thr Leu Glu Glu
420 425 430

Leu Ala Tyr Val Pro Met Lys Glu Leu Leu Glu Ile Glu Gly Leu Asp
435 440 445

Glu Pro Thr Val Glu Ala Leu Arg Glu Arg Ala Lys Asn Ala Leu Ala
450 455 460

Thr Ile Ala Gln Ala Gln Glu Glu Ser Leu Gly Asp Asn Lys Pro Ala
465 470 475 480

Asp Asp Leu Leu Asn Leu Glu Gly Val Asp Arg Asp Leu Ala Phe Lys
485 490 495

Leu Ala Ala Arg Gly Val Cys Thr Leu Glu Asp Leu Ala Glu Gln Gly
500 505 510

Ile Asp Asp Leu Ala Asp Ile Glu Gly Leu Thr Asp Glu Lys Ala Gly
515 520 525

Ala Leu Ile Met Ala Ala Arg Asn Ile Cys Trp Phe Gly Asp Glu Ala
530 535 540

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

Ala Gly Ser Ala Ala Ala Pro Phe Thr Met Glu Ser Lys Lys Tyr Gly
565 570 575

Pro Leu Lys Thr Glu Asp Asp Lys Ile Leu Val Pro Ile Asp Asp Leu
580 585 590

Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr
595 600 605

Cys Asn Ile Leu Ala Met Glu Gly Gly Ser Gly His Thr Val Thr Gly
610 615 620

Asn Ile Asp His Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro
625 630 635 640

Ser Leu Ser Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp
645 650 655

Phe Ser Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe
660 665 670

Trp Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp

675 680 685

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

Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu Lys
705 710 715 720

Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys Asp Thr
725 730 735

Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile Arg Asn Lys
740 745 750

Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr Ser Leu Leu Leu
755 760 765

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

Trp Ile Phe Asn Ile Asp Asn Glu Val Arg Glu Ile Ser Ile Glu Asn
785 790 795 800

Gly Thr Ile Lys Lys Gly Lys Leu Ile Lys Asp Val Leu Ser Lys Ile
805 810 815

Asp Ile Asn Lys Asn Lys Leu Ile Ile Gly Asn Gln Thr Ile Asp Phe
820 825 830

Ser Gly Asp Ile Asp Asn Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu
835 840 845

Leu Asp Asp Lys Ile Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys
850 855 860

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

Leu Ser Asn Ile Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys
885 890 895

Asn Ile Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly
900 905 910

Ala Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp
915 920 925

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

Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp Asp

945 950 955 960

Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr Asp Lys
965 970 975

Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln Val Lys Val
980 985 990

Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser Tyr Leu Asp Phe
995 1000 1005

Val Lys Asn Ser Asp Gly His His Asn Thr Ser Asn Phe Met Asn
1010 1015 1020

Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu Phe Gly Phe Glu
1025 1030 1035

Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr Leu Val Gly Lys
1040 1045 1050

Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp Asn Asn Lys Asn
1055 1060 1065

Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser Ser Ser Lys Ser
1070 1075 1080

Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val Val Glu Pro Ile
1085 1090 1095

Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr Ser Leu Asp Phe
1100 1105 1110

Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr Ile Asn Lys Val
1115 1120 1125

Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile Asn Ile Asn Thr
1130 1135 1140

Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile Ile Val Leu Asn
1145 1150 1155

Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn Leu Asp Ser Ser
1160 1165 1170

Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser Asp Phe Ile Leu
1175 1180 1185

Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile Leu Gln Lys Ile
1190 1195 1200

Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser Phe Asn Lys Met

1205 1210 1215

Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser Leu Gly Tyr Ile
1220 1225 1230

Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn Glu Leu Asp Arg
1235 1240 1245

Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys Thr Tyr Tyr Tyr
1250 1255 1260

Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile Asn Ile Asn Asn
1265 1270 1275

Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn Leu Val Thr Gly
1280 1285 1290

Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asp Ile Asn Thr
1295 1300 1305

Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile Asn Gly Lys His Phe
1310 1315 1320

Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly Val Phe Lys Gly
1325 1330 1335

Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Gln Asn Asn
1340 1345 1350

Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe Leu Thr
1355 1360 1365

Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val
1370 1375 1380

Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr Tyr Phe Asn Pro
1385 1390 1395

Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val Ile Asp Asn Asn
1400 1405 1410

Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile Ser Lys Gly Trp
1415 1420 1425

Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp Thr Asp Thr Ala
1430 1435 1440

Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly Lys His Phe Tyr
1445 1450 1455

Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val Phe Ser Thr Ser

1460 1465 1470

Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn Asn Asn
1475 1480 1485

Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe Leu Thr Leu
1490 1495 1500

Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser Lys Ala Val Thr
1505 1510 1515

Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn Thr Asn
1520 1525 1530

Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys
1535 1540 1545

Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln
1550 1555 1560

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Ile
1565 1570 1575

Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe
1580 1585 1590

Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn
1595 1600 1605

Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile
1610 1615 1620

Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe Leu Thr Leu Asn
1625 1630 1635

Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly
1640 1645 1650

Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe Asn Pro Asn Asn
1655 1660 1665

Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn Asn Asp Lys Tyr
1670 1675 1680

Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly Tyr Ile Thr Ile
1685 1690 1695

Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn Glu Ser Lys Met
1700 1705 1710

Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala

```
    1715                1720                1725

Pro Ala  Asn Thr His Asn Asn  Asn Ile Glu Gly Gln  Ala Ile Val
    1730                1735                1740

Tyr Gln  Asn Lys Phe Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe
    1745                1750                1755

Asp Asn  Asp Ser Lys Ala Val  Thr Gly Trp Gln Thr  Ile Asp Gly
    1760                1765                1770

Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala Glu Ala  Ala Thr Gly
    1775                1780                1785

Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr Phe Asn  Leu Asn Thr
    1790                1795                1800

Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile Asp Gly  Lys Lys Tyr
    1805                1810                1815

Tyr Phe  Asn Thr Asn Thr Phe  Ile Ala Ser Thr Gly  Tyr Thr Ser
    1820                1825                1830

Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr Asp Gly  Ile Met Gln
    1835                1840                1845

Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe Glu Tyr  Phe Ala Pro
    1850                1855                1860

Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly Gln Ala  Ile Leu Tyr
    1865                1870                1875

Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys Lys Tyr  Tyr Phe Gly
    1880                1885                1890

Ser Asp  Ser Lys Ala Val Thr  Gly Leu Arg Thr Ile  Asp Gly Lys
    1895                1900                1905

Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Val Ala Val  Thr Gly Trp
    1910                1915                1920

Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe Asn Thr  Asn Thr Ser
    1925                1930                1935

Ile Ala  Ser Thr Gly Tyr Thr  Ile Ile Ser Gly Lys  His Phe Tyr
    1940                1945                1950

Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly Val Phe  Lys Gly Pro
    1955                1960                1965

Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn Thr Asp  Ala Asn Asn
```

1970 1975 1980

Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu Tyr Leu
1985 1990 1995

His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Ala Thr
2000 2005 2010

Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn
2015 2020 2025

Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn
2030 2035 2040

Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val Phe Lys Gly
2045 2050 2055

Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn
2060 2065 2070

Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu His
2075 2080 2085

Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Val
2090 2095 2100

Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro
2105 2110 2115

Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu Ile Asp Gly
2120 2125 2130

Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Pro Gly Ile
2135 2140 2145

Tyr Gly
2150

<210> 34
<211> 2131
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 34

His His His His His His Ser His Met Ala Ser Asn Lys Glu Ile Leu
1 5 10 15

Ala Val Val Glu Ala Val Ser Asn Glu Lys Ala Leu Pro Arg Glu Lys
20 25 30

```
Ile Phe Glu Ala Leu Glu Ser Ala Leu Ala Thr Ala Thr Lys Lys Lys
        35                  40                  45

Tyr Glu Gln Glu Ile Asp Val Arg Val Gln Ile Asp Arg Lys Ser Gly
    50                  55                  60

Asp Phe Asp Thr Phe Arg Arg Trp Leu Val Val Asp Glu Val Thr Gln
65                  70                  75                  80

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

Leu Asn Leu Gly Asp Tyr Val Glu Asp Gln Ile Glu Ser Val Thr Phe
            100                 105                 110

Asp Arg Ile Thr Thr Gln Thr Ala Lys Gln Val Ile Val Gln Lys Val
        115                 120                 125

Arg Glu Ala Glu Arg Ala Met Val Val Asp Gln Phe Arg Glu His Glu
    130                 135                 140

Gly Glu Ile Ile Thr Gly Val Val Lys Lys Val Asn Arg Asp Asn Ile
145                 150                 155                 160

Ser Leu Asp Leu Gly Asn Asn Ala Glu Ala Val Ile Leu Arg Glu Asp
                165                 170                 175

Met Leu Pro Arg Glu Asn Phe Arg Pro Gly Asp Arg Val Arg Gly Val
            180                 185                 190

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

Arg Ser Lys Pro Glu Met Leu Ile Glu Leu Phe Arg Ile Glu Val Pro
    210                 215                 220

Glu Ile Gly Glu Glu Val Ile Glu Ile Lys Ala Ala Ala Arg Asp Pro
225                 230                 235                 240

Gly Ser Arg Ala Lys Ile Ala Val Lys Thr Asn Asp Lys Arg Ile Asp
                245                 250                 255

Pro Val Gly Ala Cys Val Gly Met Arg Gly Ala Arg Val Gln Ala Val
            260                 265                 270

Ser Thr Glu Leu Gly Gly Glu Arg Ile Asp Ile Val Leu Trp Asp Asp
        275                 280                 285

Asn Pro Ala Gln Phe Val Ile Asn Ala Met Ala Pro Ala Asp Val Ala
    290                 295                 300
```

```
Ser Ile Val Val Asp Glu Asp Lys His Thr Met Asp Ile Ala Val Glu
305                 310                 315                 320

Ala Gly Asn Leu Ala Gln Ala Ile Gly Arg Asn Gly Gln Asn Val Arg
                325                 330                 335

Leu Ala Ser Gln Leu Ser Gly Trp Glu Leu Asn Val Met Thr Val Asp
            340                 345                 350

Asp Leu Gln Ala Lys His Gln Ala Glu Ala His Ala Ala Ile Asp Thr
        355                 360                 365

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

Glu Glu Gly Phe Ser Thr Leu Glu Glu Leu Ala Tyr Val Pro Met Lys
385                 390                 395                 400

Glu Leu Leu Glu Ile Glu Gly Leu Asp Glu Pro Thr Val Glu Ala Leu
                405                 410                 415

Arg Glu Arg Ala Lys Asn Ala Leu Ala Thr Ile Ala Gln Ala Gln Glu
            420                 425                 430

Glu Ser Leu Gly Asp Asn Lys Pro Ala Asp Asp Leu Leu Asn Leu Glu
        435                 440                 445

Gly Val Asp Arg Asp Leu Ala Phe Lys Leu Ala Ala Arg Gly Val Cys
    450                 455                 460

Thr Leu Glu Asp Leu Ala Glu Gln Gly Ile Asp Asp Leu Ala Asp Ile
465                 470                 475                 480

Glu Gly Leu Thr Asp Glu Lys Ala Gly Ala Leu Ile Met Ala Ala Arg
                485                 490                 495

Asn Ile Cys Trp Phe Gly Asp Glu Ala Ser Gly Ala Leu Gly Gly Ser
            500                 505                 510

Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly
        515                 520                 525

Gly Ser Gly Gly Ser Gly Gly Ser Leu Val Pro Arg Gly Ser Gly Ser
    530                 535                 540

Ala Ala Ala Pro Phe Thr Met Glu Ser Lys Lys Tyr Gly Pro Leu Lys
545                 550                 555                 560

Thr Glu Asp Asp Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser
                565                 570                 575
```

```
Glu Ile Asp Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile
            580                 585                 590

Leu Ala Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp
        595                 600                 605

His Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
    610                 615                 620

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
625                 630                 635                 640

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp Glu
                645                 650                 655

Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Arg
            660                 665                 670

Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe Tyr Trp Arg
        675                 680                 685

Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu Lys Pro Val Tyr
    690                 695                 700

Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys Asp Thr Arg Asn Phe
705                 710                 715                 720

Ile Met Pro Thr Ile Thr Thr Asn Glu Ile Arg Asn Lys Leu Ser Tyr
                725                 730                 735

Ser Phe Asp Gly Ala Gly Gly Thr Tyr Ser Leu Leu Leu Ser Ser Tyr
            740                 745                 750

Pro Ile Ser Thr Asn Ile Asn Leu Ser Lys Asp Asp Leu Trp Ile Phe
        755                 760                 765

Asn Ile Asp Asn Glu Val Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile
    770                 775                 780

Lys Lys Gly Lys Leu Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn
785                 790                 795                 800

Lys Asn Lys Leu Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp
                805                 810                 815

Ile Asp Asn Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp
            820                 825                 830

Lys Ile Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser
        835                 840                 845
```

```
Leu Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
    850                 855                 860

Ile Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
865                 870                 875                 880

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile Ser
                885                 890                 895

Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser Lys Asn
            900                 905                 910

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

Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp Asp Ile Asn Thr
    930                 935                 940

Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr Asp Lys Ser Ile Asp
945                 950                 955                 960

Phe Ser Ile Ser Leu Val Ser Lys Asn Gln Val Lys Val Asn Gly Leu
                965                 970                 975

Tyr Leu Asn Glu Ser Val Tyr Ser Ser Tyr Leu Asp Phe Val Lys Asn
            980                 985                 990

Ser Asp Gly His His Asn Thr Ser  Asn Phe Met Asn Leu  Phe Leu Asp
        995                 1000                1005

Asn Ile  Ser Phe Trp Lys Leu  Phe Gly Phe Glu Asn  Ile Asn Phe
    1010                1015                1020

Val Ile  Asp Lys Tyr Phe Thr  Leu Val Gly Lys Thr  Asn Leu Gly
    1025                1030                1035

Tyr Val  Glu Phe Ile Cys Asp  Asn Asn Lys Asn Ile  Asp Ile Tyr
    1040                1045                1050

Phe Gly  Glu Trp Lys Thr Ser  Ser Ser Lys Ser Thr  Ile Phe Ser
    1055                1060                1065

Gly Asn  Gly Arg Asn Val Val  Val Glu Pro Ile Tyr  Asn Pro Asp
    1070                1075                1080

Thr Gly  Glu Asp Ile Ser Thr  Ser Leu Asp Phe Ser  Tyr Glu Pro
    1085                1090                1095

Leu Tyr  Gly Ile Asp Arg Tyr  Ile Asn Lys Val Leu  Ile Ala Pro
    1100                1105                1110
```

```
Asp Leu  Tyr Thr Ser Leu Ile  Asn Ile Asn Thr Asn  Tyr Tyr Ser
    1115                1120                1125

Asn Glu  Tyr Tyr Pro Glu Ile  Ile Val Leu Asn Pro  Asn Thr Phe
    1130                1135                1140

His Lys  Lys Val Asn Ile Asn  Leu Asp Ser Ser Ser  Phe Glu Tyr
    1145                1150                1155

Lys Trp  Ser Thr Glu Gly Ser  Asp Phe Ile Leu Val  Arg Tyr Leu
    1160                1165                1170

Glu Glu  Ser Asn Lys Lys Ile  Leu Gln Lys Ile Arg  Ile Lys Gly
    1175                1180                1185

Ile Leu  Ser Asn Thr Gln Ser  Phe Asn Lys Met Ser  Ile Asp Phe
    1190                1195                1200

Lys Asp  Ile Lys Lys Leu Ser  Leu Gly Tyr Ile Met  Ser Asn Phe
    1205                1210                1215

Lys Ser  Phe Asn Ser Glu Asn  Glu Leu Asp Arg Asp  His Leu Gly
    1220                1225                1230

Phe Lys  Ile Ile Asp Asn Lys  Thr Tyr Tyr Tyr Asp  Glu Asp Ser
    1235                1240                1245

Lys Leu  Val Lys Gly Leu Ile  Asn Ile Asn Asn Ser  Leu Phe Tyr
    1250                1255                1260

Phe Asp  Pro Ile Glu Phe Asn  Leu Val Thr Gly Trp  Gln Thr Ile
    1265                1270                1275

Asn Gly  Lys Lys Tyr Tyr Phe  Asp Ile Asn Thr Gly  Ala Ala Leu
    1280                1285                1290

Ile Ser  Tyr Lys Ile Ile Asn  Gly Lys His Phe Tyr  Phe Asn Asn
    1295                1300                1305

Asp Gly  Val Met Gln Leu Gly  Val Phe Lys Gly Pro  Asp Gly Phe
    1310                1315                1320

Glu Tyr  Phe Ala Pro Ala Asn  Thr Gln Asn Asn Asn  Ile Glu Gly
    1325                1330                1335

Gln Ala  Ile Val Tyr Gln Ser  Lys Phe Leu Thr Leu  Asn Gly Lys
    1340                1345                1350

Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Arg
    1355                1360                1365
```

```
Ile Ile  Asn Asn Glu Lys Tyr  Tyr Phe Asn Pro Asn  Asn Ala Ile
    1370                1375                1380

Ala Ala  Val Gly Leu Gln Val  Ile Asp Asn Asn Lys  Tyr Tyr Phe
    1385                1390                1395

Asn Pro  Asp Thr Ala Ile Ile  Ser Lys Gly Trp Gln  Thr Val Asn
    1400                1405                1410

Gly Ser  Arg Tyr Tyr Phe Asp  Thr Asp Thr Ala Ile  Ala Phe Asn
    1415                1420                1425

Gly Tyr  Lys Thr Ile Asp Gly  Lys His Phe Tyr Phe  Asp Ser Asp
    1430                1435                1440

Cys Val  Val Lys Ile Gly Val  Phe Ser Thr Ser Asn  Gly Phe Glu
    1445                1450                1455

Tyr Phe  Ala Pro Ala Asn Thr  Tyr Asn Asn Asn Ile  Glu Gly Gln
    1460                1465                1470

Ala Ile  Val Tyr Gln Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    1475                1480                1485

Tyr Tyr  Phe Asp Asn Asn Ser  Lys Ala Val Thr Gly  Trp Gln Thr
    1490                1495                1500

Ile Asp  Ser Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    1505                1510                1515

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    1520                1525                1530

Thr Asn  Thr Ala Glu Ala Ala  Thr Gly Trp Gln Thr  Ile Asp Gly
    1535                1540                1545

Lys Lys  Tyr Tyr Phe Asn Thr  Asn Thr Ala Ile Ala  Ser Thr Gly
    1550                1555                1560

Tyr Thr  Ile Ile Asn Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly
    1565                1570                1575

Ile Met  Gln Ile Gly Val Phe  Lys Gly Pro Asn Gly  Phe Glu Tyr
    1580                1585                1590

Phe Ala  Pro Ala Asn Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala
    1595                1600                1605

Ile Leu  Tyr Gln Asn Glu Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr
    1610                1615                1620
```

```
Tyr Phe  Gly Ser Asp Ser Lys  Ala Val Thr Gly Trp  Arg Ile Ile
    1625                1630                1635

Asn Asn  Lys Lys Tyr Tyr Phe  Asn Pro Asn Asn Ala  Ile Ala Ala
    1640                1645                1650

Ile His  Leu Cys Thr Ile Asn  Asn Asp Lys Tyr Tyr  Phe Ser Tyr
    1655                1660                1665

Asp Gly  Ile Leu Gln Asn Gly  Tyr Ile Thr Ile Glu  Arg Asn Asn
    1670                1675                1680

Phe Tyr  Phe Asp Ala Asn Asn  Glu Ser Lys Met Val  Thr Gly Val
    1685                1690                1695

Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    1700                1705                1710

His Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Val Tyr  Gln Asn Lys
    1715                1720                1725

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Asp  Asn Asp Ser
    1730                1735                1740

Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    1745                1750                1755

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    1760                1765                1770

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Leu Asn Thr Ala  Glu Ala Ala
    1775                1780                1785

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    1790                1795                1800

Asn Thr  Phe Ile Ala Ser Thr  Gly Tyr Thr Ser Ile  Asn Gly Lys
    1805                1810                1815

His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    1820                1825                1830

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His
    1835                1840                1845

Asn Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Lys Phe
    1850                1855                1860

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys
    1865                1870                1875
```

```
Ala Val  Thr Gly Leu Arg Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    1880                1885                1890

Asn Thr  Asn Thr Ala Val Ala  Val Thr Gly Trp Gln  Thr Ile Asn
    1895                1900                1905

Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr Ser Ile  Ala Ser Thr
    1910                1915                1920

Gly Tyr  Thr Ile Ile Ser Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    1925                1930                1935

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu
    1940                1945                1950

Tyr Phe  Ala Pro Ala Asn Thr  Asp Ala Asn Asn Ile  Glu Gly Gln
    1955                1960                1965

Ala Ile  Arg Tyr Gln Asn Arg  Phe Leu Tyr Leu His  Asp Asn Ile
    1970                1975                1980

Tyr Tyr  Phe Gly Asn Asn Ser  Lys Ala Ala Thr Gly  Trp Val Thr
    1985                1990                1995

Ile Asp  Gly Asn Arg Tyr Tyr  Phe Glu Pro Asn Thr  Ala Met Gly
    2000                2005                2010

Ala Asn  Gly Tyr Lys Thr Ile  Asp Asn Lys Asn Phe  Tyr Phe Arg
    2015                2020                2025

Asn Gly  Leu Pro Gln Ile Gly  Val Phe Lys Gly Ser  Asn Gly Phe
    2030                2035                2040

Glu Tyr  Phe Ala Pro Ala Asn  Thr Asp Ala Asn Asn  Ile Glu Gly
    2045                2050                2055

Gln Ala  Ile Arg Tyr Gln Asn  Arg Phe Leu His Leu  Leu Gly Lys
    2060                2065                2070

Ile Tyr  Tyr Phe Gly Asn Asn  Ser Lys Ala Val Thr  Gly Trp Gln
    2075                2080                2085

Thr Ile  Asn Gly Lys Val Tyr  Tyr Phe Met Pro Asp  Thr Ala Met
    2090                2095                2100

Ala Ala  Ala Gly Gly Leu Phe  Glu Ile Asp Gly Val  Ile Tyr Phe
    2105                2110                2115

Phe Gly  Val Asp Gly Val Lys  Ala Pro Gly Ile Tyr  Gly
    2120                2125                2130
```

<210> 35
<211> 2137
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 35

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

Ala Val Val Glu Ala Val Ser Asn Glu Lys Ala Leu Pro Arg Glu Lys
            20                  25                  30

Ile Phe Glu Ala Leu Glu Ser Ala Leu Ala Thr Ala Thr Lys Lys Lys
        35                  40                  45

Tyr Glu Gln Glu Ile Asp Val Arg Val Gln Ile Asp Arg Lys Ser Gly
    50                  55                  60

Asp Phe Asp Thr Phe Arg Arg Trp Leu Val Val Asp Glu Val Thr Gln
65                  70                  75                  80

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

Leu Asn Leu Gly Asp Tyr Val Glu Asp Gln Ile Glu Ser Val Thr Phe
            100                 105                 110

Asp Arg Ile Thr Thr Gln Thr Ala Lys Gln Val Ile Val Gln Lys Val
        115                 120                 125

Arg Glu Ala Glu Arg Ala Met Val Val Asp Gln Phe Arg Glu His Glu
    130                 135                 140

Gly Glu Ile Ile Thr Gly Val Val Lys Lys Val Asn Arg Asp Asn Ile
145                 150                 155                 160

Ser Leu Asp Leu Gly Asn Asn Ala Glu Ala Val Ile Leu Arg Glu Asp
                165                 170                 175

Met Leu Pro Arg Glu Asn Phe Arg Pro Gly Asp Arg Val Arg Gly Val
            180                 185                 190

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

Arg Ser Lys Pro Glu Met Leu Ile Glu Leu Phe Arg Ile Glu Val Pro
    210                 215                 220

Glu Ile Gly Glu Glu Val Ile Glu Ile Lys Ala Ala Ala Arg Asp Pro
```

225 230 235 240

Gly Ser Arg Ala Lys Ile Ala Val Lys Thr Asn Asp Lys Arg Ile Asp
245 250 255

Pro Val Gly Ala Cys Val Gly Met Arg Gly Ala Arg Val Gln Ala Val
260 265 270

Ser Thr Glu Leu Gly Gly Glu Arg Ile Asp Ile Val Leu Trp Asp Asp
275 280 285

Asn Pro Ala Gln Phe Val Ile Asn Ala Met Ala Pro Ala Asp Val Ala
290 295 300

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

Ala Gly Asn Leu Ala Gln Ala Ile Gly Arg Asn Gly Gln Asn Val Arg
325 330 335

Leu Ala Ser Gln Leu Ser Gly Trp Glu Leu Asn Val Met Thr Val Asp
340 345 350

Asp Leu Gln Ala Lys His Gln Ala Glu Ala His Ala Ala Ile Asp Thr
355 360 365

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

Glu Glu Gly Phe Ser Thr Leu Glu Glu Leu Ala Tyr Val Pro Met Lys
385 390 395 400

Glu Leu Leu Glu Ile Glu Gly Leu Asp Glu Pro Thr Val Glu Ala Leu
405 410 415

Arg Glu Arg Ala Lys Asn Ala Leu Ala Thr Ile Ala Gln Ala Gln Glu
420 425 430

Glu Ser Leu Gly Asp Asn Lys Pro Ala Asp Asp Leu Leu Asn Leu Glu
435 440 445

Gly Val Asp Arg Asp Leu Ala Phe Lys Leu Ala Ala Arg Gly Val Cys
450 455 460

Thr Leu Glu Asp Leu Ala Glu Gln Gly Ile Asp Asp Leu Ala Asp Ile
465 470 475 480

Glu Gly Leu Thr Asp Glu Lys Ala Gly Ala Leu Ile Met Ala Ala Arg
485 490 495

Asn Ile Cys Trp Phe Gly Asp Glu Ala Ser Gly Ala Leu Leu Ala Glu

```
            500                 505                 510

Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala
        515                 520                 525

Ala Ala Lys Glu Ala Ala Ala Lys Ala Ala Ala Gly Gly Ser Leu Val
    530                 535                 540

Pro Arg Gly Ser Gly Ser Ala Ala Ala Pro Phe Thr Met Glu Ser Lys
545                 550                 555                 560

Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys Ile Leu Val Pro Ile
                565                 570                 575

Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Lys
            580                 585                 590

Leu Gly Thr Cys Asn Ile Leu Ala Met Glu Gly Gly Ser Gly His Thr
        595                 600                 605

Val Thr Gly Asn Ile Asp His Phe Phe Ser Ser Pro Ser Ile Ser Ser
    610                 615                 620

His Ile Pro Ser Leu Ser Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu
625                 630                 635                 640

Asn Leu Asp Phe Ser Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser
                645                 650                 655

Arg Val Phe Trp Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu
            660                 665                 670

Glu Asn Asp Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro
        675                 680                 685

Gly Lys Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr
    690                 695                 700

Thr Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp
705                 710                 715                 720

Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile
                725                 730                 735

Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr Ser
            740                 745                 750

Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu Ser Lys
        755                 760                 765

Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg Glu Ile Ser
```

770 775 780

Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile Lys Asp Val Leu
785 790 795 800

Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile Ile Gly Asn Gln Thr
805 810 815

Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys Asp Arg Tyr Ile Phe Leu
820 825 830

Thr Cys Glu Leu Asp Asp Lys Ile Ser Leu Ile Ile Glu Ile Asn Leu
835 840 845

Val Ala Lys Ser Tyr Ser Leu Leu Leu Ser Gly Asp Lys Asn Tyr Leu
850 855 860

Ile Ser Asn Leu Ser Asn Ile Ile Glu Lys Ile Asn Thr Leu Gly Leu
865 870 875 880

Asp Ser Lys Asn Ile Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys
885 890 895

Tyr Phe Gly Ala Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr
900 905 910

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

Glu Phe Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met
930 935 940

Lys Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn
945 950 955 960

Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln
965 970 975

Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser Tyr
980 985 990

Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser Asn Phe
995 1000 1005

Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu Phe Gly
1010 1015 1020

Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr Leu Val
1025 1030 1035

Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp Asn Asn

1040 1045 1050

Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser Ser Ser
1055 1060 1065

Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val Val Glu
1070 1075 1080

Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr Ser Leu
1085 1090 1095

Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr Ile Asn
1100 1105 1110

Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile Asn Ile
1115 1120 1125

Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile Ile Val
1130 1135 1140

Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn Leu Asp
1145 1150 1155

Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser Asp Phe
1160 1165 1170

Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile Leu Gln
1175 1180 1185

Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser Phe Asn
1190 1195 1200

Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser Leu Gly
1205 1210 1215

Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn Glu Leu
1220 1225 1230

Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys Thr Tyr
1235 1240 1245

Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile Asn Ile
1250 1255 1260

Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn Leu Val
1265 1270 1275

Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asp Ile
1280 1285 1290

Asn Thr Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile Asn Gly Lys

1295 1300 1305

His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly Val Phe
1310 1315 1320

Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Gln
1325 1330 1335

Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe
1340 1345 1350

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys
1355 1360 1365

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr Tyr Phe
1370 1375 1380

Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val Ile Asp
1385 1390 1395

Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile Ser Lys
1400 1405 1410

Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp Thr Asp
1415 1420 1425

Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly Lys His
1430 1435 1440

Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val Phe Ser
1445 1450 1455

Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn
1460 1465 1470

Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe Leu
1475 1480 1485

Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser Lys Ala
1490 1495 1500

Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn
1505 1510 1515

Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly
1520 1525 1530

Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly
1535 1540 1545

Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr

1550 1555 1560

Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe
1565 1570 1575

Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly
1580 1585 1590

Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn
1595 1600 1605

Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe Leu Thr
1610 1615 1620

Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val
1625 1630 1635

Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe Asn Pro
1640 1645 1650

Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn Asn Asp
1655 1660 1665

Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly Tyr Ile
1670 1675 1680

Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn Glu Ser
1685 1690 1695

Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr
1700 1705 1710

Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln Ala
1715 1720 1725

Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr
1730 1735 1740

Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln Thr Ile
1745 1750 1755

Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala
1760 1765 1770

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu
1775 1780 1785

Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys
1790 1795 1800

Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly Tyr

1805 1810 1815

Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile
1820 1825 1830

Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
1835 1840 1845

Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln Ala Ile
1850 1855 1860

Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr
1865 1870 1875

Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp
1880 1885 1890

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
1895 1900 1905

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn
1910 1915 1920

Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His
1925 1930 1935

Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys
1940 1945 1950

Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala
1955 1960 1965

Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu
1970 1975 1980

Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala
1985 1990 1995

Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe Glu
2000 2005 2010

Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp Asn
2015 2020 2025

Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val Phe
2030 2035 2040

Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
2045 2050 2055

Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe

2060 2065 2070

Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys
2075 2080 2085

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe
2090 2095 2100

Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu Ile
2105 2110 2115

Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Pro
2120 2125 2130

Gly Ile Tyr Gly
2135

<210> 36
<211> 2116
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 36

His His His His His His His His His Gly Gly Ser Gly Gly Ser Gly
1 5 10 15

Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly
20 25 30

Ser Gly Gly Ser Gly Gly Ser His Met Ala Ser Asp Lys Ile Ile His
35 40 45

Leu Thr Asp Asp Ser Phe Asp Thr Asp Val Leu Lys Ala Asp Gly Ala
50 55 60

Ile Leu Val Asp Phe Trp Ala Glu Trp Cys Gly Pro Cys Lys Met Ile
65 70 75 80

Ala Pro Ile Leu Asp Glu Ile Ala Asp Glu Tyr Gln Gly Lys Leu Thr
85 90 95

Val Ala Lys Leu Asn Ile Asp Gln Asn Pro Gly Thr Ala Pro Lys Tyr
100 105 110

Gly Ile Arg Gly Ile Pro Thr Leu Leu Leu Phe Lys Asn Gly Glu Val
115 120 125

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

```
Leu Asp Ala Asn Leu Ala Arg Ala Leu Val Pro Arg Gly Ser Val Thr
145                 150                 155                 160

Ser Leu Tyr Lys Lys Ala Gly Ser Ala Ala Ala Pro Phe Thr Met Ile
                165                 170                 175

Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile Asp
            180                 185                 190

Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser Ile
        195                 200                 205

Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro Asp
    210                 215                 220

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

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

His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu Asn
            260                 265                 270

Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp Glu
        275                 280                 285

Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr Tyr
    290                 295                 300

Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val Glu
305                 310                 315                 320

Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys Glu
                325                 330                 335

Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn Leu
            340                 345                 350

Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu Asn
        355                 360                 365

Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys Asp
    370                 375                 380

Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala Gln
385                 390                 395                 400

Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu Val
                405                 410                 415
```

```
Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu Pro Thr
            420                 425                 430

Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp Gly Ile Asn
        435                 440                 445

Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His Asp Pro Leu Leu
    450                 455                 460

Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu Ala Ile Asn Met Ser
465                 470                 475                 480

Leu Ser Ile Ala Ala Thr Val Ala Ser Ile Val Gly Ile Gly Ala Glu
                485                 490                 495

Val Thr Ile Phe Leu Leu Pro Ile Ala Gly Ile Ser Ala Gly Ile Pro
            500                 505                 510

Ser Leu Val Asn Asn Glu Leu Ile Leu His Asp Lys Ala Thr Ser Val
        515                 520                 525

Val Asn Tyr Phe Asn His Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu
    530                 535                 540

Lys Thr Glu Asp Asp Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile
545                 550                 555                 560

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

Ile Leu Ala Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile
            580                 585                 590

Asp His Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu
        595                 600                 605

Ser Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser
    610                 615                 620

Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp
625                 630                 635                 640

Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr
                645                 650                 655

Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe Tyr Trp
            660                 665                 670

Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu Lys Pro Val
        675                 680                 685
```

```
Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys Asp Thr Arg Asn
    690                 695                 700

Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile Arg Asn Lys Leu Ser
705                 710                 715                 720

Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr Ser Leu Leu Leu Ser Ser
                725                 730                 735

Tyr Pro Ile Ser Thr Asn Ile Asn Leu Ser Lys Asp Asp Leu Trp Ile
            740                 745                 750

Phe Asn Ile Asp Asn Glu Val Arg Glu Ile Ser Ile Glu Asn Gly Thr
        755                 760                 765

Ile Lys Lys Gly Lys Leu Ile Lys Asp Val Leu Ser Lys Ile Asp Ile
    770                 775                 780

Asn Lys Asn Lys Leu Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly
785                 790                 795                 800

Asp Ile Asp Asn Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp
                805                 810                 815

Asp Lys Ile Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr
            820                 825                 830

Ser Leu Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser
        835                 840                 845

Asn Ile Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile
    850                 855                 860

Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile
865                 870                 875                 880

Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser Lys
                885                 890                 895

Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn Ser Lys
            900                 905                 910

Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp Asp Ile Asn
        915                 920                 925

Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr Asp Lys Ser Ile
    930                 935                 940

Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln Val Lys Val Asn Gly
945                 950                 955                 960
```

```
Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser Tyr Leu Asp Phe Val Lys
                965                 970                 975

Asn Ser Asp Gly His His Asn Thr Ser Asn Phe Met Asn Leu Phe Leu
            980                 985                 990

Asp Asn Ile Ser Phe Trp Lys Leu  Phe Gly Phe Glu Asn  Ile Asn Phe
        995                 1000                1005

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

Tyr Val  Glu Phe Ile Cys Asp  Asn Asn Lys Asn Ile  Asp Ile Tyr
    1025                1030                1035

Phe Gly  Glu Trp Lys Thr Ser  Ser Ser Lys Ser Thr  Ile Phe Ser
    1040                1045                1050

Gly Asn  Gly Arg Asn Val Val  Val Glu Pro Ile Tyr  Asn Pro Asp
    1055                1060                1065

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

Leu Tyr  Gly Ile Asp Arg Tyr  Ile Asn Lys Val Leu  Ile Ala Pro
    1085                1090                1095

Asp Leu  Tyr Thr Ser Leu Ile  Asn Ile Asn Thr Asn  Tyr Tyr Ser
    1100                1105                1110

Asn Glu  Tyr Tyr Pro Glu Ile  Ile Val Leu Asn Pro  Asn Thr Phe
    1115                1120                1125

His Lys  Lys Val Asn Ile Asn  Leu Asp Ser Ser Ser  Phe Glu Tyr
    1130                1135                1140

Lys Trp  Ser Thr Glu Gly Ser  Asp Phe Ile Leu Val  Arg Tyr Leu
    1145                1150                1155

Glu Glu  Ser Asn Lys Lys Ile  Leu Gln Lys Ile Arg  Ile Lys Gly
    1160                1165                1170

Ile Leu  Ser Asn Thr Gln Ser  Phe Asn Lys Met Ser  Ile Asp Phe
    1175                1180                1185

Lys Asp  Ile Lys Lys Leu Ser  Leu Gly Tyr Ile Met  Ser Asn Phe
    1190                1195                1200

Lys Ser  Phe Asn Ser Glu Asn  Glu Leu Asp Arg Asp  His Leu Gly
    1205                1210                1215
```

```
Phe Lys  Ile Ile Asp Asn Lys  Thr Tyr Tyr Tyr Asp  Glu Asp Ser
    1220                 1225                 1230

Lys Leu  Val Lys Gly Leu Ile  Asn Ile Asn Asn Ser  Leu Phe Tyr
    1235                 1240                 1245

Phe Asp  Pro Ile Glu Phe Asn  Leu Val Thr Gly Trp  Gln Thr Ile
    1250                 1255                 1260

Asn Gly  Lys Lys Tyr Tyr Phe  Asp Ile Asn Thr Gly  Ala Ala Leu
    1265                 1270                 1275

Ile Ser  Tyr Lys Ile Ile Asn  Gly Lys His Phe Tyr  Phe Asn Asn
    1280                 1285                 1290

Asp Gly  Val Met Gln Leu Gly  Val Phe Lys Gly Pro  Asp Gly Phe
    1295                 1300                 1305

Glu Tyr  Phe Ala Pro Ala Asn  Thr Gln Asn Asn Asn  Ile Glu Gly
    1310                 1315                 1320

Gln Ala  Ile Val Tyr Gln Ser  Lys Phe Leu Thr Leu  Asn Gly Lys
    1325                 1330                 1335

Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala Val Thr  Gly Trp Arg
    1340                 1345                 1350

Ile Ile  Asn Asn Glu Lys Tyr  Tyr Phe Asn Pro Asn  Asn Ala Ile
    1355                 1360                 1365

Ala Ala  Val Gly Leu Gln Val  Ile Asp Asn Asn Lys  Tyr Tyr Phe
    1370                 1375                 1380

Asn Pro  Asp Thr Ala Ile Ile  Ser Lys Gly Trp Gln  Thr Val Asn
    1385                 1390                 1395

Gly Ser  Arg Tyr Tyr Phe Asp  Thr Asp Thr Ala Ile  Ala Phe Asn
    1400                 1405                 1410

Gly Tyr  Lys Thr Ile Asp Gly  Lys His Phe Tyr Phe  Asp Ser Asp
    1415                 1420                 1425

Cys Val  Val Lys Ile Gly Val  Phe Ser Thr Ser Asn  Gly Phe Glu
    1430                 1435                 1440

Tyr Phe  Ala Pro Ala Asn Thr  Tyr Asn Asn Asn Ile  Glu Gly Gln
    1445                 1450                 1455

Ala Ile  Val Tyr Gln Ser Lys  Phe Leu Thr Leu Asn  Gly Lys Lys
    1460                 1465                 1470
```

```
Tyr Tyr  Phe Asp Asn Asn Ser  Lys Ala Val Thr Gly  Trp Gln Thr
    1475                 1480                 1485

Ile Asp  Ser Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Glu Ala
    1490                 1495                 1500

Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    1505                 1510                 1515

Thr Asn  Thr Ala Glu Ala Ala  Thr Gly Trp Gln Thr  Ile Asp Gly
    1520                 1525                 1530

Lys Lys  Tyr Tyr Phe Asn Thr  Asn Thr Ala Ile Ala  Ser Thr Gly
    1535                 1540                 1545

Tyr Thr  Ile Ile Asn Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly
    1550                 1555                 1560

Ile Met  Gln Ile Gly Val Phe  Lys Gly Pro Asn Gly  Phe Glu Tyr
    1565                 1570                 1575

Phe Ala  Pro Ala Asn Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala
    1580                 1585                 1590

Ile Leu  Tyr Gln Asn Glu Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr
    1595                 1600                 1605

Tyr Phe  Gly Ser Asp Ser Lys  Ala Val Thr Gly Trp  Arg Ile Ile
    1610                 1615                 1620

Asn Asn  Lys Lys Tyr Tyr Phe  Asn Pro Asn Asn Ala  Ile Ala Ala
    1625                 1630                 1635

Ile His  Leu Cys Thr Ile Asn  Asn Asp Lys Tyr Tyr  Phe Ser Tyr
    1640                 1645                 1650

Asp Gly  Ile Leu Gln Asn Gly  Tyr Ile Thr Ile Glu  Arg Asn Asn
    1655                 1660                 1665

Phe Tyr  Phe Asp Ala Asn Asn  Glu Ser Lys Met Val  Thr Gly Val
    1670                 1675                 1680

Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr
    1685                 1690                 1695

His Asn  Asn Asn Ile Glu Gly  Gln Ala Ile Val Tyr  Gln Asn Lys
    1700                 1705                 1710

Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr Phe Asp  Asn Asp Ser
    1715                 1720                 1725
```

```
Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    1730                1735                1740

Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    1745                1750                1755

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Leu Asn Thr Ala  Glu Ala Ala
    1760                1765                1770

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    1775                1780                1785

Asn Thr  Phe Ile Ala Ser Thr  Gly Tyr Thr Ser Ile  Asn Gly Lys
    1790                1795                1800

His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe
    1805                1810                1815

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His
    1820                1825                1830

Asn Asn  Asn Ile Glu Gly Gln  Ala Ile Leu Tyr Gln  Asn Lys Phe
    1835                1840                1845

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys
    1850                1855                1860

Ala Val  Thr Gly Leu Arg Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    1865                1870                1875

Asn Thr  Asn Thr Ala Val Ala  Val Thr Gly Trp Gln  Thr Ile Asn
    1880                1885                1890

Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr Ser Ile  Ala Ser Thr
    1895                1900                1905

Gly Tyr  Thr Ile Ile Ser Gly  Lys His Phe Tyr Phe  Asn Thr Asp
    1910                1915                1920

Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly Pro Asp  Gly Phe Glu
    1925                1930                1935

Tyr Phe  Ala Pro Ala Asn Thr  Asp Ala Asn Asn Ile  Glu Gly Gln
    1940                1945                1950

Ala Ile  Arg Tyr Gln Asn Arg  Phe Leu Tyr Leu His  Asp Asn Ile
    1955                1960                1965

Tyr Tyr  Phe Gly Asn Asn Ser  Lys Ala Ala Thr Gly  Trp Val Thr
    1970                1975                1980
```

Ile Asp Gly Asn Arg Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly
1985 1990 1995

Ala Asn Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg
2000 2005 2010

Asn Gly Leu Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe
2015 2020 2025

Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly
2030 2035 2040

Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu His Leu Leu Gly Lys
2045 2050 2055

Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala Val Thr Gly Trp Gln
2060 2065 2070

Thr Ile Asn Gly Lys Val Tyr Tyr Phe Met Pro Asp Thr Ala Met
2075 2080 2085

Ala Ala Ala Gly Gly Leu Phe Glu Ile Asp Gly Val Ile Tyr Phe
2090 2095 2100

Phe Gly Val Asp Gly Val Lys Ala Pro Gly Ile Tyr Gly
2105 2110 2115

<210> 37
<211> 2123
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 37

His His His His His His His His His His Gly Gly Ser Leu Ala Glu
1 5 10 15

Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala
20 25 30

Ala Ala Lys Glu Ala Ala Ala Lys Ala Ala Ala Gly Gly Ser His Met
35 40 45

Ala Ser Asp Lys Ile Ile His Leu Thr Asp Asp Ser Phe Asp Thr Asp
50 55 60

Val Leu Lys Ala Asp Gly Ala Ile Leu Val Asp Phe Trp Ala Glu Trp
65 70 75 80

Cys Gly Pro Cys Lys Met Ile Ala Pro Ile Leu Asp Glu Ile Ala Asp

```
                85                  90                  95

Glu Tyr Gln Gly Lys Leu Thr Val Ala Lys Leu Asn Ile Asp Gln Asn
            100                 105                 110

Pro Gly Thr Ala Pro Lys Tyr Gly Ile Arg Gly Ile Pro Thr Leu Leu
        115                 120                 125

Leu Phe Lys Asn Gly Glu Val Ala Ala Thr Lys Val Gly Ala Leu Ser
    130                 135                 140

Lys Gly Gln Leu Lys Glu Phe Leu Asp Ala Asn Leu Ala Arg Ala Leu
145                 150                 155                 160

Val Pro Arg Gly Ser Val Thr Ser Leu Tyr Lys Lys Ala Gly Ser Ala
                165                 170                 175

Ala Ala Pro Phe Thr Met Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr
            180                 185                 190

Ile Phe Phe Asp Ser Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn
        195                 200                 205

Ile Pro Gly Leu Ala Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu
    210                 215                 220

Asp Ala Ser Val Ser Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys
225                 230                 235                 240

Leu Asn Ile Glu Ser Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu
                245                 250                 255

Glu Pro Val Lys Asn Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp
            260                 265                 270

Glu Phe Asn Leu Leu Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys
        275                 280                 285

Lys Leu Asn Asn Leu Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile
    290                 295                 300

Ser Lys Asn Asn Ser Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn
305                 310                 315                 320

Gly Glu Ser Val Tyr Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr
                325                 330                 335

Ser Glu His Ile Thr Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile
            340                 345                 350

Thr Asp Val Asn Gly Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr
```

```
        355                 360                 365

Ser Gln Val Asn Thr Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile
    370                 375                 380

Asp Tyr Ser Ser Asn Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val
385                 390                 395                 400

Lys Val Gln Leu Tyr Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile
                405                 410                 415

Tyr Asp Ser Ile Gln Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp
            420                 425                 430

Thr Ile Asn Val Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser
        435                 440                 445

Thr Ile Leu Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu
    450                 455                 460

Asp Glu His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly
465                 470                 475                 480

Val Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser
                485                 490                 495

Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala
            500                 505                 510

Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Ile Leu
        515                 520                 525

His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu Ser Glu
    530                 535                 540

Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys Ile Leu Val
545                 550                 555                 560

Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser
                565                 570                 575

Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met Glu Gly Gly Ser Gly
            580                 585                 590

His Thr Val Thr Gly Asn Ile Asp His Phe Phe Ser Ser Pro Ser Ile
        595                 600                 605

Ser Ser His Ile Pro Ser Leu Ser Ile Tyr Ser Ala Ile Gly Ile Glu
    610                 615                 620

Thr Glu Asn Leu Asp Phe Ser Lys Lys Ile Met Met Leu Pro Asn Ala
```

625 630 635 640

Pro Ser Arg Val Phe Trp Trp Glu Thr Gly Ala Val Pro Gly Leu Arg
645 650 655

Ser Leu Glu Asn Asp Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu
660 665 670

Tyr Pro Gly Lys Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala
675 680 685

Ile Thr Thr Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys
690 695 700

Leu Asp Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn
705 710 715 720

Glu Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr
725 730 735

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
740 745 750

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg Glu
755 760 765

Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile Lys Asp
770 775 780

Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile Ile Gly Asn
785 790 795 800

Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys Asp Arg Tyr Ile
805 810 815

Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser Leu Ile Ile Glu Ile
820 825 830

Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu Leu Ser Gly Asp Lys Asn
835 840 845

Tyr Leu Ile Ser Asn Leu Ser Asn Ile Ile Glu Lys Ile Asn Thr Leu
850 855 860

Gly Leu Asp Ser Lys Asn Ile Ala Tyr Asn Tyr Thr Asp Glu Ser Asn
865 870 875 880

Asn Lys Tyr Phe Gly Ala Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile
885 890 895

His Tyr Lys Lys Asp Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser

900 905 910

Thr Leu Glu Phe Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val
915 920 925

Phe Met Lys Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp
930 935 940

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

Asn Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
965 970 975

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
980 985 990

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu Phe
995 1000 1005

Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr Leu
1010 1015 1020

Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp Asn
1025 1030 1035

Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser Ser
1040 1045 1050

Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val Val
1055 1060 1065

Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr Ser
1070 1075 1080

Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr Ile
1085 1090 1095

Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile Asn
1100 1105 1110

Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile Ile
1115 1120 1125

Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn Leu
1130 1135 1140

Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser Asp
1145 1150 1155

Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile Leu

1160 1165 1170

Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser Phe
1175 1180 1185

Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser Leu
1190 1195 1200

Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn Glu
1205 1210 1215

Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys Thr
1220 1225 1230

Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile Asn
1235 1240 1245

Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn Leu
1250 1255 1260

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asp
1265 1270 1275

Ile Asn Thr Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile Asn Gly
1280 1285 1290

Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly Val
1295 1300 1305

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
1310 1315 1320

Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
1325 1330 1335

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser
1340 1345 1350

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr Tyr
1355 1360 1365

Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val Ile
1370 1375 1380

Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile Ser
1385 1390 1395

Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp Thr
1400 1405 1410

Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly Lys

1415 1420 1425

His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val Phe
1430 1435 1440

Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Tyr
1445 1450 1455

Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe
1460 1465 1470

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser Lys
1475 1480 1485

Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe
1490 1495 1500

Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp
1505 1510 1515

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr
1520 1525 1530

Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn
1535 1540 1545

Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His
1550 1555 1560

Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys
1565 1570 1575

Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala
1580 1585 1590

Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe Leu
1595 1600 1605

Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala
1610 1615 1620

Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe Asn
1625 1630 1635

Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn Asn
1640 1645 1650

Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly Tyr
1655 1660 1665

Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn Glu

1670 1675 1680

Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
1685 1690 1695

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
1700 1705 1710

Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
1715 1720 1725

Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln Thr
1730 1735 1740

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala
1745 1750 1755

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
1760 1765 1770

Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly
1775 1780 1785

Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly
1790 1795 1800

Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly
1805 1810 1815

Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr
1820 1825 1830

Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln Ala
1835 1840 1845

Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr
1850 1855 1860

Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile
1865 1870 1875

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val
1880 1885 1890

Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr
1895 1900 1905

Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys
1910 1915 1920

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe

1925 1930 1935

Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
1940 1945 1950

Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe
1955 1960 1965

Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys
1970 1975 1980

Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe
1985 1990 1995

Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp
2000 2005 2010

Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val
2015 2020 2025

Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
2030 2035 2040

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
2045 2050 2055

Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser
2060 2065 2070

Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr
2075 2080 2085

Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu
2090 2095 2100

Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala
2105 2110 2115

Pro Gly Ile Tyr Gly
2120

<210> 38
<211> 2104
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 38

His His His His His His Ser His Met Ala Ser Asp Lys Ile Ile His
1 5 10 15

```
Leu Thr Asp Asp Ser Phe Asp Thr Asp Val Leu Lys Ala Asp Gly Ala
            20                  25                  30

Ile Leu Val Asp Phe Trp Ala Glu Trp Cys Gly Pro Cys Lys Met Ile
        35                  40                  45

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

Val Ala Lys Leu Asn Ile Asp Gln Asn Pro Gly Thr Ala Pro Lys Tyr
65                  70                  75                  80

Gly Ile Arg Gly Ile Pro Thr Leu Leu Leu Phe Lys Asn Gly Glu Val
                85                  90                  95

Ala Ala Thr Lys Val Gly Ala Leu Ser Lys Gly Gln Leu Lys Glu Phe
            100                 105                 110

Leu Asp Ala Asn Leu Ala Arg Ala Leu Gly Gly Ser Gly Gly Ser Gly
        115                 120                 125

Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly
    130                 135                 140

Ser Gly Gly Ser Leu Val Pro Arg Gly Ser Gly Ser Ala Ala Ala Pro
145                 150                 155                 160

Phe Thr Met Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe
                165                 170                 175

Asp Ser Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly
            180                 185                 190

Leu Ala Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser
        195                 200                 205

Val Ser Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile
    210                 215                 220

Glu Ser Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val
225                 230                 235                 240

Lys Asn Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn
                245                 250                 255

Leu Leu Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn
            260                 265                 270

Asn Leu Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn
        275                 280                 285
```

```
Asn Ser Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser
    290                 295                 300

Val Tyr Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His
305                 310                 315                 320

Ile Thr Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val
                325                 330                 335

Asn Gly Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val
            340                 345                 350

Asn Thr Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser
        355                 360                 365

Ser Asn Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln
    370                 375                 380

Leu Tyr Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser
385                 390                 395                 400

Ile Gln Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn
                405                 410                 415

Val Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
            420                 425                 430

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
        435                 440                 445

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu Ala
    450                 455                 460

Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile Val Gly
465                 470                 475                 480

Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala Gly Ile Ser
                485                 490                 495

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

Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu Ser Glu Ser Lys Lys
        515                 520                 525

Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys Ile Leu Val Pro Ile Asp
    530                 535                 540

Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Lys Leu
545                 550                 555                 560
```

```
Gly Thr Cys Asn Ile Leu Ala Met Glu Gly Gly Ser Gly His Thr Val
                565                 570                 575

Thr Gly Asn Ile Asp His Phe Phe Ser Ser Pro Ser Ile Ser Ser His
            580                 585                 590

Ile Pro Ser Leu Ser Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn
        595                 600                 605

Leu Asp Phe Ser Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg
    610                 615                 620

Val Phe Trp Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu
625                 630                 635                 640

Asn Asp Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly
                645                 650                 655

Lys Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
            660                 665                 670

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
        675                 680                 685

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile Arg
    690                 695                 700

Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr Ser Leu
705                 710                 715                 720

Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu Ser Lys Asp
                725                 730                 735

Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg Glu Ile Ser Ile
            740                 745                 750

Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile Lys Asp Val Leu Ser
        755                 760                 765

Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile Ile Gly Asn Gln Thr Ile
    770                 775                 780

Asp Phe Ser Gly Asp Ile Asp Asn Lys Asp Arg Tyr Ile Phe Leu Thr
785                 790                 795                 800

Cys Glu Leu Asp Asp Lys Ile Ser Leu Ile Ile Glu Ile Asn Leu Val
                805                 810                 815

Ala Lys Ser Tyr Ser Leu Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile
            820                 825                 830
```

```
Ser Asn Leu Ser Asn Ile Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp
        835                 840                 845

Ser Lys Asn Ile Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr
    850                 855                 860

Phe Gly Ala Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys
865                 870                 875                 880

Lys Asp Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu
                885                 890                 895

Phe Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
            900                 905                 910

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
        915                 920                 925

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln Val
    930                 935                 940

Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser Tyr Leu
945                 950                 955                 960

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

Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu Phe Gly Phe Glu
            980                 985                 990

Asn Ile Asn Phe Val Ile Asp Lys  Tyr Phe Thr Leu Val  Gly Lys Thr
        995                 1000                1005

Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp Asn Asn  Lys Asn Ile
    1010                1015                1020

Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser Ser Ser  Lys Ser Thr
    1025                1030                1035

Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val Val Glu  Pro Ile Tyr
    1040                1045                1050

Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr Ser Leu  Asp Phe Ser
    1055                1060                1065

Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr Ile Asn  Lys Val Leu
    1070                1075                1080

Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile Asn Ile  Asn Thr Asn
    1085                1090                1095
```

```
Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile Ile Val  Leu Asn Pro
    1100                1105                1110

Asn Thr  Phe His Lys Lys Val  Asn Ile Asn Leu Asp  Ser Ser Ser
    1115                1120                1125

Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser Asp Phe  Ile Leu Val
    1130                1135                1140

Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile Leu Gln  Lys Ile Arg
    1145                1150                1155

Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser Phe Asn  Lys Met Ser
    1160                1165                1170

Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser Leu Gly  Tyr Ile Met
    1175                1180                1185

Ser Asn  Phe Lys Ser Phe Asn  Ser Glu Asn Glu Leu  Asp Arg Asp
    1190                1195                1200

His Leu  Gly Phe Lys Ile Ile  Asp Asn Lys Thr Tyr  Tyr Tyr Asp
    1205                1210                1215

Glu Asp  Ser Lys Leu Val Lys  Gly Leu Ile Asn Ile  Asn Asn Ser
    1220                1225                1230

Leu Phe  Tyr Phe Asp Pro Ile  Glu Phe Asn Leu Val  Thr Gly Trp
    1235                1240                1245

Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe Asp Ile  Asn Thr Gly
    1250                1255                1260

Ala Ala  Leu Ile Ser Tyr Lys  Ile Ile Asn Gly Lys  His Phe Tyr
    1265                1270                1275

Phe Asn  Asn Asp Gly Val Met  Gln Leu Gly Val Phe  Lys Gly Pro
    1280                1285                1290

Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn Thr Gln  Asn Asn Asn
    1295                1300                1305

Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser Lys Phe  Leu Thr Leu
    1310                1315                1320

Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asp Ser Lys  Ala Val Thr
    1325                1330                1335

Gly Trp  Arg Ile Ile Asn Asn  Glu Lys Tyr Tyr Phe  Asn Pro Asn
    1340                1345                1350
```

```
Asn Ala  Ile Ala Ala Val Gly  Leu Gln Val Ile Asp  Asn Asn Lys
    1355                1360                1365

Tyr Tyr  Phe Asn Pro Asp Thr  Ala Ile Ile Ser Lys  Gly Trp Gln
    1370                1375                1380

Thr Val  Asn Gly Ser Arg Tyr  Tyr Phe Asp Thr Asp  Thr Ala Ile
    1385                1390                1395

Ala Phe  Asn Gly Tyr Lys Thr  Ile Asp Gly Lys His  Phe Tyr Phe
    1400                1405                1410

Asp Ser  Asp Cys Val Val Lys  Ile Gly Val Phe Ser  Thr Ser Asn
    1415                1420                1425

Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr Tyr Asn  Asn Asn Ile
    1430                1435                1440

Glu Gly  Gln Ala Ile Val Tyr  Gln Ser Lys Phe Leu  Thr Leu Asn
    1445                1450                1455

Gly Lys  Lys Tyr Tyr Phe Asp  Asn Asn Ser Lys Ala  Val Thr Gly
    1460                1465                1470

Trp Gln  Thr Ile Asp Ser Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr
    1475                1480                1485

Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile Asp Gly  Lys Lys Tyr
    1490                1495                1500

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    1505                1510                1515

Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Ile Ala
    1520                1525                1530

Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys His Phe  Tyr Phe Asn
    1535                1540                1545

Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe Lys Gly  Pro Asn Gly
    1550                1555                1560

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp Ala Asn  Asn Ile Glu
    1565                1570                1575

Gly Gln  Ala Ile Leu Tyr Gln  Asn Glu Phe Leu Thr  Leu Asn Gly
    1580                1585                1590

Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys Ala Val  Thr Gly Trp
    1595                1600                1605
```

```
Arg Ile  Ile Asn Asn Lys Lys  Tyr Tyr Phe Asn Pro  Asn Asn Ala
    1610                 1615                 1620

Ile Ala  Ala Ile His Leu Cys  Thr Ile Asn Asn Asp  Lys Tyr Tyr
    1625                 1630                 1635

Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly Tyr Ile  Thr Ile Glu
    1640                 1645                 1650

Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn Glu Ser  Lys Met Val
    1655                 1660                 1665

Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe Glu Tyr  Phe Ala Pro
    1670                 1675                 1680

Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly Gln Ala  Ile Val Tyr
    1685                 1690                 1695

Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys Lys Tyr  Tyr Phe Asp
    1700                 1705                 1710

Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln Thr Ile  Asp Gly Lys
    1715                 1720                 1725

Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Glu Ala Ala  Thr Gly Trp
    1730                 1735                 1740

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    1745                 1750                 1755

Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    1760                 1765                 1770

Phe Asn  Thr Asn Thr Phe Ile  Ala Ser Thr Gly Tyr  Thr Ser Ile
    1775                 1780                 1785

Asn Gly  Lys His Phe Tyr Phe  Asn Thr Asp Gly Ile  Met Gln Ile
    1790                 1795                 1800

Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1805                 1810                 1815

Asn Thr  His Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Leu Tyr Gln
    1820                 1825                 1830

Asn Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Gly Ser
    1835                 1840                 1845

Asp Ser  Lys Ala Val Thr Gly  Leu Arg Thr Ile Asp  Gly Lys Lys
    1850                 1855                 1860
```

```
Tyr Tyr  Phe Asn Thr Asn Thr  Ala Val Ala Val Thr  Gly Trp Gln
    1865                 1870                 1875

Thr Ile  Asn Gly Lys Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ser Ile
    1880                 1885                 1890

Ala Ser  Thr Gly Tyr Thr Ile  Ile Ser Gly Lys His  Phe Tyr Phe
    1895                 1900                 1905

Asn Thr  Asp Gly Ile Met Gln  Ile Gly Val Phe Lys  Gly Pro Asp
    1910                 1915                 1920

Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr Asp Ala  Asn Asn Ile
    1925                 1930                 1935

Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg Phe Leu  Tyr Leu His
    1940                 1945                 1950

Asp Asn  Ile Tyr Tyr Phe Gly  Asn Asn Ser Lys Ala  Ala Thr Gly
    1955                 1960                 1965

Trp Val  Thr Ile Asp Gly Asn  Arg Tyr Tyr Phe Glu  Pro Asn Thr
    1970                 1975                 1980

Ala Met  Gly Ala Asn Gly Tyr  Lys Thr Ile Asp Asn  Lys Asn Phe
    1985                 1990                 1995

Tyr Phe  Arg Asn Gly Leu Pro  Gln Ile Gly Val Phe  Lys Gly Ser
    2000                 2005                 2010

Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn Thr Asp  Ala Asn Asn
    2015                 2020                 2025

Ile Glu  Gly Gln Ala Ile Arg  Tyr Gln Asn Arg Phe  Leu His Leu
    2030                 2035                 2040

Leu Gly  Lys Ile Tyr Tyr Phe  Gly Asn Asn Ser Lys  Ala Val Thr
    2045                 2050                 2055

Gly Trp  Gln Thr Ile Asn Gly  Lys Val Tyr Tyr Phe  Met Pro Asp
    2060                 2065                 2070

Thr Ala  Met Ala Ala Ala Gly  Gly Leu Phe Glu Ile  Asp Gly Val
    2075                 2080                 2085

Ile Tyr  Phe Phe Gly Val Asp  Gly Val Lys Ala Pro  Gly Ile Tyr
    2090                 2095                 2100

Gly
```

<210> 39
<211> 2110
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 39

```
His His His His His His Ser His Met Ala Ser Asp Lys Ile Ile His
1               5                   10                  15

Leu Thr Asp Asp Ser Phe Asp Thr Asp Val Leu Lys Ala Asp Gly Ala
            20                  25                  30

Ile Leu Val Asp Phe Trp Ala Glu Trp Cys Gly Pro Cys Lys Met Ile
        35                  40                  45

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

Val Ala Lys Leu Asn Ile Asp Gln Asn Pro Gly Thr Ala Pro Lys Tyr
65                  70                  75                  80

Gly Ile Arg Gly Ile Pro Thr Leu Leu Leu Phe Lys Asn Gly Glu Val
                85                  90                  95

Ala Ala Thr Lys Val Gly Ala Leu Ser Lys Gly Gln Leu Lys Glu Phe
            100                 105                 110

Leu Asp Ala Asn Leu Ala Arg Ala Leu Leu Ala Glu Ala Ala Ala Lys
        115                 120                 125

Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu
    130                 135                 140

Ala Ala Ala Lys Ala Ala Ala Gly Gly Ser Leu Val Pro Arg Gly Ser
145                 150                 155                 160

Gly Ser Ala Ala Ala Pro Phe Thr Met Ile Met Ser Asp Leu Ser Ser
                165                 170                 175

Lys Glu Tyr Ile Phe Phe Asp Ser Ile Asp Asn Lys Leu Lys Ala Lys
            180                 185                 190

Ser Lys Asn Ile Pro Gly Leu Ala Ser Ile Ser Glu Asp Ile Lys Thr
        195                 200                 205

Leu Leu Leu Asp Ala Ser Val Ser Pro Asp Thr Lys Phe Ile Leu Asn
    210                 215                 220

Asn Leu Lys Leu Asn Ile Glu Ser Ser Ile Gly Asp Tyr Ile Tyr Tyr
```

225 230 235 240

Glu Lys Leu Glu Pro Val Lys Asn Ile Ile His Asn Ser Ile Asp Asp
245 250 255

Leu Ile Asp Glu Phe Asn Leu Leu Glu Asn Val Ser Asp Glu Leu Tyr
260 265 270

Glu Leu Lys Lys Leu Asn Asn Leu Asp Glu Lys Tyr Leu Ile Ser Phe
275 280 285

Glu Asp Ile Ser Lys Asn Asn Ser Thr Tyr Ser Val Arg Phe Ile Asn
290 295 300

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

Ser Lys Tyr Ser Glu His Ile Thr Lys Glu Ile Ser Thr Ile Lys Asn
325 330 335

Ser Ile Ile Thr Asp Val Asn Gly Asn Leu Leu Asp Asn Ile Gln Leu
340 345 350

Asp His Thr Ser Gln Val Asn Thr Leu Asn Ala Ala Phe Phe Ile Gln
355 360 365

Ser Leu Ile Asp Tyr Ser Ser Asn Lys Asp Val Leu Asn Asp Leu Ser
370 375 380

Thr Ser Val Lys Val Gln Leu Tyr Ala Gln Leu Phe Ser Thr Gly Leu
385 390 395 400

Asn Thr Ile Tyr Asp Ser Ile Gln Leu Val Asn Leu Ile Ser Asn Ala
405 410 415

Val Asn Asp Thr Ile Asn Val Leu Pro Thr Ile Thr Glu Gly Ile Pro
420 425 430

Ile Val Ser Thr Ile Leu Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys
435 440 445

Glu Leu Leu Asp Glu His Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala
450 455 460

Lys Val Gly Val Leu Ala Ile Asn Met Ser Leu Ser Ile Ala Ala Thr
465 470 475 480

Val Ala Ser Ile Val Gly Ile Gly Ala Glu Val Thr Ile Phe Leu Leu
485 490 495

Pro Ile Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu

500 505 510

Leu Ile Leu His Asp Lys Ala Thr Ser Val Val Asn Tyr Phe Asn His
515 520 525

Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys
530 535 540

Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn
545 550 555 560

Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met Glu Gly
565 570 575

Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe Phe Ser Ser
580 585 590

Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile Tyr Ser Ala Ile
595 600 605

Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys Lys Ile Met Met Leu
610 615 620

Pro Asn Ala Pro Ser Arg Val Phe Trp Trp Glu Thr Gly Ala Val Pro
625 630 635 640

Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Arg Leu Leu Asp Ser Ile
645 650 655

Arg Asp Leu Tyr Pro Gly Lys Phe Tyr Trp Arg Phe Tyr Ala Phe Phe
660 665 670

Asp Tyr Ala Ile Thr Thr Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile
675 680 685

Lys Ile Lys Leu Asp Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile
690 695 700

Thr Thr Asn Glu Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala
705 710 715 720

Gly Gly Thr Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn
725 730 735

Ile Asn Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu
740 745 750

Val Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu
755 760 765

Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile

770 775 780

Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys Asp
785 790 795 800

Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser Leu Ile
805 810 815

Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu Leu Ser Gly
820 825 830

Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Ile Ile Glu Lys Ile
835 840 845

Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala Tyr Asn Tyr Thr Asp
850 855 860

Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile Ser Lys Thr Ser Gln Lys
865 870 875 880

Ser Ile Ile His Tyr Lys Lys Asp Ser Lys Asn Ile Leu Glu Phe Tyr
885 890 895

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

Ile Asn Val Phe Met Lys Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr
915 920 925

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

Val Ser Lys Asn Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser
945 950 955 960

Val Tyr Ser Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His
965 970 975

Asn Thr Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp
980 985 990

Lys Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe
995 1000 1005

Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
1010 1015 1020

Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr
1025 1030 1035

Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val

1040 1045 1050

Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
1055 1060 1065

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg
1070 1075 1080

Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu
1085 1090 1095

Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
1100 1105 1110

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile
1115 1120 1125

Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly
1130 1135 1140

Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys
1145 1150 1155

Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln
1160 1165 1170

Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu
1175 1180 1185

Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
1190 1195 1200

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn
1205 1210 1215

Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu
1220 1225 1230

Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe
1235 1240 1245

Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
1250 1255 1260

Phe Asp Ile Asn Thr Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile
1265 1270 1275

Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu
1280 1285 1290

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala

1295 1300 1305

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln
1310 1315 1320

Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn
1325 1330 1335

Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
1340 1345 1350

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln
1355 1360 1365

Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile
1370 1375 1380

Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe
1385 1390 1395

Asp Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp
1400 1405 1410

Gly Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly
1415 1420 1425

Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1430 1435 1440

Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
1445 1450 1455

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn
1460 1465 1470

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr
1475 1480 1485

Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
1490 1495 1500

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala
1505 1510 1515

Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
1520 1525 1530

Thr Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly
1535 1540 1545

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val

1550 1555 1560

Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
1565 1570 1575

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu
1580 1585 1590

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser
1595 1600 1605

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr
1610 1615 1620

Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile
1625 1630 1635

Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
1640 1645 1650

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn
1655 1660 1665

Asn Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly
1670 1675 1680

Phe Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu
1685 1690 1695

Gly Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly
1700 1705 1710

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp
1715 1720 1725

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala
1730 1735 1740

Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr
1745 1750 1755

Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
1760 1765 1770

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser
1775 1780 1785

Thr Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr
1790 1795 1800

Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe

1805 1810 1815

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
1820 1825 1830

Gln Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
1835 1840 1845

Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg
1850 1855 1860

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val
1865 1870 1875

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe
1880 1885 1890

Asn Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser
1895 1900 1905

Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly
1910 1915 1920

Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1925 1930 1935

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
1940 1945 1950

Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn
1955 1960 1965

Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr
1970 1975 1980

Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr
1985 1990 1995

Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile
2000 2005 2010

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala
2015 2020 2025

Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln
2030 2035 2040

Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
2045 2050 2055

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val

2060 2065 2070

Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu
2075 2080 2085

Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val
2090 2095 2100

Lys Ala Pro Gly Ile Tyr Gly
2105 2110

<210> 40
<211> 1755
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 40

His His His His His His His His His Gly Gly Ser Gly Gly Ser Gly
1 5 10 15

Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly
20 25 30

Ser Gly Gly Ser Gly Gly Ser His Met Ala Ser Asp Lys Ile Ile His
35 40 45

Leu Thr Asp Asp Ser Phe Asp Thr Asp Val Leu Lys Ala Asp Gly Ala
50 55 60

Ile Leu Val Asp Phe Trp Ala Glu Trp Cys Gly Pro Cys Lys Met Ile
65 70 75 80

Ala Pro Ile Leu Asp Glu Ile Ala Asp Glu Tyr Gln Gly Lys Leu Thr
85 90 95

Val Ala Lys Leu Asn Ile Asp Gln Asn Pro Gly Thr Ala Pro Lys Tyr
100 105 110

Gly Ile Arg Gly Ile Pro Thr Leu Leu Leu Phe Lys Asn Gly Glu Val
115 120 125

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

Leu Asp Ala Asn Leu Ala Arg Ala Leu Val Pro Arg Gly Ser Val Thr
145 150 155 160

Ser Leu Tyr Lys Lys Ala Gly Ser Ala Ala Ala Pro Phe Thr Met Glu
165 170 175

```
Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys Ile Leu Val
            180                 185                 190

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

Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met Glu Gly Gly Ser Gly
    210                 215                 220

His Thr Val Thr Gly Asn Ile Asp His Phe Phe Ser Ser Pro Ser Ile
225                 230                 235                 240

Ser Ser His Ile Pro Ser Leu Ser Ile Tyr Ser Ala Ile Gly Ile Glu
                245                 250                 255

Thr Glu Asn Leu Asp Phe Ser Lys Lys Ile Met Met Leu Pro Asn Ala
            260                 265                 270

Pro Ser Arg Val Phe Trp Trp Glu Thr Gly Ala Val Pro Gly Leu Arg
        275                 280                 285

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

Tyr Pro Gly Lys Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala
305                 310                 315                 320

Ile Thr Thr Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys
                325                 330                 335

Leu Asp Lys Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn
            340                 345                 350

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

Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu
    370                 375                 380

Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg Glu
385                 390                 395                 400

Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile Lys Asp
                405                 410                 415

Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile Ile Gly Asn
            420                 425                 430

Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys Asp Arg Tyr Ile
        435                 440                 445
```

```
Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser Leu Ile Ile Glu Ile
    450                 455                 460

Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu Leu Ser Gly Asp Lys Asn
465                 470                 475                 480

Tyr Leu Ile Ser Asn Leu Ser Asn Ile Ile Glu Lys Ile Asn Thr Leu
                485                 490                 495

Gly Leu Asp Ser Lys Asn Ile Ala Tyr Asn Tyr Thr Asp Glu Ser Asn
            500                 505                 510

Asn Lys Tyr Phe Gly Ala Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile
        515                 520                 525

His Tyr Lys Lys Asp Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser
    530                 535                 540

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

Phe Met Lys Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp
                565                 570                 575

Asn Asn Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys
            580                 585                 590

Asn Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser
        595                 600                 605

Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His His Asn Thr Ser
    610                 615                 620

Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu Phe
625                 630                 635                 640

Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr Phe Thr Leu Val
                645                 650                 655

Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys Asp Asn Asn Lys
            660                 665                 670

Asn Ile Asp Ile Tyr Phe Gly Glu Trp Lys Thr Ser Ser Ser Lys Ser
        675                 680                 685

Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val Val Glu Pro Ile Tyr
    690                 695                 700

Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr Ser Leu Asp Phe Ser Tyr
705                 710                 715                 720
```

```
Glu Pro Leu Tyr Gly Ile Asp Arg Tyr Ile Asn Lys Val Leu Ile Ala
                725                 730                 735

Pro Asp Leu Tyr Thr Ser Leu Ile Asn Ile Asn Thr Asn Tyr Tyr Ser
            740                 745                 750

Asn Glu Tyr Tyr Pro Glu Ile Ile Val Leu Asn Pro Asn Thr Phe His
        755                 760                 765

Lys Lys Val Asn Ile Asn Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp
    770                 775                 780

Ser Thr Glu Gly Ser Asp Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser
785                 790                 795                 800

Asn Lys Lys Ile Leu Gln Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn
                805                 810                 815

Thr Gln Ser Phe Asn Lys Met Ser Ile Asp Phe Lys Asp Ile Lys Lys
            820                 825                 830

Leu Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser Phe Asn Ser Glu
        835                 840                 845

Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile Ile Asp Asn Lys
    850                 855                 860

Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys Leu Val Lys Gly Leu Ile Asn
865                 870                 875                 880

Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu Phe Asn Leu Val
                885                 890                 895

Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asp Ile Asn
            900                 905                 910

Thr Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile Asn Gly Lys His Phe
        915                 920                 925

Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly Val Phe Lys Gly Pro
    930                 935                 940

Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Gln Asn Asn Asn Ile
945                 950                 955                 960

Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe Leu Thr Leu Asn Gly
                965                 970                 975

Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Arg
            980                 985                 990
```

```
Ile Ile Asn Asn Glu Lys Tyr Tyr  Phe Asn Pro Asn Asn  Ala Ile Ala
        995                 1000                1005

Ala Val  Gly Leu Gln Val Ile  Asp Asn Asn Lys Tyr  Tyr Phe Asn
    1010                1015                1020

Pro Asp  Thr Ala Ile Ile Ser  Lys Gly Trp Gln Thr  Val Asn Gly
    1025                1030                1035

Ser Arg  Tyr Tyr Phe Asp Thr  Asp Thr Ala Ile Ala  Phe Asn Gly
    1040                1045                1050

Tyr Lys  Thr Ile Asp Gly Lys  His Phe Tyr Phe Asp  Ser Asp Cys
    1055                1060                1065

Val Val  Lys Ile Gly Val Phe  Ser Thr Ser Asn Gly  Phe Glu Tyr
    1070                1075                1080

Phe Ala  Pro Ala Asn Thr Tyr  Asn Asn Asn Ile Glu  Gly Gln Ala
    1085                1090                1095

Ile Val  Tyr Gln Ser Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr
    1100                1105                1110

Tyr Phe  Asp Asn Asn Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile
    1115                1120                1125

Asp Ser  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala
    1130                1135                1140

Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    1145                1150                1155

Asn Thr  Ala Glu Ala Ala Thr  Gly Trp Gln Thr Ile  Asp Gly Lys
    1160                1165                1170

Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ala Ile Ala Ser  Thr Gly Tyr
    1175                1180                1185

Thr Ile  Ile Asn Gly Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile
    1190                1195                1200

Met Gln  Ile Gly Val Phe Lys  Gly Pro Asn Gly Phe  Glu Tyr Phe
    1205                1210                1215

Ala Pro  Ala Asn Thr Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile
    1220                1225                1230

Leu Tyr  Gln Asn Glu Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr
    1235                1240                1245
```

```
Phe Gly  Ser Asp Ser Lys Ala  Val Thr Gly Trp Arg  Ile Ile Asn
    1250                 1255                 1260

Asn Lys  Lys Tyr Tyr Phe Asn  Pro Asn Asn Ala Ile  Ala Ala Ile
    1265                 1270                 1275

His Leu  Cys Thr Ile Asn Asn  Asp Lys Tyr Tyr Phe  Ser Tyr Asp
    1280                 1285                 1290

Gly Ile  Leu Gln Asn Gly Tyr  Ile Thr Ile Glu Arg  Asn Asn Phe
    1295                 1300                 1305

Tyr Phe  Asp Ala Asn Asn Glu  Ser Lys Met Val Thr  Gly Val Phe
    1310                 1315                 1320

Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr His
    1325                 1330                 1335

Asn Asn  Asn Ile Glu Gly Gln  Ala Ile Val Tyr Gln  Asn Lys Phe
    1340                 1345                 1350

Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe Asp Asn  Asp Ser Lys
    1355                 1360                 1365

Ala Val  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    1370                 1375                 1380

Asn Leu  Asn Thr Ala Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp
    1385                 1390                 1395

Gly Lys  Lys Tyr Tyr Phe Asn  Leu Asn Thr Ala Glu  Ala Ala Thr
    1400                 1405                 1410

Gly Trp  Gln Thr Ile Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn
    1415                 1420                 1425

Thr Phe  Ile Ala Ser Thr Gly  Tyr Thr Ser Ile Asn  Gly Lys His
    1430                 1435                 1440

Phe Tyr  Phe Asn Thr Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys
    1445                 1450                 1455

Gly Pro  Asn Gly Phe Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn
    1460                 1465                 1470

Asn Asn  Ile Glu Gly Gln Ala  Ile Leu Tyr Gln Asn  Lys Phe Leu
    1475                 1480                 1485

Thr Leu  Asn Gly Lys Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala
    1490                 1495                 1500
```

```
Val Thr  Gly Leu Arg Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    1505                 1510                 1515

Thr Asn  Thr Ala Val Ala Val  Thr Gly Trp Gln Thr  Ile Asn Gly
    1520                 1525                 1530

Lys Lys  Tyr Tyr Phe Asn Thr  Asn Thr Ser Ile Ala  Ser Thr Gly
    1535                 1540                 1545

Tyr Thr  Ile Ile Ser Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly
    1550                 1555                 1560

Ile Met  Gln Ile Gly Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr
    1565                 1570                 1575

Phe Ala  Pro Ala Asn Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala
    1580                 1585                 1590

Ile Arg  Tyr Gln Asn Arg Phe  Leu Tyr Leu His Asp  Asn Ile Tyr
    1595                 1600                 1605

Tyr Phe  Gly Asn Asn Ser Lys  Ala Ala Thr Gly Trp  Val Thr Ile
    1610                 1615                 1620

Asp Gly  Asn Arg Tyr Tyr Phe  Glu Pro Asn Thr Ala  Met Gly Ala
    1625                 1630                 1635

Asn Gly  Tyr Lys Thr Ile Asp  Asn Lys Asn Phe Tyr  Phe Arg Asn
    1640                 1645                 1650

Gly Leu  Pro Gln Ile Gly Val  Phe Lys Gly Ser Asn  Gly Phe Glu
    1655                 1660                 1665

Tyr Phe  Ala Pro Ala Asn Thr  Asp Ala Asn Asn Ile  Glu Gly Gln
    1670                 1675                 1680

Ala Ile  Arg Tyr Gln Asn Arg  Phe Leu His Leu Leu  Gly Lys Ile
    1685                 1690                 1695

Tyr Tyr  Phe Gly Asn Asn Ser  Lys Ala Val Thr Gly  Trp Gln Thr
    1700                 1705                 1710

Ile Asn  Gly Lys Val Tyr Tyr  Phe Met Pro Asp Thr  Ala Met Ala
    1715                 1720                 1725

Ala Ala  Gly Gly Leu Phe Glu  Ile Asp Gly Val Ile  Tyr Phe Phe
    1730                 1735                 1740

Gly Val  Asp Gly Val Lys Ala  Pro Gly Ile Tyr Gly
    1745                 1750                 1755
```

<210> 41
<211> 1762
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 41

```
His His His His His His His His His His Gly Gly Ser Leu Ala Glu
1               5                   10                  15

Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala
            20                  25                  30

Ala Ala Lys Glu Ala Ala Ala Lys Ala Ala Ala Gly Gly Ser His Met
        35                  40                  45

Ala Ser Asp Lys Ile Ile His Leu Thr Asp Asp Ser Phe Asp Thr Asp
    50                  55                  60

Val Leu Lys Ala Asp Gly Ala Ile Leu Val Asp Phe Trp Ala Glu Trp
65                  70                  75                  80

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

Glu Tyr Gln Gly Lys Leu Thr Val Ala Lys Leu Asn Ile Asp Gln Asn
            100                 105                 110

Pro Gly Thr Ala Pro Lys Tyr Gly Ile Arg Gly Ile Pro Thr Leu Leu
        115                 120                 125

Leu Phe Lys Asn Gly Glu Val Ala Ala Thr Lys Val Gly Ala Leu Ser
    130                 135                 140

Lys Gly Gln Leu Lys Glu Phe Leu Asp Ala Asn Leu Ala Arg Ala Leu
145                 150                 155                 160

Val Pro Arg Gly Ser Val Thr Ser Leu Tyr Lys Lys Ala Gly Ser Ala
                165                 170                 175

Ala Ala Pro Phe Thr Met Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr
            180                 185                 190

Glu Asp Asp Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu
        195                 200                 205

Ile Asp Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu
    210                 215                 220

Ala Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His
```

225 230 235 240

Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile
245 250 255

Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys Lys
260 265 270

Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp Glu Thr
275 280 285

Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Arg Leu
290 295 300

Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe Tyr Trp Arg Phe
305 310 315 320

Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu Lys Pro Val Tyr Glu
325 330 335

Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys Asp Thr Arg Asn Phe Ile
340 345 350

Met Pro Thr Ile Thr Thr Asn Glu Ile Arg Asn Lys Leu Ser Tyr Ser
355 360 365

Phe Asp Gly Ala Gly Gly Thr Tyr Ser Leu Leu Leu Ser Ser Tyr Pro
370 375 380

Ile Ser Thr Asn Ile Asn Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn
385 390 395 400

Ile Asp Asn Glu Val Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys
405 410 415

Lys Gly Lys Leu Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys
420 425 430

Asn Lys Leu Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile
435 440 445

Asp Asn Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys
450 455 460

Ile Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu
465 470 475 480

Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn Ile
485 490 495

Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala Tyr

500 505 510

Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile Ser Lys
515 520 525

Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser Lys Asn Ile
530 535 540

Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn Ser Lys Asp Phe
545 550 555 560

Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp Asp Ile Asn Thr Ile
565 570 575

Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr Asp Lys Ser Ile Asp Phe
580 585 590

Ser Ile Ser Leu Val Ser Lys Asn Gln Val Lys Val Asn Gly Leu Tyr
595 600 605

Leu Asn Glu Ser Val Tyr Ser Ser Tyr Leu Asp Phe Val Lys Asn Ser
610 615 620

Asp Gly His His Asn Thr Ser Asn Phe Met Asn Leu Phe Leu Asp Asn
625 630 635 640

Ile Ser Phe Trp Lys Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile
645 650 655

Asp Lys Tyr Phe Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu
660 665 670

Phe Ile Cys Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe Gly Glu Trp
675 680 685

Lys Thr Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn
690 695 700

Val Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser
705 710 715 720

Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr
725 730 735

Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile Asn
740 745 750

Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile Ile Val
755 760 765

Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn Leu Asp Ser

770 775 780

Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser Asp Phe Ile Leu
785 790 795 800

Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile Leu Gln Lys Ile Arg
805 810 815

Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser Phe Asn Lys Met Ser Ile
820 825 830

Asp Phe Lys Asp Ile Lys Lys Leu Ser Leu Gly Tyr Ile Met Ser Asn
835 840 845

Phe Lys Ser Phe Asn Ser Glu Asn Glu Leu Asp Arg Asp His Leu Gly
850 855 860

Phe Lys Ile Ile Asp Asn Lys Thr Tyr Tyr Tyr Asp Glu Asp Ser Lys
865 870 875 880

Leu Val Lys Gly Leu Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp
885 890 895

Pro Ile Glu Phe Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys
900 905 910

Lys Tyr Tyr Phe Asp Ile Asn Thr Gly Ala Ala Leu Ile Ser Tyr Lys
915 920 925

Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln
930 935 940

Leu Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala
945 950 955 960

Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser
965 970 975

Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser
980 985 990

Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr Tyr Phe
995 1000 1005

Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val Ile Asp
1010 1015 1020

Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile Ser Lys
1025 1030 1035

Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp Thr Asp

1040 1045 1050

Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly Lys His
1055 1060 1065

Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val Phe Ser
1070 1075 1080

Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Tyr Asn
1085 1090 1095

Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe Leu
1100 1105 1110

Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser Lys Ala
1115 1120 1125

Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr Phe Asn
1130 1135 1140

Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly
1145 1150 1155

Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly
1160 1165 1170

Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr
1175 1180 1185

Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys His Phe
1190 1195 1200

Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys Gly
1205 1210 1215

Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala Asn
1220 1225 1230

Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe Leu Thr
1235 1240 1245

Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val
1250 1255 1260

Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe Asn Pro
1265 1270 1275

Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn Asn Asp
1280 1285 1290

Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly Tyr Ile

1295 1300 1305

Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn Glu Ser
1310 1315 1320

Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr
1325 1330 1335

Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln Ala
1340 1345 1350

Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr
1355 1360 1365

Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln Thr Ile
1370 1375 1380

Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala
1385 1390 1395

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu
1400 1405 1410

Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys
1415 1420 1425

Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr Gly Tyr
1430 1435 1440

Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly Ile
1445 1450 1455

Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
1460 1465 1470

Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln Ala Ile
1475 1480 1485

Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr
1490 1495 1500

Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp
1505 1510 1515

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr
1520 1525 1530

Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn
1535 1540 1545

Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly Lys His

1550 1555 1560

Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe Lys
1565 1570 1575

Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp Ala
1580 1585 1590

Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe Leu
1595 1600 1605

Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser Lys Ala
1610 1615 1620

Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr Phe Glu
1625 1630 1635

Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile Asp Asn
1640 1645 1650

Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly Val Phe
1655 1660 1665

Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
1670 1675 1680

Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg Phe
1685 1690 1695

Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn Ser Lys
1700 1705 1710

Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr Tyr Phe
1715 1720 1725

Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu Ile
1730 1735 1740

Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Pro
1745 1750 1755

Gly Ile Tyr Gly
1760

<210> 42
<211> 1743
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 42

```
His His His His His His Ser His Met Ala Ser Asp Lys Ile Ile His
1               5                  10                  15

Leu Thr Asp Asp Ser Phe Asp Thr Asp Val Leu Lys Ala Asp Gly Ala
            20                  25                  30

Ile Leu Val Asp Phe Trp Ala Glu Trp Cys Gly Pro Cys Lys Met Ile
        35                  40                  45

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

Val Ala Lys Leu Asn Ile Asp Gln Asn Pro Gly Thr Ala Pro Lys Tyr
65                  70                  75                  80

Gly Ile Arg Gly Ile Pro Thr Leu Leu Leu Phe Lys Asn Gly Glu Val
                85                  90                  95

Ala Ala Thr Lys Val Gly Ala Leu Ser Lys Gly Gln Leu Lys Glu Phe
            100                 105                 110

Leu Asp Ala Asn Leu Ala Arg Ala Leu Gly Gly Ser Gly Gly Ser Gly
        115                 120                 125

Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly
    130                 135                 140

Ser Gly Gly Ser Leu Val Pro Arg Gly Ser Gly Ser Ala Ala Ala Pro
145                 150                 155                 160

Phe Thr Met Glu Ser Lys Lys Tyr Gly Pro Leu Lys Thr Glu Asp Asp
                165                 170                 175

Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
            180                 185                 190

Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile Leu Ala Met Glu
        195                 200                 205

Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp His Phe Phe Ser
    210                 215                 220

Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser Ile Tyr Ser Ala
225                 230                 235                 240

Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys Lys Ile Met Met
                245                 250                 255

Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp Glu Thr Gly Ala Val
            260                 265                 270
```

```
Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Arg Leu Leu Asp Ser
        275                 280                 285

Ile Arg Asp Leu Tyr Pro Gly Lys Phe Tyr Trp Arg Phe Tyr Ala Phe
    290                 295                 300

Phe Asp Tyr Ala Ile Thr Thr Leu Lys Pro Val Tyr Glu Asp Thr Asn
305                 310                 315                 320

Ile Lys Ile Lys Leu Asp Lys Asp Thr Arg Asn Phe Ile Met Pro Thr
                325                 330                 335

Ile Thr Thr Asn Glu Ile Arg Asn Lys Leu Ser Tyr Ser Phe Asp Gly
            340                 345                 350

Ala Gly Gly Thr Tyr Ser Leu Leu Leu Ser Ser Tyr Pro Ile Ser Thr
        355                 360                 365

Asn Ile Asn Leu Ser Lys Asp Asp Leu Trp Ile Phe Asn Ile Asp Asn
    370                 375                 380

Glu Val Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile Lys Lys Gly Lys
385                 390                 395                 400

Leu Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn Lys Asn Lys Leu
                405                 410                 415

Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp Ile Asp Asn Lys
            420                 425                 430

Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp Lys Ile Ser Leu
        435                 440                 445

Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser Leu Leu Leu Ser
    450                 455                 460

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

Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala Tyr Asn Tyr Thr
                485                 490                 495

Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile Ser Lys Thr Ser Gln
            500                 505                 510

Lys Ser Ile Ile His Tyr Lys Lys Asp Ser Lys Asn Ile Leu Glu Phe
        515                 520                 525

Tyr Asn Asp Ser Thr Leu Glu Phe Asn Ser Lys Asp Phe Ile Ala Glu
    530                 535                 540
```

```
Asp Ile Asn Val Phe Met Lys Asp Asp Ile Asn Thr Ile Thr Gly Lys
545                 550                 555                 560

Tyr Tyr Val Asp Asn Asn Thr Asp Lys Ser Ile Asp Phe Ser Ile Ser
                565                 570                 575

Leu Val Ser Lys Asn Gln Val Lys Val Asn Gly Leu Tyr Leu Asn Glu
            580                 585                 590

Ser Val Tyr Ser Ser Tyr Leu Asp Phe Val Lys Asn Ser Asp Gly His
        595                 600                 605

His Asn Thr Ser Asn Phe Met Asn Leu Phe Leu Asp Asn Ile Ser Phe
    610                 615                 620

Trp Lys Leu Phe Gly Phe Glu Asn Ile Asn Phe Val Ile Asp Lys Tyr
625                 630                 635                 640

Phe Thr Leu Val Gly Lys Thr Asn Leu Gly Tyr Val Glu Phe Ile Cys
                645                 650                 655

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

Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn Gly Arg Asn Val Val Val
        675                 680                 685

Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu Asp Ile Ser Thr Ser Leu
    690                 695                 700

Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile Asp Arg Tyr Ile Asn Lys
705                 710                 715                 720

Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser Leu Ile Asn Ile Asn Thr
                725                 730                 735

Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu Ile Ile Val Leu Asn Pro
            740                 745                 750

Asn Thr Phe His Lys Lys Val Asn Ile Asn Leu Asp Ser Ser Ser Phe
        755                 760                 765

Glu Tyr Lys Trp Ser Thr Glu Gly Ser Asp Phe Ile Leu Val Arg Tyr
    770                 775                 780

Leu Glu Glu Ser Asn Lys Lys Ile Leu Gln Lys Ile Arg Ile Lys Gly
785                 790                 795                 800

Ile Leu Ser Asn Thr Gln Ser Phe Asn Lys Met Ser Ile Asp Phe Lys
                805                 810                 815
```

```
Asp Ile Lys Lys Leu Ser Leu Gly Tyr Ile Met Ser Asn Phe Lys Ser
            820                 825                 830

Phe Asn Ser Glu Asn Glu Leu Asp Arg Asp His Leu Gly Phe Lys Ile
        835                 840                 845

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

Gly Leu Ile Asn Ile Asn Asn Ser Leu Phe Tyr Phe Asp Pro Ile Glu
865                 870                 875                 880

Phe Asn Leu Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr
                885                 890                 895

Phe Asp Ile Asn Thr Gly Ala Ala Leu Ile Ser Tyr Lys Ile Ile Asn
            900                 905                 910

Gly Lys His Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly Val
        915                 920                 925

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Gln
    930                 935                 940

Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys Phe Leu
945                 950                 955                 960

Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val
                965                 970                 975

Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys Tyr Tyr Phe Asn Pro Asn
            980                 985                 990

Asn Ala Ile Ala Ala Val Gly Leu  Gln Val Ile Asp Asn  Asn Lys Tyr
        995                 1000                1005

Tyr Phe  Asn Pro Asp Thr Ala  Ile Ile Ser Lys Gly  Trp Gln Thr
    1010                1015                1020

Val Asn  Gly Ser Arg Tyr Tyr  Phe Asp Thr Asp Thr  Ala Ile Ala
    1025                1030                1035

Phe Asn  Gly Tyr Lys Thr Ile  Asp Gly Lys His Phe  Tyr Phe Asp
    1040                1045                1050

Ser Asp  Cys Val Val Lys Ile  Gly Val Phe Ser Thr  Ser Asn Gly
    1055                1060                1065

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Tyr Asn Asn  Asn Ile Glu
    1070                1075                1080
```

```
Gly Gln  Ala Ile Val Tyr Gln  Ser Lys Phe Leu Thr  Leu Asn Gly
    1085                1090                1095

Lys Lys  Tyr Tyr Phe Asp Asn  Asn Ser Lys Ala Val  Thr Gly Trp
    1100                1105                1110

Gln Thr  Ile Asp Ser Lys Lys  Tyr Tyr Phe Asn Thr  Asn Thr Ala
    1115                1120                1125

Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    1130                1135                1140

Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile
    1145                1150                1155

Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn Thr Ala  Ile Ala Ser
    1160                1165                1170

Thr Gly  Tyr Thr Ile Ile Asn  Gly Lys His Phe Tyr  Phe Asn Thr
    1175                1180                1185

Asp Gly  Ile Met Gln Ile Gly  Val Phe Lys Gly Pro  Asn Gly Phe
    1190                1195                1200

Glu Tyr  Phe Ala Pro Ala Asn  Thr Asp Ala Asn Asn  Ile Glu Gly
    1205                1210                1215

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

Lys Tyr  Tyr Phe Gly Ser Asp  Ser Lys Ala Val Thr  Gly Trp Arg
    1235                1240                1245

Ile Ile  Asn Asn Lys Lys Tyr  Tyr Phe Asn Pro Asn  Asn Ala Ile
    1250                1255                1260

Ala Ala  Ile His Leu Cys Thr  Ile Asn Asn Asp Lys  Tyr Tyr Phe
    1265                1270                1275

Ser Tyr  Asp Gly Ile Leu Gln  Asn Gly Tyr Ile Thr  Ile Glu Arg
    1280                1285                1290

Asn Asn  Phe Tyr Phe Asp Ala  Asn Asn Glu Ser Lys  Met Val Thr
    1295                1300                1305

Gly Val  Phe Lys Gly Pro Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala
    1310                1315                1320

Asn Thr  His Asn Asn Asn Ile  Glu Gly Gln Ala Ile  Val Tyr Gln
    1325                1330                1335
```

```
Asn Lys  Phe Leu Thr Leu Asn  Gly Lys Lys Tyr Tyr  Phe Asp Asn
    1340                1345                1350

Asp Ser  Lys Ala Val Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys
    1355                1360                1365

Tyr Tyr  Phe Asn Leu Asn Thr  Ala Glu Ala Ala Thr  Gly Trp Gln
    1370                1375                1380

Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Glu
    1385                1390                1395

Ala Ala  Thr Gly Trp Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe
    1400                1405                1410

Asn Thr  Asn Thr Phe Ile Ala  Ser Thr Gly Tyr Thr  Ser Ile Asn
    1415                1420                1425

Gly Lys  His Phe Tyr Phe Asn  Thr Asp Gly Ile Met  Gln Ile Gly
    1430                1435                1440

Val Phe  Lys Gly Pro Asn Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn
    1445                1450                1455

Thr His  Asn Asn Asn Ile Glu  Gly Gln Ala Ile Leu  Tyr Gln Asn
    1460                1465                1470

Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr Tyr Phe  Gly Ser Asp
    1475                1480                1485

Ser Lys  Ala Val Thr Gly Leu  Arg Thr Ile Asp Gly  Lys Lys Tyr
    1490                1495                1500

Tyr Phe  Asn Thr Asn Thr Ala  Val Ala Val Thr Gly  Trp Gln Thr
    1505                1510                1515

Ile Asn  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ser Ile Ala
    1520                1525                1530

Ser Thr  Gly Tyr Thr Ile Ile  Ser Gly Lys His Phe  Tyr Phe Asn
    1535                1540                1545

Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe Lys Gly  Pro Asp Gly
    1550                1555                1560

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp Ala Asn  Asn Ile Glu
    1565                1570                1575

Gly Gln  Ala Ile Arg Tyr Gln  Asn Arg Phe Leu Tyr  Leu His Asp
    1580                1585                1590
```

```
Asn Ile  Tyr Tyr Phe Gly Asn  Asn Ser Lys Ala Ala  Thr Gly Trp
    1595                1600                1605

Val Thr  Ile Asp Gly Asn Arg  Tyr Tyr Phe Glu Pro  Asn Thr Ala
    1610                1615                1620

Met Gly  Ala Asn Gly Tyr Lys  Thr Ile Asp Asn Lys  Asn Phe Tyr
    1625                1630                1635

Phe Arg  Asn Gly Leu Pro Gln  Ile Gly Val Phe Lys  Gly Ser Asn
    1640                1645                1650

Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr Asp Ala  Asn Asn Ile
    1655                1660                1665

Glu Gly  Gln Ala Ile Arg Tyr  Gln Asn Arg Phe Leu  His Leu Leu
    1670                1675                1680

Gly Lys  Ile Tyr Tyr Phe Gly  Asn Asn Ser Lys Ala  Val Thr Gly
    1685                1690                1695

Trp Gln  Thr Ile Asn Gly Lys  Val Tyr Tyr Phe Met  Pro Asp Thr
    1700                1705                1710

Ala Met  Ala Ala Ala Gly Gly  Leu Phe Glu Ile Asp  Gly Val Ile
    1715                1720                1725

Tyr Phe  Phe Gly Val Asp Gly  Val Lys Ala Pro Gly  Ile Tyr Gly
    1730                1735                1740


<210>  43
<211>  1749
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Fusion protein

<400>  43

His His His His His His Ser His Met Ala Ser Asp Lys Ile Ile His
1               5                  10                  15

Leu Thr Asp Asp Ser Phe Asp Thr Asp Val Leu Lys Ala Asp Gly Ala
            20                  25                  30

Ile Leu Val Asp Phe Trp Ala Glu Trp Cys Gly Pro Cys Lys Met Ile
        35                  40                  45

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

Val Ala Lys Leu Asn Ile Asp Gln Asn Pro Gly Thr Ala Pro Lys Tyr
```

65 70 75 80

Gly Ile Arg Gly Ile Pro Thr Leu Leu Leu Phe Lys Asn Gly Glu Val
85 90 95

Ala Ala Thr Lys Val Gly Ala Leu Ser Lys Gly Gln Leu Lys Glu Phe
100 105 110

Leu Asp Ala Asn Leu Ala Arg Ala Leu Leu Ala Glu Ala Ala Ala Lys
115 120 125

Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu
130 135 140

Ala Ala Ala Lys Ala Ala Ala Gly Gly Ser Leu Val Pro Arg Gly Ser
145 150 155 160

Gly Ser Ala Ala Ala Pro Phe Thr Met Glu Ser Lys Lys Tyr Gly Pro
165 170 175

Leu Lys Thr Glu Asp Asp Lys Ile Leu Val Pro Ile Asp Asp Leu Val
180 185 190

Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys
195 200 205

Asn Ile Leu Ala Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn
210 215 220

Ile Asp His Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser
225 230 235 240

Leu Ser Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe
245 250 255

Ser Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp
260 265 270

Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
275 280 285

Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe Tyr
290 295 300

Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu Lys Pro
305 310 315 320

Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys Asp Thr Arg
325 330 335

Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile Arg Asn Lys Leu

340 345 350

Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr Ser Leu Leu Leu Ser
355 360 365

Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu Ser Lys Asp Asp Leu Trp
370 375 380

Ile Phe Asn Ile Asp Asn Glu Val Arg Glu Ile Ser Ile Glu Asn Gly
385 390 395 400

Thr Ile Lys Lys Gly Lys Leu Ile Lys Asp Val Leu Ser Lys Ile Asp
405 410 415

Ile Asn Lys Asn Lys Leu Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser
420 425 430

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

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

Tyr Ser Leu Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu
465 470 475 480

Ser Asn Ile Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn
485 490 495

Ile Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala
500 505 510

Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser
515 520 525

Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn Ser
530 535 540

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

Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr Asp Lys Ser
565 570 575

Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln Val Lys Val Asn
580 585 590

Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser Tyr Leu Asp Phe Val
595 600 605

Lys Asn Ser Asp Gly His His Asn Thr Ser Asn Phe Met Asn Leu Phe

610 615 620

Leu Asp Asn Ile Ser Phe Trp Lys Leu Phe Gly Phe Glu Asn Ile Asn
625 630 635 640

Phe Val Ile Asp Lys Tyr Phe Thr Leu Val Gly Lys Thr Asn Leu Gly
645 650 655

Tyr Val Glu Phe Ile Cys Asp Asn Asn Lys Asn Ile Asp Ile Tyr Phe
660 665 670

Gly Glu Trp Lys Thr Ser Ser Ser Lys Ser Thr Ile Phe Ser Gly Asn
675 680 685

Gly Arg Asn Val Val Val Glu Pro Ile Tyr Asn Pro Asp Thr Gly Glu
690 695 700

Asp Ile Ser Thr Ser Leu Asp Phe Ser Tyr Glu Pro Leu Tyr Gly Ile
705 710 715 720

Asp Arg Tyr Ile Asn Lys Val Leu Ile Ala Pro Asp Leu Tyr Thr Ser
725 730 735

Leu Ile Asn Ile Asn Thr Asn Tyr Tyr Ser Asn Glu Tyr Tyr Pro Glu
740 745 750

Ile Ile Val Leu Asn Pro Asn Thr Phe His Lys Lys Val Asn Ile Asn
755 760 765

Leu Asp Ser Ser Ser Phe Glu Tyr Lys Trp Ser Thr Glu Gly Ser Asp
770 775 780

Phe Ile Leu Val Arg Tyr Leu Glu Glu Ser Asn Lys Lys Ile Leu Gln
785 790 795 800

Lys Ile Arg Ile Lys Gly Ile Leu Ser Asn Thr Gln Ser Phe Asn Lys
805 810 815

Met Ser Ile Asp Phe Lys Asp Ile Lys Lys Leu Ser Leu Gly Tyr Ile
820 825 830

Met Ser Asn Phe Lys Ser Phe Asn Ser Glu Asn Glu Leu Asp Arg Asp
835 840 845

His Leu Gly Phe Lys Ile Ile Asp Asn Lys Thr Tyr Tyr Tyr Asp Glu
850 855 860

Asp Ser Lys Leu Val Lys Gly Leu Ile Asn Ile Asn Asn Ser Leu Phe
865 870 875 880

Tyr Phe Asp Pro Ile Glu Phe Asn Leu Val Thr Gly Trp Gln Thr Ile

885 890 895

Asn Gly Lys Lys Tyr Tyr Phe Asp Ile Asn Thr Gly Ala Ala Leu Ile
900 905 910

Ser Tyr Lys Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Asn Asp Gly
915 920 925

Val Met Gln Leu Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe
930 935 940

Ala Pro Ala Asn Thr Gln Asn Asn Asn Ile Glu Gly Gln Ala Ile Val
945 950 955 960

Tyr Gln Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp
965 970 975

Asn Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Glu Lys
980 985 990

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Val Gly Leu Gln Val
995 1000 1005

Ile Asp Asn Asn Lys Tyr Tyr Phe Asn Pro Asp Thr Ala Ile Ile
1010 1015 1020

Ser Lys Gly Trp Gln Thr Val Asn Gly Ser Arg Tyr Tyr Phe Asp
1025 1030 1035

Thr Asp Thr Ala Ile Ala Phe Asn Gly Tyr Lys Thr Ile Asp Gly
1040 1045 1050

Lys His Phe Tyr Phe Asp Ser Asp Cys Val Val Lys Ile Gly Val
1055 1060 1065

Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
1070 1075 1080

Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Ser Lys
1085 1090 1095

Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser
1100 1105 1110

Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Ser Lys Lys Tyr Tyr
1115 1120 1125

Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile
1130 1135 1140

Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala

1145 1150 1155

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr
1160 1165 1170

Asn Thr Ala Ile Ala Ser Thr Gly Tyr Thr Ile Ile Asn Gly Lys
1175 1180 1185

His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val Phe
1190 1195 1200

Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Asp
1205 1210 1215

Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn Glu Phe
1220 1225 1230

Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly Ser Asp Ser Lys
1235 1240 1245

Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys Tyr Tyr Phe
1250 1255 1260

Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr Ile Asn
1265 1270 1275

Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn Gly
1280 1285 1290

Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
1295 1300 1305

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe
1310 1315 1320

Glu Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly
1325 1330 1335

Gln Ala Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys
1340 1345 1350

Lys Tyr Tyr Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln
1355 1360 1365

Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
1370 1375 1380

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe
1385 1390 1395

Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr Ile Asp

1400 1405 1410

Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Phe Ile Ala Ser Thr
1415 1420 1425

Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp
1430 1435 1440

Gly Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
1445 1450 1455

Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln
1460 1465 1470

Ala Ile Leu Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys
1475 1480 1485

Tyr Tyr Phe Gly Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr
1490 1495 1500

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala
1505 1510 1515

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asn
1520 1525 1530

Thr Asn Thr Ser Ile Ala Ser Thr Gly Tyr Thr Ile Ile Ser Gly
1535 1540 1545

Lys His Phe Tyr Phe Asn Thr Asp Gly Ile Met Gln Ile Gly Val
1550 1555 1560

Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr
1565 1570 1575

Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn Arg
1580 1585 1590

Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly Asn Asn Ser
1595 1600 1605

Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg Tyr Tyr
1610 1615 1620

Phe Glu Pro Asn Thr Ala Met Gly Ala Asn Gly Tyr Lys Thr Ile
1625 1630 1635

Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu Pro Gln Ile Gly
1640 1645 1650

Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn

1655 1660 1665

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
1670 1675 1680

Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn Asn
1685 1690 1695

Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
1700 1705 1710

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe
1715 1720 1725

Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys
1730 1735 1740

Ala Pro Gly Ile Tyr Gly
1745

<210> 44
<211> 2163
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 44

His His His His His His His His His Gly Gly Ser Gly Gly Ser Gly
1 5 10 15

Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly
20 25 30

Ser Gly Gly Ser Gly Gly Ser His Met Ala Ser Asn Lys Glu Ile Leu
35 40 45

Ala Val Val Glu Ala Val Ser Asn Glu Lys Ala Leu Pro Arg Glu Lys
50 55 60

Ile Phe Glu Ala Leu Glu Ser Ala Leu Ala Thr Ala Thr Lys Lys Lys
65 70 75 80

Tyr Glu Gln Glu Ile Asp Val Arg Val Gln Ile Asp Arg Lys Ser Gly
85 90 95

Asp Phe Asp Thr Phe Arg Arg Trp Leu Val Val Asp Glu Val Thr Gln
100 105 110

Pro Thr Lys Glu Ile Thr Leu Glu Ala Ala Arg Tyr Glu Asp Glu Ser
115 120 125

```
Leu Asn Leu Gly Asp Tyr Val Glu Asp Gln Ile Glu Ser Val Thr Phe
    130                 135                 140

Asp Arg Ile Thr Thr Gln Thr Ala Lys Gln Val Ile Val Gln Lys Val
145                 150                 155                 160

Arg Glu Ala Glu Arg Ala Met Val Val Asp Gln Phe Arg Glu His Glu
                165                 170                 175

Gly Glu Ile Ile Thr Gly Val Val Lys Lys Val Asn Arg Asp Asn Ile
            180                 185                 190

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

Met Leu Pro Arg Glu Asn Phe Arg Pro Gly Asp Arg Val Arg Gly Val
    210                 215                 220

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

Arg Ser Lys Pro Glu Met Leu Ile Glu Leu Phe Arg Ile Glu Val Pro
                245                 250                 255

Glu Ile Gly Glu Glu Val Ile Glu Ile Lys Ala Ala Ala Arg Asp Pro
            260                 265                 270

Gly Ser Arg Ala Lys Ile Ala Val Lys Thr Asn Asp Lys Arg Ile Asp
        275                 280                 285

Pro Val Gly Ala Cys Val Gly Met Arg Gly Ala Arg Val Gln Ala Val
    290                 295                 300

Ser Thr Glu Leu Gly Gly Glu Arg Ile Asp Ile Val Leu Trp Asp Asp
305                 310                 315                 320

Asn Pro Ala Gln Phe Val Ile Asn Ala Met Ala Pro Ala Asp Val Ala
                325                 330                 335

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

Ala Gly Asn Leu Ala Gln Ala Ile Gly Arg Asn Gly Gln Asn Val Arg
        355                 360                 365

Leu Ala Ser Gln Leu Ser Gly Trp Glu Leu Asn Val Met Thr Val Asp
    370                 375                 380

Asp Leu Gln Ala Lys His Gln Ala Glu Ala His Ala Ala Ile Asp Thr
385                 390                 395                 400
```

```
Phe Thr Lys Tyr Leu Asp Ile Asp Glu Asp Phe Ala Thr Val Leu Val
                405                 410                 415

Glu Glu Gly Phe Ser Thr Leu Glu Glu Leu Ala Tyr Val Pro Met Lys
            420                 425                 430

Glu Leu Leu Glu Ile Glu Gly Leu Asp Glu Pro Thr Val Glu Ala Leu
        435                 440                 445

Arg Glu Arg Ala Lys Asn Ala Leu Ala Thr Ile Ala Gln Ala Gln Glu
    450                 455                 460

Glu Ser Leu Gly Asp Asn Lys Pro Ala Asp Asp Leu Leu Asn Leu Glu
465                 470                 475                 480

Gly Val Asp Arg Asp Leu Ala Phe Lys Leu Ala Ala Arg Gly Val Cys
                485                 490                 495

Thr Leu Glu Asp Leu Ala Glu Gln Gly Ile Asp Asp Leu Ala Asp Ile
            500                 505                 510

Glu Gly Leu Thr Asp Glu Lys Ala Gly Ala Leu Ile Met Ala Ala Arg
        515                 520                 525

Asn Ile Cys Trp Phe Gly Asp Glu Ala Ser Gly Ala Leu Val Pro Arg
    530                 535                 540

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

Phe Thr Met Ser Ile Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser
                565                 570                 575

Phe Asn Pro Lys Glu Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro
            580                 585                 590

Glu Leu Ser Thr Leu Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser
        595                 600                 605

Asp Ile Glu Leu Glu Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn
    610                 615                 620

Val Ile Ser Asn Ile Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu
625                 630                 635                 640

Ala Lys Asn Leu Thr Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe
                645                 650                 655

Lys Leu Ile Glu Ser Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln
            660                 665                 670
```

```
Asn Glu Leu Glu Asp Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu
        675                 680                 685

Thr Asp Glu Gly Phe Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu
    690                 695                 700

Ser Ile Phe Val Glu Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn
705                 710                 715                 720

His Ile Thr Glu Glu Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr
                725                 730                 735

Val Asn Gly Lys Leu Val Lys Lys Val Asn Leu Asp Thr Thr His Glu
            740                 745                 750

Val Asn Thr Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr
        755                 760                 765

Asn Ser Ser Lys Glu Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val
    770                 775                 780

Gln Val Tyr Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp
785                 790                 795                 800

Ala Ala Lys Val Val Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile
                805                 810                 815

Asp Leu Leu Pro Thr Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile
            820                 825                 830

Ile Asp Gly Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr
        835                 840                 845

Ser Asp Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met
    850                 855                 860

Ala Val Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
865                 870                 875                 880

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
                885                 890                 895

Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg Asp
            900                 905                 910

Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu Val Glu
        915                 920                 925

Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met Met Pro Gln
    930                 935                 940
```

```
Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Val
945                 950                 955                 960

Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly Gly Ser Gly His Thr
                965                 970                 975

Val Thr Asp Asp Ile Asp His Phe Phe Ser Ala Pro Ser Ile Thr Tyr
            980                 985                 990

Arg Glu Pro His Leu Ser Ile Tyr  Asp Val Leu Glu Val  Gln Lys Glu
        995                 1000                1005

Glu Leu  Asp Leu Ser Lys Asp  Leu Met Val Leu Pro  Asn Ala Pro
    1010                1015                1020

Asn Arg  Val Phe Ala Trp Glu  Thr Gly Trp Thr Pro  Gly Leu Arg
    1025                1030                1035

Ser Leu  Glu Asn Asp Gly Thr  Lys Leu Leu Asp Arg  Ile Arg Asp
    1040                1045                1050

Asn Tyr  Glu Gly Glu Phe Tyr  Trp Arg Tyr Phe Ala  Phe Ile Ala
    1055                1060                1065

Asp Ala  Leu Ile Thr Thr Leu  Lys Pro Arg Tyr Glu  Asp Thr Asn
    1070                1075                1080

Ile Arg  Ile Asn Leu Asp Ser  Asn Thr Arg Ser Phe  Ile Val Pro
    1085                1090                1095

Ile Ile  Thr Thr Glu Tyr Ile  Arg Glu Lys Leu Ser  Tyr Ser Phe
    1100                1105                1110

Tyr Gly  Ser Gly Gly Thr Tyr  Ala Leu Ser Leu Ser  Gln Tyr Asn
    1115                1120                1125

Met Gly  Ile Asn Ile Glu Leu  Ser Glu Ser Asp Val  Trp Ile Ile
    1130                1135                1140

Asp Val  Asp Asn Val Val Arg  Asp Val Thr Ile Glu  Ser Asp Lys
    1145                1150                1155

Ile Lys  Lys Gly Asp Leu Ile  Glu Gly Ile Leu Ser  Thr Leu Ser
    1160                1165                1170

Ile Glu  Glu Asn Lys Ile Ile  Leu Asn Ser His Glu  Ile Asn Phe
    1175                1180                1185

Ser Gly  Glu Val Asn Gly Ser  Asn Gly Phe Val Ser  Leu Thr Phe
    1190                1195                1200
```

```
Ser Ile  Leu Glu Gly Ile Asn  Ala Ile Ile Glu Val  Asp Leu Leu
    1205                 1210                 1215

Ser Lys  Ser Tyr Lys Leu Leu  Ile Ser Gly Glu Leu  Lys Ile Leu
    1220                 1225                 1230

Met Leu  Asn Ser Asn His Ile  Gln Gln Lys Ile Asp  Tyr Ile Gly
    1235                 1240                 1245

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

Ser Glu  Gly Lys Glu Asn Gly  Phe Ile Asn Gly Ser  Thr Lys Glu
    1265                 1270                 1275

Gly Leu  Phe Val Ser Glu Leu  Pro Asp Val Val Leu  Ile Ser Lys
    1280                 1285                 1290

Val Tyr  Met Asp Asp Ser Lys  Pro Ser Phe Gly Tyr  Tyr Ser Asn
    1295                 1300                 1305

Asn Leu  Lys Asp Val Lys Val  Ile Thr Lys Asp Asn  Val Asn Ile
    1310                 1315                 1320

Leu Thr  Gly Tyr Tyr Leu Lys  Asp Asp Ile Lys Ile  Ser Leu Ser
    1325                 1330                 1335

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

Leu Asp  Glu Ser Gly Val Ala  Glu Ile Leu Lys Phe  Met Asn Arg
    1355                 1360                 1365

Lys Gly  Asn Thr Asn Thr Ser  Asp Ser Leu Met Ser  Phe Leu Glu
    1370                 1375                 1380

Ser Met  Asn Ile Lys Ser Ile  Phe Val Asn Phe Leu  Gln Ser Asn
    1385                 1390                 1395

Ile Lys  Phe Ile Leu Asp Ala  Asn Phe Ile Ile Ser  Gly Thr Thr
    1400                 1405                 1410

Ser Ile  Gly Gln Phe Glu Phe  Ile Cys Asp Glu Asn  Asp Asn Ile
    1415                 1420                 1425

Gln Pro  Tyr Phe Ile Lys Phe  Asn Thr Leu Glu Thr  Asn Tyr Thr
    1430                 1435                 1440

Leu Tyr  Val Gly Asn Arg Gln  Asn Met Ile Val Glu  Pro Asn Tyr
    1445                 1450                 1455
```

```
Asp Leu  Asp Asp Ser Gly Asp  Ile Ser Ser Thr Val  Ile Asn Phe
    1460                 1465                 1470

Ser Gln  Lys Tyr Leu Tyr Gly  Ile Asp Ser Cys Val  Asn Lys Val
    1475                 1480                 1485

Val Ile  Ser Pro Asn Ile Tyr  Thr Asp Glu Ile Asn  Ile Thr Pro
    1490                 1495                 1500

Val Tyr  Glu Thr Asn Asn Thr  Tyr Pro Glu Val Ile  Val Leu Asp
    1505                 1510                 1515

Ala Asn  Tyr Ile Asn Glu Lys  Ile Asn Val Asn Ile  Asn Asp Leu
    1520                 1525                 1530

Ser Ile  Arg Tyr Val Trp Ser  Asn Asp Gly Asn Asp  Phe Ile Leu
    1535                 1540                 1545

Met Ser  Thr Ser Glu Glu Asn  Lys Val Ser Gln Val  Lys Ile Arg
    1550                 1555                 1560

Phe Val  Asn Val Phe Lys Asp  Lys Thr Leu Ala Asn  Lys Leu Ser
    1565                 1570                 1575

Phe Asn  Phe Ser Asp Lys Gln  Asp Val Pro Val Ser  Glu Ile Ile
    1580                 1585                 1590

Leu Ser  Phe Thr Pro Ser Tyr  Tyr Glu Asp Gly Leu  Ile Gly Tyr
    1595                 1600                 1605

Asp Leu  Gly Leu Val Ser Leu  Tyr Asn Glu Lys Phe  Tyr Ile Asn
    1610                 1615                 1620

Asn Phe  Gly Met Met Val Ser  Gly Leu Ile Tyr Ile  Asn Asp Ser
    1625                 1630                 1635

Leu Tyr  Tyr Phe Lys Pro Pro  Val Asn Asn Leu Ile  Thr Gly Phe
    1640                 1645                 1650

Val Thr  Val Gly Asp Asp Lys  Tyr Tyr Phe Asn Pro  Ile Asn Gly
    1655                 1660                 1665

Gly Ala  Ala Ser Ile Gly Glu  Thr Ile Ile Asp Asp  Lys Asn Tyr
    1670                 1675                 1680

Tyr Phe  Asn Gln Ser Gly Val  Leu Gln Thr Gly Val  Phe Ser Thr
    1685                 1690                 1695

Glu Asp  Gly Phe Lys Tyr Phe  Ala Pro Ala Asn Thr  Leu Asp Glu
    1700                 1705                 1710
```

```
Asn Leu  Glu Gly Glu Ala Ile  Asp Phe Thr Gly Lys  Leu Ile Ile
    1715                 1720                 1725

Asp Glu  Asn Ile Tyr Tyr Phe  Asp Asp Asn Tyr Arg  Gly Ala Val
    1730                 1735                 1740

Glu Trp  Lys Glu Leu Asp Gly  Glu Met His Tyr Phe  Ser Pro Glu
    1745                 1750                 1755

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

Tyr Tyr  Phe Asn Ser Asp Gly  Val Met Gln Lys Gly  Phe Val Ser
    1775                 1780                 1785

Ile Asn  Asp Asn Lys His Tyr  Phe Asp Asp Ser Gly  Val Met Lys
    1790                 1795                 1800

Val Gly  Tyr Thr Glu Ile Asp  Gly Lys His Phe Tyr  Phe Ala Glu
    1805                 1810                 1815

Asn Gly  Glu Met Gln Ile Gly  Val Phe Asn Thr Glu  Asp Gly Phe
    1820                 1825                 1830

Lys Tyr  Phe Ala His His Asn  Glu Asp Leu Gly Asn  Glu Glu Gly
    1835                 1840                 1845

Glu Glu  Ile Ser Tyr Ser Gly  Ile Leu Asn Phe Asn  Asn Lys Ile
    1850                 1855                 1860

Tyr Tyr  Phe Asp Asp Ser Phe  Thr Ala Val Val Gly  Trp Lys Asp
    1865                 1870                 1875

Leu Glu  Asp Gly Ser Lys Tyr  Tyr Phe Asp Glu Asp  Thr Ala Glu
    1880                 1885                 1890

Ala Tyr  Ile Gly Leu Ser Leu  Ile Asn Asp Gly Gln  Tyr Tyr Phe
    1895                 1900                 1905

Asn Asp  Asp Gly Ile Met Gln  Val Gly Phe Val Thr  Ile Asn Asp
    1910                 1915                 1920

Lys Val  Phe Tyr Phe Ser Asp  Ser Gly Ile Ile Glu  Ser Gly Val
    1925                 1930                 1935

Gln Asn  Ile Asp Asp Asn Tyr  Phe Tyr Ile Asp Asp  Asn Gly Ile
    1940                 1945                 1950

Val Gln  Ile Gly Val Phe Asp  Thr Ser Asp Gly Tyr  Lys Tyr Phe
    1955                 1960                 1965
```

```
Ala Pro  Ala Asn Thr Val Asn  Asp Asn Ile Tyr Gly  Gln Ala Val
    1970                1975                1980

Glu Tyr  Ser Gly Leu Val Arg  Val Gly Glu Asp Val  Tyr Tyr Phe
    1985                1990                1995

Gly Glu  Thr Tyr Thr Ile Glu  Thr Gly Trp Ile Tyr  Asp Met Glu
    2000                2005                2010

Asn Glu  Ser Asp Lys Tyr Tyr  Phe Asn Pro Glu Thr  Lys Lys Ala
    2015                2020                2025

Cys Lys  Gly Ile Asn Leu Ile  Asp Asp Ile Lys Tyr  Tyr Phe Asp
    2030                2035                2040

Glu Lys  Gly Ile Met Arg Thr  Gly Leu Ile Ser Phe  Glu Asn Asn
    2045                2050                2055

Asn Tyr  Tyr Phe Asn Glu Asn  Gly Glu Met Gln Phe  Gly Tyr Ile
    2060                2065                2070

Asn Ile  Glu Asp Lys Met Phe  Tyr Phe Gly Glu Asp  Gly Val Met
    2075                2080                2085

Gln Ile  Gly Val Phe Asn Thr  Pro Asp Gly Phe Lys  Tyr Phe Ala
    2090                2095                2100

His Gln  Asn Thr Leu Asp Glu  Asn Phe Glu Gly Glu  Ser Ile Asn
    2105                2110                2115

Tyr Thr  Gly Trp Leu Asp Leu  Asp Glu Lys Arg Tyr  Tyr Phe Thr
    2120                2125                2130

Asp Glu  Tyr Ile Ala Ala Thr  Gly Ser Val Ile Ile  Asp Gly Glu
    2135                2140                2145

Glu Tyr  Tyr Phe Asp Pro Asp  Thr Ala Gln Leu Val  Ile Ser Glu
    2150                2155                2160
```

<210> 45
<211> 2151
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 45

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

Ala Val Val Glu Ala Val Ser Asn Glu Lys Ala Leu Pro Arg Glu Lys
```

```
            20                  25                  30

Ile Phe Glu Ala Leu Glu Ser Ala Leu Ala Thr Ala Thr Lys Lys Lys
        35                  40                  45

Tyr Glu Gln Glu Ile Asp Val Arg Val Gln Ile Asp Arg Lys Ser Gly
    50                  55                  60

Asp Phe Asp Thr Phe Arg Arg Trp Leu Val Val Asp Glu Val Thr Gln
65                  70                  75                  80

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

Leu Asn Leu Gly Asp Tyr Val Glu Asp Gln Ile Glu Ser Val Thr Phe
            100                 105                 110

Asp Arg Ile Thr Thr Gln Thr Ala Lys Gln Val Ile Val Gln Lys Val
        115                 120                 125

Arg Glu Ala Glu Arg Ala Met Val Val Asp Gln Phe Arg Glu His Glu
    130                 135                 140

Gly Glu Ile Ile Thr Gly Val Val Lys Lys Val Asn Arg Asp Asn Ile
145                 150                 155                 160

Ser Leu Asp Leu Gly Asn Asn Ala Glu Ala Val Ile Leu Arg Glu Asp
                165                 170                 175

Met Leu Pro Arg Glu Asn Phe Arg Pro Gly Asp Arg Val Arg Gly Val
            180                 185                 190

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

Arg Ser Lys Pro Glu Met Leu Ile Glu Leu Phe Arg Ile Glu Val Pro
    210                 215                 220

Glu Ile Gly Glu Glu Val Ile Glu Ile Lys Ala Ala Ala Arg Asp Pro
225                 230                 235                 240

Gly Ser Arg Ala Lys Ile Ala Val Lys Thr Asn Asp Lys Arg Ile Asp
                245                 250                 255

Pro Val Gly Ala Cys Val Gly Met Arg Gly Ala Arg Val Gln Ala Val
            260                 265                 270

Ser Thr Glu Leu Gly Gly Glu Arg Ile Asp Ile Val Leu Trp Asp Asp
        275                 280                 285

Asn Pro Ala Gln Phe Val Ile Asn Ala Met Ala Pro Ala Asp Val Ala
```

290 295 300

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

Ala Gly Asn Leu Ala Gln Ala Ile Gly Arg Asn Gly Gln Asn Val Arg
325 330 335

Leu Ala Ser Gln Leu Ser Gly Trp Glu Leu Asn Val Met Thr Val Asp
340 345 350

Asp Leu Gln Ala Lys His Gln Ala Glu Ala His Ala Ala Ile Asp Thr
355 360 365

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

Glu Glu Gly Phe Ser Thr Leu Glu Glu Leu Ala Tyr Val Pro Met Lys
385 390 395 400

Glu Leu Leu Glu Ile Glu Gly Leu Asp Glu Pro Thr Val Glu Ala Leu
405 410 415

Arg Glu Arg Ala Lys Asn Ala Leu Ala Thr Ile Ala Gln Ala Gln Glu
420 425 430

Glu Ser Leu Gly Asp Asn Lys Pro Ala Asp Asp Leu Leu Asn Leu Glu
435 440 445

Gly Val Asp Arg Asp Leu Ala Phe Lys Leu Ala Ala Arg Gly Val Cys
450 455 460

Thr Leu Glu Asp Leu Ala Glu Gln Gly Ile Asp Asp Leu Ala Asp Ile
465 470 475 480

Glu Gly Leu Thr Asp Glu Lys Ala Gly Ala Leu Ile Met Ala Ala Arg
485 490 495

Asn Ile Cys Trp Phe Gly Asp Glu Ala Ser Gly Ala Leu Gly Gly Ser
500 505 510

Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly
515 520 525

Gly Ser Gly Gly Ser Gly Gly Ser Leu Val Pro Arg Gly Ser Gly Ser
530 535 540

Ala Ala Ala Pro Phe Thr Met Ser Ile Ile Lys Asp Ile Ser Ser Lys
545 550 555 560

Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn Lys Ile Thr Val Lys Ser

565 570 575

Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu Gln Glu Ile Arg Asn Asn
580 585 590

Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu Lys Val Met Leu Thr Glu
595 600 605

Cys Glu Ile Asn Val Ile Ser Asn Ile Asp Thr Gln Ile Val Glu Glu
610 615 620

Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser Asp Ser Ile Asn Tyr Ile
625 630 635 640

Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile Ser Asp Ala Leu Cys Asp
645 650 655

Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser His Phe Ile Ser Phe Glu
660 665 670

Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser Ile Arg Phe Ile Asn Lys
675 680 685

Glu Thr Gly Glu Ser Ile Phe Val Glu Thr Glu Lys Thr Ile Phe Ser
690 695 700

Glu Tyr Ala Asn His Ile Thr Glu Glu Ile Ser Lys Ile Lys Gly Thr
705 710 715 720

Ile Phe Asp Thr Val Asn Gly Lys Leu Val Lys Lys Val Asn Leu Asp
725 730 735

Thr Thr His Glu Val Asn Thr Leu Asn Ala Ala Phe Phe Ile Gln Ser
740 745 750

Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser Leu Ser Asn Leu Ser Val
755 760 765

Ala Met Lys Val Gln Val Tyr Ala Gln Leu Phe Ser Thr Gly Leu Asn
770 775 780

Thr Ile Thr Asp Ala Ala Lys Val Val Glu Leu Val Ser Thr Ala Leu
785 790 795 800

Asp Glu Thr Ile Asp Leu Leu Pro Thr Leu Ser Glu Gly Leu Pro Ile
805 810 815

Ile Ala Thr Ile Ile Asp Gly Val Ser Leu Gly Ala Ala Ile Lys Glu
820 825 830

Leu Ser Glu Thr Ser Asp Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys

835 840 845

Ile Gly Ile Met Ala Val Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile
850 855 860

Thr Ser Ser Leu Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro
865 870 875 880

Leu Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu
885 890 895

Val Leu Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val
900 905 910

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

Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
930 935 940

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly Gly
945 950 955 960

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

Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp Val Leu Glu
980 985 990

Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu Met Val Leu Pro
995 1000 1005

Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr Gly Trp Thr Pro
1010 1015 1020

Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys Leu Leu Asp Arg
1025 1030 1035

Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp Arg Tyr Phe Ala
1040 1045 1050

Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys Pro Arg Tyr Glu
1055 1060 1065

Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn Thr Arg Ser Phe
1070 1075 1080

Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg Glu Lys Leu Ser
1085 1090 1095

Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala Leu Ser Leu Ser

1100 1105 1110

Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser Glu Ser Asp Val
1115 1120 1125

Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp Val Thr Ile Glu
1130 1135 1140

Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu Gly Ile Leu Ser
1145 1150 1155

Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu Asn Ser His Glu
1160 1165 1170

Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn Gly Phe Val Ser
1175 1180 1185

Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala Ile Ile Glu Val
1190 1195 1200

Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile Ser Gly Glu Leu
1205 1210 1215

Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln Gln Lys Ile Asp
1220 1225 1230

Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn Ile Pro Tyr Ser
1235 1240 1245

Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe Ile Asn Gly Ser
1250 1255 1260

Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro Asp Val Val Leu
1265 1270 1275

Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro Ser Phe Gly Tyr
1280 1285 1290

Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile Thr Lys Asp Asn
1295 1300 1305

Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp Asp Ile Lys Ile
1310 1315 1320

Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr Ile Lys Leu Asn
1325 1330 1335

Ser Val His Leu Asp Glu Ser Gly Val Ala Glu Ile Leu Lys Phe
1340 1345 1350

Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp Ser Leu Met Ser

1355 1360 1365

Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe Val Asn Phe Leu
1370 1375 1380

Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn Phe Ile Ile Ser
1385 1390 1395

Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile Cys Asp Glu Asn
1400 1405 1410

Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn Thr Leu Glu Thr
1415 1420 1425

Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn Met Ile Val Glu
1430 1435 1440

Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile Ser Ser Thr Val
1445 1450 1455

Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile Asp Ser Cys Val
1460 1465 1470

Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr Asp Glu Ile Asn
1475 1480 1485

Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr Pro Glu Val Ile
1490 1495 1500

Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile Asn Val Asn Ile
1505 1510 1515

Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn Asp Gly Asn Asp
1520 1525 1530

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val
1535 1540 1545

Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn
1550 1555 1560

Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser
1565 1570 1575

Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu
1580 1585 1590

Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe
1595 1600 1605

Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly Leu Ile Tyr Ile

1610 1615 1620

Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val Asn Asn Leu Ile
1625 1630 1635

Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr Tyr Phe Asn Pro
1640 1645 1650

Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr Ile Ile Asp Asp
1655 1660 1665

Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu Gln Thr Gly Val
1670 1675 1680

Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala Pro Ala Asn Thr
1685 1690 1695

Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp Phe Thr Gly Lys
1700 1705 1710

Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp Asn Tyr Arg
1715 1720 1725

Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His Tyr Phe
1730 1735 1740

Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile Gly
1745 1750 1755

Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
1760 1765 1770

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly
1775 1780 1785

Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr
1790 1795 1800

Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu
1805 1810 1815

Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn
1820 1825 1830

Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn
1835 1840 1845

Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr Ala Val Val Gly
1850 1855 1860

Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr Phe Asp Glu Asp

1865 1870 1875

Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile Asn Asp Gly Gln
1880 1885 1890

Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val Gly Phe Val Thr
1895 1900 1905

Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser Gly Ile Ile Glu
1910 1915 1920

Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe Tyr Ile Asp Asp
1925 1930 1935

Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr Ser Asp Gly Tyr
1940 1945 1950

Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn Ile Tyr Gly
1955 1960 1965

Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu Asp Val
1970 1975 1980

Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile Tyr
1985 1990 1995

Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr
2000 2005 2010

Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr
2015 2020 2025

Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe
2030 2035 2040

Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe
2045 2050 2055

Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp
2060 2065 2070

Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys
2075 2080 2085

Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu
2090 2095 2100

Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp Glu Lys Arg Tyr
2105 2110 2115

Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly Ser Val Ile Ile

2120 2125 2130

Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr Ala Gln Leu Val
2135 2140 2145

Ile Ser Glu
2150

<210> 46
<211> 2170
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 46

His His His His His His His His His His Gly Gly Ser Leu Ala Glu
1 5 10 15

Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala
20 25 30

Ala Ala Lys Glu Ala Ala Ala Lys Ala Ala Ala Gly Gly Ser His Met
35 40 45

Ala Ser Asn Lys Glu Ile Leu Ala Val Val Glu Ala Val Ser Asn Glu
50 55 60

Lys Ala Leu Pro Arg Glu Lys Ile Phe Glu Ala Leu Glu Ser Ala Leu
65 70 75 80

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

Gln Ile Asp Arg Lys Ser Gly Asp Phe Asp Thr Phe Arg Arg Trp Leu
100 105 110

Val Val Asp Glu Val Thr Gln Pro Thr Lys Glu Ile Thr Leu Glu Ala
115 120 125

Ala Arg Tyr Glu Asp Glu Ser Leu Asn Leu Gly Asp Tyr Val Glu Asp
130 135 140

Gln Ile Glu Ser Val Thr Phe Asp Arg Ile Thr Thr Gln Thr Ala Lys
145 150 155 160

Gln Val Ile Val Gln Lys Val Arg Glu Ala Glu Arg Ala Met Val Val
165 170 175

Asp Gln Phe Arg Glu His Glu Gly Glu Ile Ile Thr Gly Val Val Lys
180 185 190

```
Lys Val Asn Arg Asp Asn Ile Ser Leu Asp Leu Gly Asn Asn Ala Glu
        195                 200                 205

Ala Val Ile Leu Arg Glu Asp Met Leu Pro Arg Glu Asn Phe Arg Pro
    210                 215                 220

Gly Asp Arg Val Arg Gly Val Leu Tyr Ser Val Arg Pro Glu Ala Arg
225                 230                 235                 240

Gly Ala Gln Leu Phe Val Thr Arg Ser Lys Pro Glu Met Leu Ile Glu
                245                 250                 255

Leu Phe Arg Ile Glu Val Pro Glu Ile Gly Glu Glu Val Ile Glu Ile
            260                 265                 270

Lys Ala Ala Ala Arg Asp Pro Gly Ser Arg Ala Lys Ile Ala Val Lys
        275                 280                 285

Thr Asn Asp Lys Arg Ile Asp Pro Val Gly Ala Cys Val Gly Met Arg
    290                 295                 300

Gly Ala Arg Val Gln Ala Val Ser Thr Glu Leu Gly Gly Glu Arg Ile
305                 310                 315                 320

Asp Ile Val Leu Trp Asp Asp Asn Pro Ala Gln Phe Val Ile Asn Ala
                325                 330                 335

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

Thr Met Asp Ile Ala Val Glu Ala Gly Asn Leu Ala Gln Ala Ile Gly
        355                 360                 365

Arg Asn Gly Gln Asn Val Arg Leu Ala Ser Gln Leu Ser Gly Trp Glu
    370                 375                 380

Leu Asn Val Met Thr Val Asp Asp Leu Gln Ala Lys His Gln Ala Glu
385                 390                 395                 400

Ala His Ala Ala Ile Asp Thr Phe Thr Lys Tyr Leu Asp Ile Asp Glu
                405                 410                 415

Asp Phe Ala Thr Val Leu Val Glu Glu Gly Phe Ser Thr Leu Glu Glu
            420                 425                 430

Leu Ala Tyr Val Pro Met Lys Glu Leu Leu Glu Ile Glu Gly Leu Asp
        435                 440                 445

Glu Pro Thr Val Glu Ala Leu Arg Glu Arg Ala Lys Asn Ala Leu Ala
    450                 455                 460
```

```
Thr Ile Ala Gln Ala Gln Glu Glu Ser Leu Gly Asp Asn Lys Pro Ala
465                 470                 475                 480

Asp Asp Leu Leu Asn Leu Glu Gly Val Asp Arg Asp Leu Ala Phe Lys
                485                 490                 495

Leu Ala Ala Arg Gly Val Cys Thr Leu Glu Asp Leu Ala Glu Gln Gly
            500                 505                 510

Ile Asp Asp Leu Ala Asp Ile Glu Gly Leu Thr Asp Glu Lys Ala Gly
        515                 520                 525

Ala Leu Ile Met Ala Ala Arg Asn Ile Cys Trp Phe Gly Asp Glu Ala
    530                 535                 540

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

Ala Gly Ser Ala Ala Ala Pro Phe Thr Met Ser Ile Ile Lys Asp Ile
                565                 570                 575

Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn Lys Ile Thr
            580                 585                 590

Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu Gln Glu Ile
        595                 600                 605

Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu Lys Val Met
    610                 615                 620

Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp Thr Gln Ile
625                 630                 635                 640

Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser Asp Ser Ile
                645                 650                 655

Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile Ser Asp Ala
            660                 665                 670

Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser His Phe Ile
        675                 680                 685

Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser Ile Arg Phe
    690                 695                 700

Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr Glu Lys Thr
705                 710                 715                 720

Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile Ser Lys Ile
                725                 730                 735
```

```
Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val Lys Lys Val
            740                 745                 750

Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala Ala Phe Phe
        755                 760                 765

Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser Leu Ser Asn
    770                 775                 780

Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu Phe Ser Thr
785                 790                 795                 800

Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu Leu Val Ser
                805                 810                 815

Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr Leu Ser Glu Gly
            820                 825                 830

Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val Ser Leu Gly Ala Ala
        835                 840                 845

Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro Leu Leu Arg Gln Glu Ile
    850                 855                 860

Glu Ala Lys Ile Gly Ile Met Ala Val Asn Leu Thr Thr Ala Thr Thr
865                 870                 875                 880

Ala Ile Ile Thr Ser Ser Leu Gly Ile Ala Ser Gly Phe Ser Ile Leu
                885                 890                 895

Leu Val Pro Leu Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn
            900                 905                 910

Asn Glu Leu Val Leu Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe
        915                 920                 925

Lys His Val Ser Leu Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp
    930                 935                 940

Asp Lys Ile Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp
945                 950                 955                 960

Phe Asn Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met
                965                 970                 975

Glu Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
            980                 985                 990

Ser Ala Pro Ser Ile Thr Tyr Arg  Glu Pro His Leu Ser  Ile Tyr Asp
        995                 1000                1005
```

```
Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp Leu Ser  Lys Asp Leu
    1010                 1015                 1020

Met Val  Leu Pro Asn Ala Pro  Asn Arg Val Phe Ala  Trp Glu Thr
    1025                 1030                 1035

Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu Asn Asp  Gly Thr Lys
    1040                 1045                 1050

Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu Gly Glu  Phe Tyr Trp
    1055                 1060                 1065

Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu Ile Thr  Thr Leu Lys
    1070                 1075                 1080

Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile Asn Leu  Asp Ser Asn
    1085                 1090                 1095

Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr Thr Glu  Tyr Ile Arg
    1100                 1105                 1110

Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser Gly Gly  Thr Tyr Ala
    1115                 1120                 1125

Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile Asn Ile  Glu Leu Ser
    1130                 1135                 1140

Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp Asn Val  Val Arg Asp
    1145                 1150                 1155

Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys Gly Asp  Leu Ile Glu
    1160                 1165                 1170

Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu Asn Lys  Ile Ile Leu
    1175                 1180                 1185

Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu Val Asn  Gly Ser Asn
    1190                 1195                 1200

Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu Glu Gly  Ile Asn Ala
    1205                 1210                 1215

Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser Tyr Lys  Leu Leu Ile
    1220                 1225                 1230

Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn Ser Asn  His Ile Gln
    1235                 1240                 1245

Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser Glu Leu  Gln Lys Asn
    1250                 1255                 1260
```

```
Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly Lys Glu  Asn Gly Phe
    1265                 1270                 1275

Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe Val Ser  Glu Leu Pro
    1280                 1285                 1290

Asp Val  Val Leu Ile Ser Lys  Val Tyr Met Asp Asp  Ser Lys Pro
    1295                 1300                 1305

Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys Asp Val  Lys Val Ile
    1310                 1315                 1320

Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly Tyr Tyr  Leu Lys Asp
    1325                 1330                 1335

Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu Gln Asp  Glu Lys Thr
    1340                 1345                 1350

Ile Lys  Leu Asn Ser Val His  Leu Asp Glu Ser Gly  Val Ala Glu
    1355                 1360                 1365

Ile Leu  Lys Phe Met Asn Arg  Lys Gly Asn Thr Asn  Thr Ser Asp
    1370                 1375                 1380

Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn Ile Lys  Ser Ile Phe
    1385                 1390                 1395

Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe Ile Leu  Asp Ala Asn
    1400                 1405                 1410

Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly Gln Phe  Glu Phe Ile
    1415                 1420                 1425

Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr Phe Ile  Lys Phe Asn
    1430                 1435                 1440

Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val Gly Asn  Arg Gln Asn
    1445                 1450                 1455

Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp Asp Ser  Gly Asp Ile
    1460                 1465                 1470

Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys Tyr Leu  Tyr Gly Ile
    1475                 1480                 1485

Asp Ser  Cys Val Asn Lys Val  Val Ile Ser Pro Asn  Ile Tyr Thr
    1490                 1495                 1500

Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu Thr Asn  Asn Thr Tyr
    1505                 1510                 1515
```

```
Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr Ile Asn  Glu Lys Ile
    1520                1525                1530

Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg Tyr Val  Trp Ser Asn
    1535                1540                1545

Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr Ser Glu  Glu Asn Lys
    1550                1555                1560

Val Ser  Gln Val Lys Ile Arg  Phe Val Asn Val Phe  Lys Asp Lys
    1565                1570                1575

Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe Ser Asp  Lys Gln Asp
    1580                1585                1590

Val Pro  Val Ser Glu Ile Ile  Leu Ser Phe Thr Pro  Ser Tyr Tyr
    1595                1600                1605

Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly Leu Val  Ser Leu Tyr
    1610                1615                1620

Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly Met Met  Val Ser Gly
    1625                1630                1635

Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr Phe Lys  Pro Pro Val
    1640                1645                1650

Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val Gly Asp  Asp Lys Tyr
    1655                1660                1665

Tyr Phe  Asn Pro Ile Asn Gly  Gly Ala Ala Ser Ile  Gly Glu Thr
    1670                1675                1680

Ile Ile  Asp Asp Lys Asn Tyr  Tyr Phe Asn Gln Ser  Gly Val Leu
    1685                1690                1695

Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly Phe Lys  Tyr Phe Ala
    1700                1705                1710

Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu Gly Glu  Ala Ile Asp
    1715                1720                1725

Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn Ile Tyr  Tyr Phe Asp
    1730                1735                1740

Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys Glu Leu  Asp Gly Glu
    1745                1750                1755

Met His  Tyr Phe Ser Pro Glu  Thr Gly Lys Ala Phe  Lys Gly Leu
    1760                1765                1770
```

```
Asn Gln  Ile Gly Asp Tyr Lys  Tyr Tyr Phe Asn Ser  Asp Gly Val
    1775                 1780                 1785

Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp Asn Lys  His Tyr Phe
    1790                 1795                 1800

Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr Thr Glu  Ile Asp Gly
    1805                 1810                 1815

Lys His  Phe Tyr Phe Ala Glu  Asn Gly Glu Met Gln  Ile Gly Val
    1820                 1825                 1830

Phe Asn  Thr Glu Asp Gly Phe  Lys Tyr Phe Ala His  His Asn Glu
    1835                 1840                 1845

Asp Leu  Gly Asn Glu Glu Gly  Glu Glu Ile Ser Tyr  Ser Gly Ile
    1850                 1855                 1860

Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe Asp Asp  Ser Phe Thr
    1865                 1870                 1875

Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp Gly Ser  Lys Tyr Tyr
    1880                 1885                 1890

Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile Gly Leu  Ser Leu Ile
    1895                 1900                 1905

Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp Gly Ile  Met Gln Val
    1910                 1915                 1920

Gly Phe  Val Thr Ile Asn Asp  Lys Val Phe Tyr Phe  Ser Asp Ser
    1925                 1930                 1935

Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile Asp Asp  Asn Tyr Phe
    1940                 1945                 1950

Tyr Ile  Asp Asp Asn Gly Ile  Val Gln Ile Gly Val  Phe Asp Thr
    1955                 1960                 1965

Ser Asp  Gly Tyr Lys Tyr Phe  Ala Pro Ala Asn Thr  Val Asn Asp
    1970                 1975                 1980

Asn Ile  Tyr Gly Gln Ala Val  Glu Tyr Ser Gly Leu  Val Arg Val
    1985                 1990                 1995

Gly Glu  Asp Val Tyr Tyr Phe  Gly Glu Thr Tyr Thr  Ile Glu Thr
    2000                 2005                 2010

Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser Asp Lys  Tyr Tyr Phe
    2015                 2020                 2025
```

```
Asn Pro  Glu Thr Lys Lys Ala  Cys Lys Gly Ile Asn  Leu Ile Asp
    2030                2035                2040

Asp Ile  Lys Tyr Tyr Phe Asp  Glu Lys Gly Ile Met  Arg Thr Gly
    2045                2050                2055

Leu Ile  Ser Phe Glu Asn Asn  Asn Tyr Tyr Phe Asn  Glu Asn Gly
    2060                2065                2070

Glu Met  Gln Phe Gly Tyr Ile  Asn Ile Glu Asp Lys  Met Phe Tyr
    2075                2080                2085

Phe Gly  Glu Asp Gly Val Met  Gln Ile Gly Val Phe  Asn Thr Pro
    2090                2095                2100

Asp Gly  Phe Lys Tyr Phe Ala  His Gln Asn Thr Leu  Asp Glu Asn
    2105                2110                2115

Phe Glu  Gly Glu Ser Ile Asn  Tyr Thr Gly Trp Leu  Asp Leu Asp
    2120                2125                2130

Glu Lys  Arg Tyr Tyr Phe Thr  Asp Glu Tyr Ile Ala  Ala Thr Gly
    2135                2140                2145

Ser Val  Ile Ile Asp Gly Glu  Glu Tyr Tyr Phe Asp  Pro Asp Thr
    2150                2155                2160

Ala Gln  Leu Val Ile Ser Glu
    2165                2170
```

<210> 47
<211> 2157
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 47

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

Ala Val Val Glu Ala Val Ser Asn Glu Lys Ala Leu Pro Arg Glu Lys
            20                  25                  30

Ile Phe Glu Ala Leu Glu Ser Ala Leu Ala Thr Ala Thr Lys Lys Lys
        35                  40                  45

Tyr Glu Gln Glu Ile Asp Val Arg Val Gln Ile Asp Arg Lys Ser Gly
    50                  55                  60

Asp Phe Asp Thr Phe Arg Arg Trp Leu Val Val Asp Glu Val Thr Gln
```

65 70 75 80

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

Leu Asn Leu Gly Asp Tyr Val Glu Asp Gln Ile Glu Ser Val Thr Phe
100 105 110

Asp Arg Ile Thr Thr Gln Thr Ala Lys Gln Val Ile Val Gln Lys Val
115 120 125

Arg Glu Ala Glu Arg Ala Met Val Val Asp Gln Phe Arg Glu His Glu
130 135 140

Gly Glu Ile Ile Thr Gly Val Val Lys Lys Val Asn Arg Asp Asn Ile
145 150 155 160

Ser Leu Asp Leu Gly Asn Asn Ala Glu Ala Val Ile Leu Arg Glu Asp
165 170 175

Met Leu Pro Arg Glu Asn Phe Arg Pro Gly Asp Arg Val Arg Gly Val
180 185 190

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

Arg Ser Lys Pro Glu Met Leu Ile Glu Leu Phe Arg Ile Glu Val Pro
210 215 220

Glu Ile Gly Glu Glu Val Ile Glu Ile Lys Ala Ala Ala Arg Asp Pro
225 230 235 240

Gly Ser Arg Ala Lys Ile Ala Val Lys Thr Asn Asp Lys Arg Ile Asp
245 250 255

Pro Val Gly Ala Cys Val Gly Met Arg Gly Ala Arg Val Gln Ala Val
260 265 270

Ser Thr Glu Leu Gly Gly Glu Arg Ile Asp Ile Val Leu Trp Asp Asp
275 280 285

Asn Pro Ala Gln Phe Val Ile Asn Ala Met Ala Pro Ala Asp Val Ala
290 295 300

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

Ala Gly Asn Leu Ala Gln Ala Ile Gly Arg Asn Gly Gln Asn Val Arg
325 330 335

Leu Ala Ser Gln Leu Ser Gly Trp Glu Leu Asn Val Met Thr Val Asp

```
            340                 345                 350

Asp Leu Gln Ala Lys His Gln Ala Glu Ala His Ala Ala Ile Asp Thr
        355                 360                 365

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

Glu Glu Gly Phe Ser Thr Leu Glu Glu Leu Ala Tyr Val Pro Met Lys
385                 390                 395                 400

Glu Leu Leu Glu Ile Glu Gly Leu Asp Glu Pro Thr Val Glu Ala Leu
                405                 410                 415

Arg Glu Arg Ala Lys Asn Ala Leu Ala Thr Ile Ala Gln Ala Gln Glu
            420                 425                 430

Glu Ser Leu Gly Asp Asn Lys Pro Ala Asp Asp Leu Leu Asn Leu Glu
        435                 440                 445

Gly Val Asp Arg Asp Leu Ala Phe Lys Leu Ala Ala Arg Gly Val Cys
    450                 455                 460

Thr Leu Glu Asp Leu Ala Glu Gln Gly Ile Asp Asp Leu Ala Asp Ile
465                 470                 475                 480

Glu Gly Leu Thr Asp Glu Lys Ala Gly Ala Leu Ile Met Ala Ala Arg
                485                 490                 495

Asn Ile Cys Trp Phe Gly Asp Glu Ala Ser Gly Ala Leu Leu Ala Glu
            500                 505                 510

Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala
        515                 520                 525

Ala Ala Lys Glu Ala Ala Ala Lys Ala Ala Ala Gly Gly Ser Leu Val
    530                 535                 540

Pro Arg Gly Ser Gly Ser Ala Ala Ala Pro Phe Thr Met Ser Ile Ile
545                 550                 555                 560

Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn
                565                 570                 575

Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu
            580                 585                 590

Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu
        595                 600                 605

Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp
```

610 615 620

Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser
625 630 635 640

Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile
645 650 655

Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser
660 665 670

His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser
675 680 685

Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr
690 695 700

Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile
705 710 715 720

Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val
725 730 735

Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala
740 745 750

Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser
755 760 765

Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu
770 775 780

Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys Val Val Glu
785 790 795 800

Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr Leu
805 810 815

Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val Ser Leu
820 825 830

Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro Leu Leu Arg
835 840 845

Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val Asn Leu Thr Thr
850 855 860

Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly Ile Ala Ser Gly Phe
865 870 875 880

Ser Ile Leu Leu Val Pro Leu Ala Gly Ile Ser Ala Gly Ile Pro Ser

885 890 895

Leu Val Asn Asn Glu Leu Val Leu Arg Asp Lys Ala Thr Lys Val Val
900 905 910

Asp Tyr Phe Lys His Val Ser Leu Val Glu Thr Glu Gly Val Phe Thr
915 920 925

Leu Leu Asp Asp Lys Ile Met Met Pro Gln Asp Asp Leu Val Ile Ser
930 935 940

Glu Ile Asp Phe Asn Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile
945 950 955 960

Trp Arg Met Glu Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp
965 970 975

His Phe Phe Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser
980 985 990

Ile Tyr Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys
995 1000 1005

Asp Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp
1010 1015 1020

Glu Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly
1025 1030 1035

Thr Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe
1040 1045 1050

Tyr Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr
1055 1060 1065

Leu Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp
1070 1075 1080

Ser Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr
1085 1090 1095

Ile Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr
1100 1105 1110

Tyr Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu
1115 1120 1125

Leu Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val
1130 1135 1140

Arg Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu

```
    1145                1150                1155

Ile Glu  Gly Ile Leu Ser Thr  Leu Ser Ile Glu Glu  Asn Lys Ile
    1160                1165                1170

Ile Leu  Asn Ser His Glu Ile  Asn Phe Ser Gly Glu  Val Asn Gly
    1175                1180                1185

Ser Asn  Gly Phe Val Ser Leu  Thr Phe Ser Ile Leu  Glu Gly Ile
    1190                1195                1200

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

Leu Ile  Ser Gly Glu Leu Lys  Ile Leu Met Leu Asn  Ser Asn His
    1220                1225                1230

Ile Gln  Gln Lys Ile Asp Tyr  Ile Gly Phe Asn Ser  Glu Leu Gln
    1235                1240                1245

Lys Asn  Ile Pro Tyr Ser Phe  Val Asp Ser Glu Gly  Lys Glu Asn
    1250                1255                1260

Gly Phe  Ile Asn Gly Ser Thr  Lys Glu Gly Leu Phe  Val Ser Glu
    1265                1270                1275

Leu Pro  Asp Val Val Leu Ile  Ser Lys Val Tyr Met  Asp Asp Ser
    1280                1285                1290

Lys Pro  Ser Phe Gly Tyr Tyr  Ser Asn Asn Leu Lys  Asp Val Lys
    1295                1300                1305

Val Ile  Thr Lys Asp Asn Val  Asn Ile Leu Thr Gly  Tyr Tyr Leu
    1310                1315                1320

Lys Asp  Asp Ile Lys Ile Ser  Leu Ser Leu Thr Leu  Gln Asp Glu
    1325                1330                1335

Lys Thr  Ile Lys Leu Asn Ser  Val His Leu Asp Glu  Ser Gly Val
    1340                1345                1350

Ala Glu  Ile Leu Lys Phe Met  Asn Arg Lys Gly Asn  Thr Asn Thr
    1355                1360                1365

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

Ile Phe  Val Asn Phe Leu Gln  Ser Asn Ile Lys Phe  Ile Leu Asp
    1385                1390                1395

Ala Asn  Phe Ile Ile Ser Gly  Thr Thr Ser Ile Gly  Gln Phe Glu
```

1400 1405 1410

Phe Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys
1415 1420 1425

Phe Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg
1430 1435 1440

Gln Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly
1445 1450 1455

Asp Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr
1460 1465 1470

Gly Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile
1475 1480 1485

Tyr Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn
1490 1495 1500

Thr Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu
1505 1510 1515

Lys Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp
1520 1525 1530

Ser Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu
1535 1540 1545

Asn Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys
1550 1555 1560

Asp Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys
1565 1570 1575

Gln Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser
1580 1585 1590

Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser
1595 1600 1605

Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val
1610 1615 1620

Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro
1625 1630 1635

Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp
1640 1645 1650

Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly

```
    1655                1660                1665

Glu Thr  Ile Ile Asp Asp Lys  Asn Tyr Tyr Phe Asn  Gln Ser Gly
    1670                1675                1680

Val Leu  Gln Thr Gly Val Phe  Ser Thr Glu Asp Gly  Phe Lys Tyr
    1685                1690                1695

Phe Ala  Pro Ala Asn Thr Leu  Asp Glu Asn Leu Glu  Gly Glu Ala
    1700                1705                1710

Ile Asp  Phe Thr Gly Lys Leu  Ile Ile Asp Glu Asn  Ile Tyr Tyr
    1715                1720                1725

Phe Asp  Asp Asn Tyr Arg Gly  Ala Val Glu Trp Lys  Glu Leu Asp
    1730                1735                1740

Gly Glu  Met His Tyr Phe Ser  Pro Glu Thr Gly Lys  Ala Phe Lys
    1745                1750                1755

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

Gly Val  Met Gln Lys Gly Phe  Val Ser Ile Asn Asp  Asn Lys His
    1775                1780                1785

Tyr Phe  Asp Asp Ser Gly Val  Met Lys Val Gly Tyr  Thr Glu Ile
    1790                1795                1800

Asp Gly  Lys His Phe Tyr Phe  Ala Glu Asn Gly Glu  Met Gln Ile
    1805                1810                1815

Gly Val  Phe Asn Thr Glu Asp  Gly Phe Lys Tyr Phe  Ala His His
    1820                1825                1830

Asn Glu  Asp Leu Gly Asn Glu  Glu Gly Glu Glu Ile  Ser Tyr Ser
    1835                1840                1845

Gly Ile  Leu Asn Phe Asn Asn  Lys Ile Tyr Tyr Phe  Asp Asp Ser
    1850                1855                1860

Phe Thr  Ala Val Val Gly Trp  Lys Asp Leu Glu Asp  Gly Ser Lys
    1865                1870                1875

Tyr Tyr  Phe Asp Glu Asp Thr  Ala Glu Ala Tyr Ile  Gly Leu Ser
    1880                1885                1890

Leu Ile  Asn Asp Gly Gln Tyr  Tyr Phe Asn Asp Asp  Gly Ile Met
    1895                1900                1905

Gln Val  Gly Phe Val Thr Ile  Asn Asp Lys Val Phe  Tyr Phe Ser
```

1910 1915 1920

Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn
1925 1930 1935

Tyr Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe
1940 1945 1950

Asp Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val
1955 1960 1965

Asn Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val
1970 1975 1980

Arg Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile
1985 1990 1995

Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr
2000 2005 2010

Tyr Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu
2015 2020 2025

Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg
2030 2035 2040

Thr Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu
2045 2050 2055

Asn Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met
2060 2065 2070

Phe Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn
2075 2080 2085

Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp
2090 2095 2100

Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp
2105 2110 2115

Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala
2120 2125 2130

Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro
2135 2140 2145

Asp Thr Ala Gln Leu Val Ile Ser Glu
2150 2155

<210> 48

<211> 1776
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 48

```
His His His His His His His His His His Gly Gly Ser Gly Gly Ser
1               5                  10                  15

Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly
            20                  25                  30

Gly Ser Gly Gly Ser Gly Gly Ser His Met Ala Ser Asp Lys Ile Ile
        35                  40                  45

His Leu Thr Asp Asp Ser Phe Asp Thr Asp Val Leu Lys Ala Asp Gly
    50                  55                  60

Ala Ile Leu Val Asp Phe Trp Ala Glu Trp Cys Gly Pro Cys Lys Met
65                  70                  75                  80

Ile Ala Pro Ile Leu Asp Glu Ile Ala Asp Glu Tyr Gln Gly Lys Leu
                85                  90                  95

Thr Val Ala Lys Leu Asn Ile Asp Gln Asn Pro Gly Thr Ala Pro Lys
            100                 105                 110

Tyr Gly Ile Arg Gly Ile Pro Thr Leu Leu Leu Phe Lys Asn Gly Glu
        115                 120                 125

Val Ala Ala Thr Lys Val Gly Ala Leu Ser Lys Gly Gln Leu Lys Glu
    130                 135                 140

Phe Leu Asp Ala Asn Leu Ala Arg Ala Leu Val Pro Arg Gly Ser Val
145                 150                 155                 160

Thr Ser Leu Tyr Lys Lys Ala Gly Ser Ala Ala Ala Pro Phe Thr Met
                165                 170                 175

Ser Ile Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro
            180                 185                 190

Lys Glu Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro Glu Leu Ser
        195                 200                 205

Thr Leu Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu
    210                 215                 220

Leu Glu Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn Val Ile Ser
225                 230                 235                 240
```

```
Asn Ile Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu Ala Lys Asn
                245                 250                 255

Leu Thr Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile
            260                 265                 270

Glu Ser Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu
        275                 280                 285

Glu Asp Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu
    290                 295                 300

Gly Phe Ser Ile Arg Phe Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe
305                 310                 315                 320

Val Glu Thr Glu Lys Thr Ile Phe Ser Glu Tyr Ala Asn His Ile Thr
                325                 330                 335

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

Lys Leu Val Lys Lys Val Asn Leu Asp Thr Thr His Glu Val Asn Thr
        355                 360                 365

Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser
    370                 375                 380

Lys Glu Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val Gln Val Tyr
385                 390                 395                 400

Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp Ala Ala Lys
                405                 410                 415

Val Val Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu
            420                 425                 430

Pro Thr Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly
        435                 440                 445

Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr Ser Asp Pro
    450                 455                 460

Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met Ala Val Asn
465                 470                 475                 480

Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu Gly Ile Ala
                485                 490                 495

Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile Ser Ala Gly
            500                 505                 510
```

```
Ile Pro Ser Leu Val Asn Asn Glu Leu Val Leu Arg Asp Lys Ala Thr
        515                 520                 525

Lys Val Val Asp Tyr Phe Lys His Val Ser Leu Val Glu Thr Glu Gly
    530                 535                 540

Val Phe Thr Leu Leu Asp Asp Lys Ile Met Met Pro Gln Asp Asp Leu
545                 550                 555                 560

Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Val Leu Gly Lys
                565                 570                 575

Cys Glu Ile Trp Arg Met Glu Gly Gly Ser Gly His Thr Val Thr Asp
            580                 585                 590

Asp Ile Asp His Phe Phe Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro
        595                 600                 605

His Leu Ser Ile Tyr Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp
    610                 615                 620

Leu Ser Lys Asp Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe
625                 630                 635                 640

Ala Trp Glu Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp
                645                 650                 655

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

Tyr Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu
        675                 680                 685

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

Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg Glu
705                 710                 715                 720

Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala Leu Ser
                725                 730                 735

Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser Glu Ser Asp
            740                 745                 750

Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp Val Thr Ile Glu
        755                 760                 765

Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu Gly Ile Leu Ser Thr
    770                 775                 780
```

```
Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu Asn Ser His Glu Ile Asn
785                 790                 795                 800

Phe Ser Gly Glu Val Asn Gly Ser Asn Gly Phe Val Ser Leu Thr Phe
                805                 810                 815

Ser Ile Leu Glu Gly Ile Asn Ala Ile Ile Glu Val Asp Leu Leu Ser
            820                 825                 830

Lys Ser Tyr Lys Leu Leu Ile Ser Gly Glu Leu Lys Ile Leu Met Leu
        835                 840                 845

Asn Ser Asn His Ile Gln Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser
    850                 855                 860

Glu Leu Gln Lys Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys
865                 870                 875                 880

Glu Asn Gly Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser
                885                 890                 895

Glu Leu Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser
            900                 905                 910

Lys Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp Val Lys Val
        915                 920                 925

Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp
    930                 935                 940

Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr Ile
945                 950                 955                 960

Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala Glu Ile Leu
                965                 970                 975

Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp Ser Leu Met
            980                 985                 990

Ser Phe Leu Glu Ser Met Asn Ile  Lys Ser Ile Phe Val  Asn Phe Leu
        995                 1000                1005

Gln Ser  Asn Ile Lys Phe Ile  Leu Asp Ala Asn Phe  Ile Ile Ser
    1010                1015                1020

Gly Thr  Thr Ser Ile Gly Gln  Phe Glu Phe Ile Cys  Asp Glu Asn
    1025                1030                1035

Asp Asn  Ile Gln Pro Tyr Phe  Ile Lys Phe Asn Thr  Leu Glu Thr
    1040                1045                1050
```

```
Asn Tyr  Thr Leu Tyr Val Gly  Asn Arg Gln Asn Met  Ile Val Glu
    1055                1060                1065

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

Ile Asn  Phe Ser Gln Lys Tyr  Leu Tyr Gly Ile Asp  Ser Cys Val
    1085                1090                1095

Asn Lys  Val Val Ile Ser Pro  Asn Ile Tyr Thr Asp  Glu Ile Asn
    1100                1105                1110

Ile Thr  Pro Val Tyr Glu Thr  Asn Asn Thr Tyr Pro  Glu Val Ile
    1115                1120                1125

Val Leu  Asp Ala Asn Tyr Ile  Asn Glu Lys Ile Asn  Val Asn Ile
    1130                1135                1140

Asn Asp  Leu Ser Ile Arg Tyr  Val Trp Ser Asn Asp  Gly Asn Asp
    1145                1150                1155

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

Lys Ile  Arg Phe Val Asn Val  Phe Lys Asp Lys Thr  Leu Ala Asn
    1175                1180                1185

Lys Leu  Ser Phe Asn Phe Ser  Asp Lys Gln Asp Val  Pro Val Ser
    1190                1195                1200

Glu Ile  Ile Leu Ser Phe Thr  Pro Ser Tyr Tyr Glu  Asp Gly Leu
    1205                1210                1215

Ile Gly  Tyr Asp Leu Gly Leu  Val Ser Leu Tyr Asn  Glu Lys Phe
    1220                1225                1230

Tyr Ile  Asn Asn Phe Gly Met  Met Val Ser Gly Leu  Ile Tyr Ile
    1235                1240                1245

Asn Asp  Ser Leu Tyr Tyr Phe  Lys Pro Pro Val Asn  Asn Leu Ile
    1250                1255                1260

Thr Gly  Phe Val Thr Val Gly  Asp Asp Lys Tyr Tyr  Phe Asn Pro
    1265                1270                1275

Ile Asn  Gly Gly Ala Ala Ser  Ile Gly Glu Thr Ile  Ile Asp Asp
    1280                1285                1290

Lys Asn  Tyr Tyr Phe Asn Gln  Ser Gly Val Leu Gln  Thr Gly Val
    1295                1300                1305
```

```
Phe Ser  Thr Glu Asp Gly Phe  Lys Tyr Phe Ala Pro  Ala Asn Thr
    1310                1315                1320

Leu Asp  Glu Asn Leu Glu Gly  Glu Ala Ile Asp Phe  Thr Gly Lys
    1325                1330                1335

Leu Ile  Ile Asp Glu Asn Ile  Tyr Tyr Phe Asp Asp  Asn Tyr Arg
    1340                1345                1350

Gly Ala  Val Glu Trp Lys Glu  Leu Asp Gly Glu Met  His Tyr Phe
    1355                1360                1365

Ser Pro  Glu Thr Gly Lys Ala  Phe Lys Gly Leu Asn  Gln Ile Gly
    1370                1375                1380

Asp Tyr  Lys Tyr Tyr Phe Asn  Ser Asp Gly Val Met  Gln Lys Gly
    1385                1390                1395

Phe Val  Ser Ile Asn Asp Asn  Lys His Tyr Phe Asp  Asp Ser Gly
    1400                1405                1410

Val Met  Lys Val Gly Tyr Thr  Glu Ile Asp Gly Lys  His Phe Tyr
    1415                1420                1425

Phe Ala  Glu Asn Gly Glu Met  Gln Ile Gly Val Phe  Asn Thr Glu
    1430                1435                1440

Asp Gly  Phe Lys Tyr Phe Ala  His His Asn Glu Asp  Leu Gly Asn
    1445                1450                1455

Glu Glu  Gly Glu Glu Ile Ser  Tyr Ser Gly Ile Leu  Asn Phe Asn
    1460                1465                1470

Asn Lys  Ile Tyr Tyr Phe Asp  Asp Ser Phe Thr Ala  Val Val Gly
    1475                1480                1485

Trp Lys  Asp Leu Glu Asp Gly  Ser Lys Tyr Tyr Phe  Asp Glu Asp
    1490                1495                1500

Thr Ala  Glu Ala Tyr Ile Gly  Leu Ser Leu Ile Asn  Asp Gly Gln
    1505                1510                1515

Tyr Tyr  Phe Asn Asp Asp Gly  Ile Met Gln Val Gly  Phe Val Thr
    1520                1525                1530

Ile Asn  Asp Lys Val Phe Tyr  Phe Ser Asp Ser Gly  Ile Ile Glu
    1535                1540                1545

Ser Gly  Val Gln Asn Ile Asp  Asp Asn Tyr Phe Tyr  Ile Asp Asp
    1550                1555                1560
```

```
Asn Gly  Ile Val Gln Ile Gly  Val Phe Asp Thr Ser  Asp Gly Tyr
    1565                1570                1575

Lys Tyr  Phe Ala Pro Ala Asn  Thr Val Asn Asp Asn  Ile Tyr Gly
    1580                1585                1590

Gln Ala  Val Glu Tyr Ser Gly  Leu Val Arg Val Gly  Glu Asp Val
    1595                1600                1605

Tyr Tyr  Phe Gly Glu Thr Tyr  Thr Ile Glu Thr Gly  Trp Ile Tyr
    1610                1615                1620

Asp Met  Glu Asn Glu Ser Asp  Lys Tyr Tyr Phe Asn  Pro Glu Thr
    1625                1630                1635

Lys Lys  Ala Cys Lys Gly Ile  Asn Leu Ile Asp Asp  Ile Lys Tyr
    1640                1645                1650

Tyr Phe  Asp Glu Lys Gly Ile  Met Arg Thr Gly Leu  Ile Ser Phe
    1655                1660                1665

Glu Asn  Asn Asn Tyr Tyr Phe  Asn Glu Asn Gly Glu  Met Gln Phe
    1670                1675                1680

Gly Tyr  Ile Asn Ile Glu Asp  Lys Met Phe Tyr Phe  Gly Glu Asp
    1685                1690                1695

Gly Val  Met Gln Ile Gly Val  Phe Asn Thr Pro Asp  Gly Phe Lys
    1700                1705                1710

Tyr Phe  Ala His Gln Asn Thr  Leu Asp Glu Asn Phe  Glu Gly Glu
    1715                1720                1725

Ser Ile  Asn Tyr Thr Gly Trp  Leu Asp Leu Asp Glu  Lys Arg Tyr
    1730                1735                1740

Tyr Phe  Thr Asp Glu Tyr Ile  Ala Ala Thr Gly Ser  Val Ile Ile
    1745                1750                1755

Asp Gly  Glu Glu Tyr Tyr Phe  Asp Pro Asp Thr Ala  Gln Leu Val
    1760                1765                1770

Ile Ser  Glu
    1775
```

<210> 49
<211> 1763
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 49

```
His His His His His His Ser His Met Ala Ser Asp Lys Ile Ile His
1               5                  10                  15

Leu Thr Asp Asp Ser Phe Asp Thr Asp Val Leu Lys Ala Asp Gly Ala
            20                  25                  30

Ile Leu Val Asp Phe Trp Ala Glu Trp Cys Gly Pro Cys Lys Met Ile
        35                  40                  45

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

Val Ala Lys Leu Asn Ile Asp Gln Asn Pro Gly Thr Ala Pro Lys Tyr
65                  70                  75                  80

Gly Ile Arg Gly Ile Pro Thr Leu Leu Leu Phe Lys Asn Gly Glu Val
                85                  90                  95

Ala Ala Thr Lys Val Gly Ala Leu Ser Lys Gly Gln Leu Lys Glu Phe
            100                 105                 110

Leu Asp Ala Asn Leu Ala Arg Ala Leu Gly Gly Ser Gly Gly Ser Gly
        115                 120                 125

Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly
    130                 135                 140

Ser Gly Gly Ser Leu Val Pro Arg Gly Ser Gly Ser Ala Ala Ala Pro
145                 150                 155                 160

Phe Thr Met Ser Ile Ile Lys Asp Ile Ser Ser Lys Glu Tyr Ile Ser
                165                 170                 175

Phe Asn Pro Lys Glu Asn Lys Ile Thr Val Lys Ser Lys Asn Leu Pro
            180                 185                 190

Glu Leu Ser Thr Leu Leu Gln Glu Ile Arg Asn Asn Ser Asn Ser Ser
        195                 200                 205

Asp Ile Glu Leu Glu Glu Lys Val Met Leu Thr Glu Cys Glu Ile Asn
    210                 215                 220

Val Ile Ser Asn Ile Asp Thr Gln Ile Val Glu Glu Arg Ile Glu Glu
225                 230                 235                 240

Ala Lys Asn Leu Thr Ser Asp Ser Ile Asn Tyr Ile Lys Asp Glu Phe
                245                 250                 255

Lys Leu Ile Glu Ser Ile Ser Asp Ala Leu Cys Asp Leu Lys Gln Gln
```

```
            260                 265                 270

Asn Glu Leu Glu Asp Ser His Phe Ile Ser Phe Glu Asp Ile Ser Glu
        275                 280                 285

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

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

His Ile Thr Glu Glu Ile Ser Lys Ile Lys Gly Thr Ile Phe Asp Thr
                325                 330                 335

Val Asn Gly Lys Leu Val Lys Lys Val Asn Leu Asp Thr Thr His Glu
            340                 345                 350

Val Asn Thr Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Glu Tyr
        355                 360                 365

Asn Ser Ser Lys Glu Ser Leu Ser Asn Leu Ser Val Ala Met Lys Val
    370                 375                 380

Gln Val Tyr Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Thr Asp
385                 390                 395                 400

Ala Ala Lys Val Val Glu Leu Val Ser Thr Ala Leu Asp Glu Thr Ile
                405                 410                 415

Asp Leu Leu Pro Thr Leu Ser Glu Gly Leu Pro Ile Ile Ala Thr Ile
            420                 425                 430

Ile Asp Gly Val Ser Leu Gly Ala Ala Ile Lys Glu Leu Ser Glu Thr
        435                 440                 445

Ser Asp Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile Gly Ile Met
    450                 455                 460

Ala Val Asn Leu Thr Thr Ala Thr Thr Ala Ile Ile Thr Ser Ser Leu
465                 470                 475                 480

Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu Val Pro Leu Ala Gly Ile
                485                 490                 495

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

Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser Leu Val Glu
        515                 520                 525

Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met Met Pro Gln
```

530 535 540

Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Val
545 550 555 560

Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly Gly Ser Gly His Thr
565 570 575

Val Thr Asp Asp Ile Asp His Phe Phe Ser Ala Pro Ser Ile Thr Tyr
580 585 590

Arg Glu Pro His Leu Ser Ile Tyr Asp Val Leu Glu Val Gln Lys Glu
595 600 605

Glu Leu Asp Leu Ser Lys Asp Leu Met Val Leu Pro Asn Ala Pro Asn
610 615 620

Arg Val Phe Ala Trp Glu Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu
625 630 635 640

Glu Asn Asp Gly Thr Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu
645 650 655

Gly Glu Phe Tyr Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile
660 665 670

Thr Thr Leu Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu
675 680 685

Asp Ser Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr
690 695 700

Ile Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
705 710 715 720

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
725 730 735

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp Val
740 745 750

Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu Gly Ile
755 760 765

Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu Asn Ser His
770 775 780

Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn Gly Phe Val Ser
785 790 795 800

Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala Ile Ile Glu Val Asp

805 810 815

Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile Ser Gly Glu Leu Lys Ile
820 825 830

Leu Met Leu Asn Ser Asn His Ile Gln Gln Lys Ile Asp Tyr Ile Gly
835 840 845

Phe Asn Ser Glu Leu Gln Lys Asn Ile Pro Tyr Ser Phe Val Asp Ser
850 855 860

Glu Gly Lys Glu Asn Gly Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu
865 870 875 880

Phe Val Ser Glu Leu Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met
885 890 895

Asp Asp Ser Lys Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp
900 905 910

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

Leu Lys Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu
930 935 940

Lys Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
945 950 955 960

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
965 970 975

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe Val
980 985 990

Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn Phe Ile
995 1000 1005

Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile Cys Asp
1010 1015 1020

Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn Thr Leu
1025 1030 1035

Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn Met Ile
1040 1045 1050

Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile Ser Ser
1055 1060 1065

Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile Asp Ser

1070 1075 1080

Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr Asp Glu
1085 1090 1095

Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr Pro Glu
1100 1105 1110

Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile Asn Val
1115 1120 1125

Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn Asp Gly
1130 1135 1140

Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser
1145 1150 1155

Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu
1160 1165 1170

Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro
1175 1180 1185

Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp
1190 1195 1200

Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr Asn Glu
1205 1210 1215

Lys Phe Tyr Ile Asn Asn Phe Gly Met Met Val Ser Gly Leu Ile
1220 1225 1230

Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro Pro Val Asn Asn
1235 1240 1245

Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr Tyr Phe
1250 1255 1260

Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr Ile Ile
1265 1270 1275

Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu Gln Thr
1280 1285 1290

Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala Pro Ala
1295 1300 1305

Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp Phe Thr
1310 1315 1320

Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp Asn

1325 1330 1335

Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
1340 1345 1350

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln
1355 1360 1365

Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln
1370 1375 1380

Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp
1385 1390 1395

Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His
1400 1405 1410

Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn
1415 1420 1425

Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu Asp Leu
1430 1435 1440

Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile Leu Asn
1445 1450 1455

Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr Ala Val
1460 1465 1470

Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr Phe Asp
1475 1480 1485

Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile Asn Asp
1490 1495 1500

Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val Gly Phe
1505 1510 1515

Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser Gly Ile
1520 1525 1530

Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe Tyr Ile
1535 1540 1545

Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr Ser Asp
1550 1555 1560

Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn Ile
1565 1570 1575

Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu

1580 1585 1590

Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp
1595 1600 1605

Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro
1610 1615 1620

Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile
1625 1630 1635

Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile
1640 1645 1650

Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met
1655 1660 1665

Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly
1670 1675 1680

Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro Asp Gly
1685 1690 1695

Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn Phe Glu
1700 1705 1710

Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp Glu Lys
1715 1720 1725

Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly Ser Val
1730 1735 1740

Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr Ala Gln
1745 1750 1755

Leu Val Ile Ser Glu
1760

<210> 50
<211> 1782
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 50

His His His His His His His His His His Gly Gly Ser Leu Ala Glu
1 5 10 15

Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala
20 25 30

```
Ala Ala Lys Glu Ala Ala Ala Lys Ala Ala Ala Gly Gly Ser His Met
        35                  40                  45

Ala Ser Asp Lys Ile Ile His Leu Thr Asp Asp Ser Phe Asp Thr Asp
    50                  55                  60

Val Leu Lys Ala Asp Gly Ala Ile Leu Val Asp Phe Trp Ala Glu Trp
65                  70                  75                  80

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

Glu Tyr Gln Gly Lys Leu Thr Val Ala Lys Leu Asn Ile Asp Gln Asn
            100                 105                 110

Pro Gly Thr Ala Pro Lys Tyr Gly Ile Arg Gly Ile Pro Thr Leu Leu
        115                 120                 125

Leu Phe Lys Asn Gly Glu Val Ala Ala Thr Lys Val Gly Ala Leu Ser
    130                 135                 140

Lys Gly Gln Leu Lys Glu Phe Leu Asp Ala Asn Leu Ala Arg Ala Leu
145                 150                 155                 160

Val Pro Arg Gly Ser Val Thr Ser Leu Tyr Lys Lys Ala Gly Ser Ala
                165                 170                 175

Ala Ala Pro Phe Thr Met Ser Ile Ile Lys Asp Ile Ser Ser Lys Glu
            180                 185                 190

Tyr Ile Ser Phe Asn Pro Lys Glu Asn Lys Ile Thr Val Lys Ser Lys
        195                 200                 205

Asn Leu Pro Glu Leu Ser Thr Leu Leu Gln Glu Ile Arg Asn Asn Ser
    210                 215                 220

Asn Ser Ser Asp Ile Glu Leu Glu Glu Lys Val Met Leu Thr Glu Cys
225                 230                 235                 240

Glu Ile Asn Val Ile Ser Asn Ile Asp Thr Gln Ile Val Glu Glu Arg
                245                 250                 255

Ile Glu Glu Ala Lys Asn Leu Thr Ser Asp Ser Ile Asn Tyr Ile Lys
            260                 265                 270

Asp Glu Phe Lys Leu Ile Glu Ser Ile Ser Asp Ala Leu Cys Asp Leu
        275                 280                 285

Lys Gln Gln Asn Glu Leu Glu Asp Ser His Phe Ile Ser Phe Glu Asp
    290                 295                 300
```

```
Ile Ser Glu Thr Asp Glu Gly Phe Ser Ile Arg Phe Ile Asn Lys Glu
305                 310                 315                 320

Thr Gly Glu Ser Ile Phe Val Glu Thr Glu Lys Thr Ile Phe Ser Glu
                325                 330                 335

Tyr Ala Asn His Ile Thr Glu Glu Ile Ser Lys Ile Lys Gly Thr Ile
            340                 345                 350

Phe Asp Thr Val Asn Gly Lys Leu Val Lys Lys Val Asn Leu Asp Thr
        355                 360                 365

Thr His Glu Val Asn Thr Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu
    370                 375                 380

Ile Glu Tyr Asn Ser Ser Lys Glu Ser Leu Ser Asn Leu Ser Val Ala
385                 390                 395                 400

Met Lys Val Gln Val Tyr Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr
                405                 410                 415

Ile Thr Asp Ala Ala Lys Val Val Glu Leu Val Ser Thr Ala Leu Asp
            420                 425                 430

Glu Thr Ile Asp Leu Leu Pro Thr Leu Ser Glu Gly Leu Pro Ile Ile
        435                 440                 445

Ala Thr Ile Ile Asp Gly Val Ser Leu Gly Ala Ala Ile Lys Glu Leu
    450                 455                 460

Ser Glu Thr Ser Asp Pro Leu Leu Arg Gln Glu Ile Glu Ala Lys Ile
465                 470                 475                 480

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

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

Ala Gly Ile Ser Ala Gly Ile Pro Ser Leu Val Asn Asn Glu Leu Val
        515                 520                 525

Leu Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys His Val Ser
    530                 535                 540

Leu Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp Lys Ile Met
545                 550                 555                 560

Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn
                565                 570                 575
```

```
Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly Gly Ser
            580                 585                 590

Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser Ala Pro Ser
        595                 600                 605

Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp Val Leu Glu Val
    610                 615                 620

Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu Met Val Leu Pro Asn
625                 630                 635                 640

Ala Pro Asn Arg Val Phe Ala Trp Glu Thr Gly Trp Thr Pro Gly Leu
                645                 650                 655

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

Asn Tyr Glu Gly Glu Phe Tyr Trp Arg Tyr Phe Ala Phe Ile Ala Asp
        675                 680                 685

Ala Leu Ile Thr Thr Leu Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg
    690                 695                 700

Ile Asn Leu Asp Ser Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr
705                 710                 715                 720

Thr Glu Tyr Ile Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly
                725                 730                 735

Gly Thr Tyr Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile
            740                 745                 750

Glu Leu Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val
        755                 760                 765

Arg Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile
    770                 775                 780

Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu
785                 790                 795                 800

Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn Gly
                805                 810                 815

Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala Ile Ile
            820                 825                 830

Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile Ser Gly Glu
        835                 840                 845
```

```
Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln Gln Lys Ile Asp
    850                 855                 860

Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn Ile Pro Tyr Ser Phe
865                 870                 875                 880

Val Asp Ser Glu Gly Lys Glu Asn Gly Phe Ile Asn Gly Ser Thr Lys
                885                 890                 895

Glu Gly Leu Phe Val Ser Glu Leu Pro Asp Val Val Leu Ile Ser Lys
            900                 905                 910

Val Tyr Met Asp Asp Ser Lys Pro Ser Phe Gly Tyr Tyr Ser Asn Asn
        915                 920                 925

Leu Lys Asp Val Lys Val Ile Thr Lys Asp Asn Val Asn Ile Leu Thr
    930                 935                 940

Gly Tyr Tyr Leu Lys Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu
945                 950                 955                 960

Gln Asp Glu Lys Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser
                965                 970                 975

Gly Val Ala Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn
            980                 985                 990

Thr Ser Asp Ser Leu Met Ser Phe  Leu Glu Ser Met Asn  Ile Lys Ser
        995                 1000                1005

Ile Phe  Val Asn Phe Leu Gln  Ser Asn Ile Lys Phe  Ile Leu Asp
    1010                1015                1020

Ala Asn  Phe Ile Ile Ser Gly  Thr Thr Ser Ile Gly  Gln Phe Glu
    1025                1030                1035

Phe Ile  Cys Asp Glu Asn Asp  Asn Ile Gln Pro Tyr  Phe Ile Lys
    1040                1045                1050

Phe Asn  Thr Leu Glu Thr Asn  Tyr Thr Leu Tyr Val  Gly Asn Arg
    1055                1060                1065

Gln Asn  Met Ile Val Glu Pro  Asn Tyr Asp Leu Asp  Asp Ser Gly
    1070                1075                1080

Asp Ile  Ser Ser Thr Val Ile  Asn Phe Ser Gln Lys  Tyr Leu Tyr
    1085                1090                1095

Gly Ile  Asp Ser Cys Val Asn  Lys Val Val Ile Ser  Pro Asn Ile
    1100                1105                1110
```

```
Tyr Thr  Asp Glu Ile Asn Ile  Thr Pro Val Tyr Glu  Thr Asn Asn
    1115                1120                1125

Thr Tyr  Pro Glu Val Ile Val  Leu Asp Ala Asn Tyr  Ile Asn Glu
    1130                1135                1140

Lys Ile  Asn Val Asn Ile Asn  Asp Leu Ser Ile Arg  Tyr Val Trp
    1145                1150                1155

Ser Asn  Asp Gly Asn Asp Phe  Ile Leu Met Ser Thr  Ser Glu Glu
    1160                1165                1170

Asn Lys  Val Ser Gln Val Lys  Ile Arg Phe Val Asn  Val Phe Lys
    1175                1180                1185

Asp Lys  Thr Leu Ala Asn Lys  Leu Ser Phe Asn Phe  Ser Asp Lys
    1190                1195                1200

Gln Asp  Val Pro Val Ser Glu  Ile Ile Leu Ser Phe  Thr Pro Ser
    1205                1210                1215

Tyr Tyr  Glu Asp Gly Leu Ile  Gly Tyr Asp Leu Gly  Leu Val Ser
    1220                1225                1230

Leu Tyr  Asn Glu Lys Phe Tyr  Ile Asn Asn Phe Gly  Met Met Val
    1235                1240                1245

Ser Gly  Leu Ile Tyr Ile Asn  Asp Ser Leu Tyr Tyr  Phe Lys Pro
    1250                1255                1260

Pro Val  Asn Asn Leu Ile Thr  Gly Phe Val Thr Val  Gly Asp Asp
    1265                1270                1275

Lys Tyr  Tyr Phe Asn Pro Ile  Asn Gly Gly Ala Ala  Ser Ile Gly
    1280                1285                1290

Glu Thr  Ile Ile Asp Asp Lys  Asn Tyr Tyr Phe Asn  Gln Ser Gly
    1295                1300                1305

Val Leu  Gln Thr Gly Val Phe  Ser Thr Glu Asp Gly  Phe Lys Tyr
    1310                1315                1320

Phe Ala  Pro Ala Asn Thr Leu  Asp Glu Asn Leu Glu  Gly Glu Ala
    1325                1330                1335

Ile Asp  Phe Thr Gly Lys Leu  Ile Ile Asp Glu Asn  Ile Tyr Tyr
    1340                1345                1350

Phe Asp  Asp Asn Tyr Arg Gly  Ala Val Glu Trp Lys  Glu Leu Asp
    1355                1360                1365
```

```
Gly Glu  Met His Tyr Phe Ser  Pro Glu Thr Gly Lys  Ala Phe Lys
    1370                 1375                 1380

Gly Leu  Asn Gln Ile Gly Asp  Tyr Lys Tyr Tyr Phe  Asn Ser Asp
    1385                 1390                 1395

Gly Val  Met Gln Lys Gly Phe  Val Ser Ile Asn Asp  Asn Lys His
    1400                 1405                 1410

Tyr Phe  Asp Asp Ser Gly Val  Met Lys Val Gly Tyr  Thr Glu Ile
    1415                 1420                 1425

Asp Gly  Lys His Phe Tyr Phe  Ala Glu Asn Gly Glu  Met Gln Ile
    1430                 1435                 1440

Gly Val  Phe Asn Thr Glu Asp  Gly Phe Lys Tyr Phe  Ala His His
    1445                 1450                 1455

Asn Glu  Asp Leu Gly Asn Glu  Glu Gly Glu Glu Ile  Ser Tyr Ser
    1460                 1465                 1470

Gly Ile  Leu Asn Phe Asn Asn  Lys Ile Tyr Tyr Phe  Asp Asp Ser
    1475                 1480                 1485

Phe Thr  Ala Val Val Gly Trp  Lys Asp Leu Glu Asp  Gly Ser Lys
    1490                 1495                 1500

Tyr Tyr  Phe Asp Glu Asp Thr  Ala Glu Ala Tyr Ile  Gly Leu Ser
    1505                 1510                 1515

Leu Ile  Asn Asp Gly Gln Tyr  Tyr Phe Asn Asp Asp  Gly Ile Met
    1520                 1525                 1530

Gln Val  Gly Phe Val Thr Ile  Asn Asp Lys Val Phe  Tyr Phe Ser
    1535                 1540                 1545

Asp Ser  Gly Ile Ile Glu Ser  Gly Val Gln Asn Ile  Asp Asp Asn
    1550                 1555                 1560

Tyr Phe  Tyr Ile Asp Asp Asn  Gly Ile Val Gln Ile  Gly Val Phe
    1565                 1570                 1575

Asp Thr  Ser Asp Gly Tyr Lys  Tyr Phe Ala Pro Ala  Asn Thr Val
    1580                 1585                 1590

Asn Asp  Asn Ile Tyr Gly Gln  Ala Val Glu Tyr Ser  Gly Leu Val
    1595                 1600                 1605

Arg Val  Gly Glu Asp Val Tyr  Tyr Phe Gly Glu Thr  Tyr Thr Ile
    1610                 1615                 1620
```

```
Glu Thr  Gly Trp Ile Tyr Asp  Met Glu Asn Glu Ser  Asp Lys Tyr
    1625                 1630                 1635

Tyr Phe  Asn Pro Glu Thr Lys  Lys Ala Cys Lys Gly  Ile Asn Leu
    1640                 1645                 1650

Ile Asp  Asp Ile Lys Tyr Tyr  Phe Asp Glu Lys Gly  Ile Met Arg
    1655                 1660                 1665

Thr Gly  Leu Ile Ser Phe Glu  Asn Asn Asn Tyr Tyr  Phe Asn Glu
    1670                 1675                 1680

Asn Gly  Glu Met Gln Phe Gly  Tyr Ile Asn Ile Glu  Asp Lys Met
    1685                 1690                 1695

Phe Tyr  Phe Gly Glu Asp Gly  Val Met Gln Ile Gly  Val Phe Asn
    1700                 1705                 1710

Thr Pro  Asp Gly Phe Lys Tyr  Phe Ala His Gln Asn  Thr Leu Asp
    1715                 1720                 1725

Glu Asn  Phe Glu Gly Glu Ser  Ile Asn Tyr Thr Gly  Trp Leu Asp
    1730                 1735                 1740

Leu Asp  Glu Lys Arg Tyr Tyr  Phe Thr Asp Glu Tyr  Ile Ala Ala
    1745                 1750                 1755

Thr Gly  Ser Val Ile Ile Asp  Gly Glu Glu Tyr Tyr  Phe Asp Pro
    1760                 1765                 1770

Asp Thr  Ala Gln Leu Val Ile  Ser Glu
    1775                 1780
```

<210> 51
<211> 1769
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 51

```
His His His His His His Ser His Met Ala Ser Asp Lys Ile Ile His
1               5                  10                  15

Leu Thr Asp Asp Ser Phe Asp Thr Asp Val Leu Lys Ala Asp Gly Ala
            20                  25                  30

Ile Leu Val Asp Phe Trp Ala Glu Trp Cys Gly Pro Cys Lys Met Ile
        35                  40                  45

Ala Pro Ile Leu Asp Glu Ile Ala Asp Glu Tyr Gln Gly Lys Leu Thr
```

```
    50                  55                  60

Val Ala Lys Leu Asn Ile Asp Gln Asn Pro Gly Thr Ala Pro Lys Tyr
65                  70                  75                  80

Gly Ile Arg Gly Ile Pro Thr Leu Leu Leu Phe Lys Asn Gly Glu Val
                85                  90                  95

Ala Ala Thr Lys Val Gly Ala Leu Ser Lys Gly Gln Leu Lys Glu Phe
            100                 105                 110

Leu Asp Ala Asn Leu Ala Arg Ala Leu Leu Ala Glu Ala Ala Ala Lys
        115                 120                 125

Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu
    130                 135                 140

Ala Ala Ala Lys Ala Ala Ala Gly Gly Ser Leu Val Pro Arg Gly Ser
145                 150                 155                 160

Gly Ser Ala Ala Ala Pro Phe Thr Met Ser Ile Ile Lys Asp Ile Ser
                165                 170                 175

Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn Lys Ile Thr Val
            180                 185                 190

Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu Gln Glu Ile Arg
        195                 200                 205

Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu Lys Val Met Leu
    210                 215                 220

Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp Thr Gln Ile Val
225                 230                 235                 240

Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser Asp Ser Ile Asn
                245                 250                 255

Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile Ser Asp Ala Leu
            260                 265                 270

Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser His Phe Ile Ser
        275                 280                 285

Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser Ile Arg Phe Ile
    290                 295                 300

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

Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile Ser Lys Ile Lys
```

325 330 335

Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val Lys Lys Val Asn
340 345 350

Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala Ala Phe Phe Ile
355 360 365

Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser Leu Ser Asn Leu
370 375 380

Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu Phe Ser Thr Gly
385 390 395 400

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

Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr Leu Ser Glu Gly Leu
420 425 430

Pro Ile Ile Ala Thr Ile Ile Asp Gly Val Ser Leu Gly Ala Ala Ile
435 440 445

Lys Glu Leu Ser Glu Thr Ser Asp Pro Leu Leu Arg Gln Glu Ile Glu
450 455 460

Ala Lys Ile Gly Ile Met Ala Val Asn Leu Thr Thr Ala Thr Thr Ala
465 470 475 480

Ile Ile Thr Ser Ser Leu Gly Ile Ala Ser Gly Phe Ser Ile Leu Leu
485 490 495

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

Glu Leu Val Leu Arg Asp Lys Ala Thr Lys Val Val Asp Tyr Phe Lys
515 520 525

His Val Ser Leu Val Glu Thr Glu Gly Val Phe Thr Leu Leu Asp Asp
530 535 540

Lys Ile Met Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe
545 550 555 560

Asn Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu
565 570 575

Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser
580 585 590

Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp Val

595 600 605

Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu Met Val
610 615 620

Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr Gly Trp Thr
625 630 635 640

Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys Leu Leu Asp Arg
645 650 655

Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp Arg Tyr Phe Ala Phe
660 665 670

Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys Pro Arg Tyr Glu Asp Thr
675 680 685

Asn Ile Arg Ile Asn Leu Asp Ser Asn Thr Arg Ser Phe Ile Val Pro
690 695 700

Ile Ile Thr Thr Glu Tyr Ile Arg Glu Lys Leu Ser Tyr Ser Phe Tyr
705 710 715 720

Gly Ser Gly Gly Thr Tyr Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly
725 730 735

Ile Asn Ile Glu Leu Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp
740 745 750

Asn Val Val Arg Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly
755 760 765

Asp Leu Ile Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys
770 775 780

Ile Ile Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly
785 790 795 800

Ser Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn
805 810 815

Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile
820 825 830

Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln Gln
835 840 845

Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn Ile Pro
850 855 860

Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe Ile Asn Gly

865 870 875 880

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

Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro Ser Phe Gly Tyr Tyr
900 905 910

Ser Asn Asn Leu Lys Asp Val Lys Val Ile Thr Lys Asp Asn Val Asn
915 920 925

Ile Leu Thr Gly Tyr Tyr Leu Lys Asp Asp Ile Lys Ile Ser Leu Ser
930 935 940

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

Asp Glu Ser Gly Val Ala Glu Ile Leu Lys Phe Met Asn Arg Lys Gly
965 970 975

Asn Thr Asn Thr Ser Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn
980 985 990

Ile Lys Ser Ile Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile
995 1000 1005

Leu Asp Ala Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln
1010 1015 1020

Phe Glu Phe Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe
1025 1030 1035

Ile Lys Phe Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly
1040 1045 1050

Asn Arg Gln Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp
1055 1060 1065

Ser Gly Asp Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr
1070 1075 1080

Leu Tyr Gly Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro
1085 1090 1095

Asn Ile Tyr Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr
1100 1105 1110

Asn Asn Thr Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile
1115 1120 1125

Asn Glu Lys Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr

1130 1135 1140

Val Trp Ser Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser
1145 1150 1155

Glu Glu Asn Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val
1160 1165 1170

Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser
1175 1180 1185

Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr
1190 1195 1200

Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu
1205 1210 1215

Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met
1220 1225 1230

Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe
1235 1240 1245

Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
1250 1255 1260

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser
1265 1270 1275

Ile Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln
1280 1285 1290

Ser Gly Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe
1295 1300 1305

Lys Tyr Phe Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly
1310 1315 1320

Glu Ala Ile Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile
1325 1330 1335

Tyr Tyr Phe Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu
1340 1345 1350

Leu Asp Gly Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala
1355 1360 1365

Phe Lys Gly Leu Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn
1370 1375 1380

Ser Asp Gly Val Met Gln Lys Gly Phe Val Ser Ile Asn Asp Asn

1385 1390 1395

Lys His Tyr Phe Asp Asp Ser Gly Val Met Lys Val Gly Tyr Thr
1400 1405 1410

Glu Ile Asp Gly Lys His Phe Tyr Phe Ala Glu Asn Gly Glu Met
1415 1420 1425

Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala
1430 1435 1440

His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser
1445 1450 1455

Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp
1460 1465 1470

Asp Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly
1475 1480 1485

Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly
1490 1495 1500

Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly
1505 1510 1515

Ile Met Gln Val Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr
1520 1525 1530

Phe Ser Asp Ser Gly Ile Ile Glu Ser Gly Val Gln Asn Ile Asp
1535 1540 1545

Asp Asn Tyr Phe Tyr Ile Asp Asp Asn Gly Ile Val Gln Ile Gly
1550 1555 1560

Val Phe Asp Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn
1565 1570 1575

Thr Val Asn Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly
1580 1585 1590

Leu Val Arg Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr
1595 1600 1605

Thr Ile Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp
1610 1615 1620

Lys Tyr Tyr Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile
1625 1630 1635

Asn Leu Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile

1640 1645 1650

Met Arg Thr Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe
1655 1660 1665

Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp
1670 1675 1680

Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly Val
1685 1690 1695

Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn Thr
1700 1705 1710

Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp
1715 1720 1725

Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile
1730 1735 1740

Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe
1745 1750 1755

Asp Pro Asp Thr Ala Gln Leu Val Ile Ser Glu
1760 1765

<210> 52
<211> 1402
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 52

His His His His His His His His His His Gly Gly Ser Leu Ala Glu
1 5 10 15

Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala
20 25 30

Ala Ala Lys Glu Ala Ala Ala Lys Ala Ala Ala Gly Gly Ser His Met
35 40 45

Ala Ser Asp Lys Ile Ile His Leu Thr Asp Asp Ser Phe Asp Thr Asp
50 55 60

Val Leu Lys Ala Asp Gly Ala Ile Leu Val Asp Phe Trp Ala Glu Trp
65 70 75 80

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

```
Glu Tyr Gln Gly Lys Leu Thr Val Ala Lys Leu Asn Ile Asp Gln Asn
            100                 105                 110

Pro Gly Thr Ala Pro Lys Tyr Gly Ile Arg Gly Ile Pro Thr Leu Leu
        115                 120                 125

Leu Phe Lys Asn Gly Glu Val Ala Ala Thr Lys Val Gly Ala Leu Ser
    130                 135                 140

Lys Gly Gln Leu Lys Glu Phe Leu Asp Ala Asn Leu Ala Arg Ala Leu
145                 150                 155                 160

Val Pro Arg Gly Ser Val Thr Ser Leu Tyr Lys Lys Ala Gly Ser Ala
                165                 170                 175

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

Phe Asn Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met
        195                 200                 205

Glu Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe
    210                 215                 220

Ser Ala Pro Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp
225                 230                 235                 240

Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu Met
                245                 250                 255

Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr Gly Trp
            260                 265                 270

Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys Leu Leu Asp
        275                 280                 285

Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp Arg Tyr Phe Ala
    290                 295                 300

Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys Pro Arg Tyr Glu Asp
305                 310                 315                 320

Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn Thr Arg Ser Phe Ile Val
                325                 330                 335

Pro Ile Ile Thr Thr Glu Tyr Ile Arg Glu Lys Leu Ser Tyr Ser Phe
            340                 345                 350

Tyr Gly Ser Gly Gly Thr Tyr Ala Leu Ser Leu Ser Gln Tyr Asn Met
        355                 360                 365
```

```
Gly Ile Asn Ile Glu Leu Ser Glu Ser Asp Val Trp Ile Ile Asp Val
    370                 375                 380

Asp Asn Val Val Arg Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys
385                 390                 395                 400

Gly Asp Leu Ile Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn
                405                 410                 415

Lys Ile Ile Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn
            420                 425                 430

Gly Ser Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile
        435                 440                 445

Asn Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu
    450                 455                 460

Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln
465                 470                 475                 480

Gln Lys Ile Asp Tyr Ile Gly Phe Asn Ser Glu Leu Gln Lys Asn Ile
                485                 490                 495

Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe Ile Asn
            500                 505                 510

Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro Asp Val Val
        515                 520                 525

Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro Ser Phe Gly Tyr
    530                 535                 540

Tyr Ser Asn Asn Leu Lys Asp Val Lys Val Ile Thr Lys Asp Asn Val
545                 550                 555                 560

Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp Asp Ile Lys Ile Ser Leu
                565                 570                 575

Ser Leu Thr Leu Gln Asp Glu Lys Thr Ile Lys Leu Asn Ser Val His
            580                 585                 590

Leu Asp Glu Ser Gly Val Ala Glu Ile Leu Lys Phe Met Asn Arg Lys
        595                 600                 605

Gly Asn Thr Asn Thr Ser Asp Ser Leu Met Ser Phe Leu Glu Ser Met
    610                 615                 620

Asn Ile Lys Ser Ile Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe
625                 630                 635                 640
```

```
Ile Leu Asp Ala Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln
                645                 650                 655

Phe Glu Phe Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro Tyr Phe Ile
            660                 665                 670

Lys Phe Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg
        675                 680                 685

Gln Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp
    690                 695                 700

Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile
705                 710                 715                 720

Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr Asp
                725                 730                 735

Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr Pro Glu
            740                 745                 750

Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile Asn Val Asn
        755                 760                 765

Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn Asp Gly Asn Asp
    770                 775                 780

Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys
785                 790                 795                 800

Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
                805                 810                 815

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile
            820                 825                 830

Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp
        835                 840                 845

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

Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr
865                 870                 875                 880

Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly
                885                 890                 895

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
            900                 905                 910
```

```
Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
        915                 920                 925

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
    930                 935                 940

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
945                 950                 955                 960

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
                965                 970                 975

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
            980                 985                 990

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

Gly Asp  Tyr Lys Tyr Tyr Phe  Asn Ser Asp Gly Val  Met Gln Lys
    1010                1015                1020

Gly Phe  Val Ser Ile Asn Asp  Asn Lys His Tyr Phe  Asp Asp Ser
    1025                1030                1035

Gly Val  Met Lys Val Gly Tyr  Thr Glu Ile Asp Gly  Lys His Phe
    1040                1045                1050

Tyr Phe  Ala Glu Asn Gly Glu  Met Gln Ile Gly Val  Phe Asn Thr
    1055                1060                1065

Glu Asp  Gly Phe Lys Tyr Phe  Ala His His Asn Glu  Asp Leu Gly
    1070                1075                1080

Asn Glu  Glu Gly Glu Glu Ile  Ser Tyr Ser Gly Ile  Leu Asn Phe
    1085                1090                1095

Asn Asn  Lys Ile Tyr Tyr Phe  Asp Asp Ser Phe Thr  Ala Val Val
    1100                1105                1110

Gly Trp  Lys Asp Leu Glu Asp  Gly Ser Lys Tyr Tyr  Phe Asp Glu
    1115                1120                1125

Asp Thr  Ala Glu Ala Tyr Ile  Gly Leu Ser Leu Ile  Asn Asp Gly
    1130                1135                1140

Gln Tyr  Tyr Phe Asn Asp Asp  Gly Ile Met Gln Val  Gly Phe Val
    1145                1150                1155

Thr Ile  Asn Asp Lys Val Phe  Tyr Phe Ser Asp Ser  Gly Ile Ile
    1160                1165                1170
```

```
Glu Ser  Gly Val Gln Asn Ile  Asp Asp Asn Tyr Phe  Tyr Ile Asp
    1175                1180                1185

Asp Asn  Gly Ile Val Gln Ile  Gly Val Phe Asp Thr  Ser Asp Gly
    1190                1195                1200

Tyr Lys  Tyr Phe Ala Pro Ala  Asn Thr Val Asn Asp  Asn Ile Tyr
    1205                1210                1215

Gly Gln  Ala Val Glu Tyr Ser  Gly Leu Val Arg Val  Gly Glu Asp
    1220                1225                1230

Val Tyr  Tyr Phe Gly Glu Thr  Tyr Thr Ile Glu Thr  Gly Trp Ile
    1235                1240                1245

Tyr Asp  Met Glu Asn Glu Ser  Asp Lys Tyr Tyr Phe  Asn Pro Glu
    1250                1255                1260

Thr Lys  Lys Ala Cys Lys Gly  Ile Asn Leu Ile Asp  Asp Ile Lys
    1265                1270                1275

Tyr Tyr  Phe Asp Glu Lys Gly  Ile Met Arg Thr Gly  Leu Ile Ser
    1280                1285                1290

Phe Glu  Asn Asn Asn Tyr Tyr  Phe Asn Glu Asn Gly  Glu Met Gln
    1295                1300                1305

Phe Gly  Tyr Ile Asn Ile Glu  Asp Lys Met Phe Tyr  Phe Gly Glu
    1310                1315                1320

Asp Gly  Val Met Gln Ile Gly  Val Phe Asn Thr Pro  Asp Gly Phe
    1325                1330                1335

Lys Tyr  Phe Ala His Gln Asn  Thr Leu Asp Glu Asn  Phe Glu Gly
    1340                1345                1350

Glu Ser  Ile Asn Tyr Thr Gly  Trp Leu Asp Leu Asp  Glu Lys Arg
    1355                1360                1365

Tyr Tyr  Phe Thr Asp Glu Tyr  Ile Ala Ala Thr Gly  Ser Val Ile
    1370                1375                1380

Ile Asp  Gly Glu Glu Tyr Tyr  Phe Asp Pro Asp Thr  Ala Gln Leu
    1385                1390                1395

Val Ile  Ser Glu
    1400
```

<210> 53
<211> 1389
<212> PRT

<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 53

```
His His His His His His Ser His Met Ala Ser Asp Lys Ile Ile His
1               5                   10                  15

Leu Thr Asp Asp Ser Phe Asp Thr Asp Val Leu Lys Ala Asp Gly Ala
            20                  25                  30

Ile Leu Val Asp Phe Trp Ala Glu Trp Cys Gly Pro Cys Lys Met Ile
        35                  40                  45

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

Val Ala Lys Leu Asn Ile Asp Gln Asn Pro Gly Thr Ala Pro Lys Tyr
65                  70                  75                  80

Gly Ile Arg Gly Ile Pro Thr Leu Leu Leu Phe Lys Asn Gly Glu Val
                85                  90                  95

Ala Ala Thr Lys Val Gly Ala Leu Ser Lys Gly Gln Leu Lys Glu Phe
            100                 105                 110

Leu Asp Ala Asn Leu Ala Arg Ala Leu Leu Ala Glu Ala Ala Ala Lys
        115                 120                 125

Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu Ala Ala Ala Lys Glu
    130                 135                 140

Ala Ala Ala Lys Ala Ala Ala Gly Gly Ser Leu Val Pro Arg Gly Ser
145                 150                 155                 160

Gly Ser Ala Ala Gly Gly Ser Met Pro Gln Asp Asp Leu Val Ile Ser
                165                 170                 175

Glu Ile Asp Phe Asn Asn Asn Ser Ile Val Leu Gly Lys Cys Glu Ile
            180                 185                 190

Trp Arg Met Glu Gly Gly Ser Gly His Thr Val Thr Asp Asp Ile Asp
        195                 200                 205

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

Ile Tyr Asp Val Leu Glu Val Gln Lys Glu Glu Leu Asp Leu Ser Lys
225                 230                 235                 240

Asp Leu Met Val Leu Pro Asn Ala Pro Asn Arg Val Phe Ala Trp Glu
```

245 250 255

Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys
260 265 270

Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu Gly Glu Phe Tyr Trp Arg
275 280 285

Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile Thr Thr Leu Lys Pro Arg
290 295 300

Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu Asp Ser Asn Thr Arg Ser
305 310 315 320

Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr Ile Arg Glu Lys Leu Ser
325 330 335

Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr Ala Leu Ser Leu Ser Gln
340 345 350

Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser Glu Ser Asp Val Trp Ile
355 360 365

Ile Asp Val Asp Asn Val Val Arg Asp Val Thr Ile Glu Ser Asp Lys
370 375 380

Ile Lys Lys Gly Asp Leu Ile Glu Gly Ile Leu Ser Thr Leu Ser Ile
385 390 395 400

Glu Glu Asn Lys Ile Ile Leu Asn Ser His Glu Ile Asn Phe Ser Gly
405 410 415

Glu Val Asn Gly Ser Asn Gly Phe Val Ser Leu Thr Phe Ser Ile Leu
420 425 430

Glu Gly Ile Asn Ala Ile Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr
435 440 445

Lys Leu Leu Ile Ser Gly Glu Leu Lys Ile Leu Met Leu Asn Ser Asn
450 455 460

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

Lys Asn Ile Pro Tyr Ser Phe Val Asp Ser Glu Gly Lys Glu Asn Gly
485 490 495

Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu Phe Val Ser Glu Leu Pro
500 505 510

Asp Val Val Leu Ile Ser Lys Val Tyr Met Asp Asp Ser Lys Pro Ser

```
        515                 520                 525

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

Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr Leu Lys Asp Asp Ile Lys
545                 550                 555                 560

Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu Lys Thr Ile Lys Leu Asn
                565                 570                 575

Ser Val His Leu Asp Glu Ser Gly Val Ala Glu Ile Leu Lys Phe Met
            580                 585                 590

Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp Ser Leu Met Ser Phe Leu
        595                 600                 605

Glu Ser Met Asn Ile Lys Ser Ile Phe Val Asn Phe Leu Gln Ser Asn
    610                 615                 620

Ile Lys Phe Ile Leu Asp Ala Asn Phe Ile Ile Ser Gly Thr Thr Ser
625                 630                 635                 640

Ile Gly Gln Phe Glu Phe Ile Cys Asp Glu Asn Asp Asn Ile Gln Pro
                645                 650                 655

Tyr Phe Ile Lys Phe Asn Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val
            660                 665                 670

Gly Asn Arg Gln Asn Met Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp
        675                 680                 685

Ser Gly Asp Ile Ser Ser Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu
    690                 695                 700

Tyr Gly Ile Asp Ser Cys Val Asn Lys Val Val Ile Ser Pro Asn Ile
705                 710                 715                 720

Tyr Thr Asp Glu Ile Asn Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr
                725                 730                 735

Tyr Pro Glu Val Ile Val Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile
            740                 745                 750

Asn Val Asn Ile Asn Asp Leu Ser Ile Arg Tyr Val Trp Ser Asn Asp
        755                 760                 765

Gly Asn Asp Phe Ile Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser
    770                 775                 780

Gln Val Lys Ile Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala
```

785 790 795 800

Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser
805 810 815

Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile
820 825 830

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

Asn Asn Phe Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser
850 855 860

Leu Tyr Tyr Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly Phe Val
865 870 875 880

Thr Val Gly Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala
885 890 895

Ala Ser Ile Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn
900 905 910

Gln Ser Gly Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe
915 920 925

Lys Tyr Phe Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu
930 935 940

Ala Ile Asp Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr
945 950 955 960

Phe Asp Asp Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly
965 970 975

Glu Met His Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu
980 985 990

Asn Gln Ile Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met
995 1000 1005

Gln Lys Gly Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp
1010 1015 1020

Asp Ser Gly Val Met Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys
1025 1030 1035

His Phe Tyr Phe Ala Glu Asn Gly Glu Met Gln Ile Gly Val Phe
1040 1045 1050

Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn Glu Asp

1055 1060 1065

Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser Gly Ile Leu
1070 1075 1080

Asn Phe Asn Asn Lys Ile Tyr Tyr Phe Asp Asp Ser Phe Thr Ala
1085 1090 1095

Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys Tyr Tyr Phe
1100 1105 1110

Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu Ile Asn
1115 1120 1125

Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val Gly
1130 1135 1140

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

Ile Ile Glu Ser Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe Tyr
1160 1165 1170

Ile Asp Asp Asn Gly Ile Val Gln Ile Gly Val Phe Asp Thr Ser
1175 1180 1185

Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn Thr Val Asn Asp Asn
1190 1195 1200

Ile Tyr Gly Gln Ala Val Glu Tyr Ser Gly Leu Val Arg Val Gly
1205 1210 1215

Glu Asp Val Tyr Tyr Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly
1220 1225 1230

Trp Ile Tyr Asp Met Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn
1235 1240 1245

Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp
1250 1255 1260

Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met Arg Thr Gly Leu
1265 1270 1275

Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu
1280 1285 1290

Met Gln Phe Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr Phe
1295 1300 1305

Gly Glu Asp Gly Val Met Gln Ile Gly Val Phe Asn Thr Pro Asp

1310 1315 1320

Gly Phe Lys Tyr Phe Ala His Gln Asn Thr Leu Asp Glu Asn Phe
1325 1330 1335

Glu Gly Glu Ser Ile Asn Tyr Thr Gly Trp Leu Asp Leu Asp Glu
1340 1345 1350

Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr Ile Ala Ala Thr Gly Ser
1355 1360 1365

Val Ile Ile Asp Gly Glu Glu Tyr Tyr Phe Asp Pro Asp Thr Ala
1370 1375 1380

Gln Leu Val Ile Ser Glu
1385

<210> 54
<211> 1395
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 54

His His His His His His His His His Gly Gly Ser Gly Gly Ser Gly
1 5 10 15

Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly
20 25 30

Ser Gly Gly Ser Gly Gly Ser His Met Ala Ser Asp Lys Ile Ile His
35 40 45

Leu Thr Asp Asp Ser Phe Asp Thr Asp Val Leu Lys Ala Asp Gly Ala
50 55 60

Ile Leu Val Asp Phe Trp Ala Glu Trp Cys Gly Pro Cys Lys Met Ile
65 70 75 80

Ala Pro Ile Leu Asp Glu Ile Ala Asp Glu Tyr Gln Gly Lys Leu Thr
85 90 95

Val Ala Lys Leu Asn Ile Asp Gln Asn Pro Gly Thr Ala Pro Lys Tyr
100 105 110

Gly Ile Arg Gly Ile Pro Thr Leu Leu Leu Phe Lys Asn Gly Glu Val
115 120 125

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

```
Leu Asp Ala Asn Leu Ala Arg Ala Leu Val Pro Arg Gly Ser Val Thr
145                 150                 155                 160

Ser Leu Tyr Lys Lys Ala Gly Ser Ala Ala Gly Gly Ser Met Pro Gln
                165                 170                 175

Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Val
            180                 185                 190

Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly Gly Ser Gly His Thr
        195                 200                 205

Val Thr Asp Asp Ile Asp His Phe Phe Ser Ala Pro Ser Ile Thr Tyr
    210                 215                 220

Arg Glu Pro His Leu Ser Ile Tyr Asp Val Leu Glu Val Gln Lys Glu
225                 230                 235                 240

Glu Leu Asp Leu Ser Lys Asp Leu Met Val Leu Pro Asn Ala Pro Asn
                245                 250                 255

Arg Val Phe Ala Trp Glu Thr Gly Trp Thr Pro Gly Leu Arg Ser Leu
            260                 265                 270

Glu Asn Asp Gly Thr Lys Leu Leu Asp Arg Ile Arg Asp Asn Tyr Glu
        275                 280                 285

Gly Glu Phe Tyr Trp Arg Tyr Phe Ala Phe Ile Ala Asp Ala Leu Ile
    290                 295                 300

Thr Thr Leu Lys Pro Arg Tyr Glu Asp Thr Asn Ile Arg Ile Asn Leu
305                 310                 315                 320

Asp Ser Asn Thr Arg Ser Phe Ile Val Pro Ile Ile Thr Thr Glu Tyr
                325                 330                 335

Ile Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser Gly Gly Thr Tyr
            340                 345                 350

Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn Ile Glu Leu Ser
        355                 360                 365

Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val Val Arg Asp Val
    370                 375                 380

Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu Ile Glu Gly Ile
385                 390                 395                 400

Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile Leu Asn Ser His
                405                 410                 415
```

```
Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn Gly Phe Val Ser
            420                 425                 430

Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala Ile Ile Glu Val Asp
        435                 440                 445

Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile Ser Gly Glu Leu Lys Ile
    450                 455                 460

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

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

Glu Gly Lys Glu Asn Gly Phe Ile Asn Gly Ser Thr Lys Glu Gly Leu
            500                 505                 510

Phe Val Ser Glu Leu Pro Asp Val Val Leu Ile Ser Lys Val Tyr Met
        515                 520                 525

Asp Asp Ser Lys Pro Ser Phe Gly Tyr Tyr Ser Asn Asn Leu Lys Asp
    530                 535                 540

Val Lys Val Ile Thr Lys Asp Asn Val Asn Ile Leu Thr Gly Tyr Tyr
545                 550                 555                 560

Leu Lys Asp Asp Ile Lys Ile Ser Leu Ser Leu Thr Leu Gln Asp Glu
                565                 570                 575

Lys Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu Ser Gly Val Ala
            580                 585                 590

Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr Asn Thr Ser Asp
        595                 600                 605

Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys Ser Ile Phe Val
    610                 615                 620

Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp Ala Asn Phe Ile
625                 630                 635                 640

Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe Ile Cys Asp Glu
                645                 650                 655

Asn Asp Asn Ile Gln Pro Tyr Phe Ile Lys Phe Asn Thr Leu Glu Thr
            660                 665                 670

Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn Met Ile Val Glu Pro
        675                 680                 685
```

```
Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile Ser Ser Thr Val Ile Asn
    690                 695                 700

Phe Ser Gln Lys Tyr Leu Tyr Gly Ile Asp Ser Cys Val Asn Lys Val
705                 710                 715                 720

Val Ile Ser Pro Asn Ile Tyr Thr Asp Glu Ile Asn Ile Thr Pro Val
                725                 730                 735

Tyr Glu Thr Asn Asn Thr Tyr Pro Glu Val Ile Val Leu Asp Ala Asn
            740                 745                 750

Tyr Ile Asn Glu Lys Ile Asn Val Asn Ile Asn Asp Leu Ser Ile Arg
        755                 760                 765

Tyr Val Trp Ser Asn Asp Gly Asn Asp Phe Ile Leu Met Ser Thr Ser
    770                 775                 780

Glu Glu Asn Lys Val Ser Gln Val Lys Ile Arg Phe Val Asn Val Phe
785                 790                 795                 800

Lys Asp Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn Phe Ser Asp Lys
                805                 810                 815

Gln Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe Thr Pro Ser Tyr
            820                 825                 830

Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu Val Ser Leu Tyr
        835                 840                 845

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

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

Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys Tyr Tyr Phe Asn
                885                 890                 895

Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr Ile Ile Asp Asp
            900                 905                 910

Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu Gln Thr Gly Val Phe
        915                 920                 925

Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala Pro Ala Asn Thr Leu Asp
    930                 935                 940

Glu Asn Leu Glu Gly Glu Ala Ile Asp Phe Thr Gly Lys Leu Ile Ile
945                 950                 955                 960
```

```
Asp Glu Asn Ile Tyr Tyr Phe Asp Asp Asn Tyr Arg Gly Ala Val Glu
                965                 970                 975

Trp Lys Glu Leu Asp Gly Glu Met His Tyr Phe Ser Pro Glu Thr Gly
            980                 985                 990

Lys Ala Phe Lys Gly Leu Asn Gln  Ile Gly Asp Tyr Lys  Tyr Tyr Phe
        995                 1000                1005

Asn Ser  Asp Gly Val Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp
    1010                1015                1020

Asn Lys  His Tyr Phe Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr
    1025                1030                1035

Thr Glu  Ile Asp Gly Lys His  Phe Tyr Phe Ala Glu  Asn Gly Glu
    1040                1045                1050

Met Gln  Ile Gly Val Phe Asn  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1055                1060                1065

Ala His  His Asn Glu Asp Leu  Gly Asn Glu Glu Gly  Glu Glu Ile
    1070                1075                1080

Ser Tyr  Ser Gly Ile Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe
    1085                1090                1095

Asp Asp  Ser Phe Thr Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp
    1100                1105                1110

Gly Ser  Lys Tyr Tyr Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile
    1115                1120                1125

Gly Leu  Ser Leu Ile Asn Asp  Gly Gln Tyr Tyr Phe  Asn Asp Asp
    1130                1135                1140

Gly Ile  Met Gln Val Gly Phe  Val Thr Ile Asn Asp  Lys Val Phe
    1145                1150                1155

Tyr Phe  Ser Asp Ser Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile
    1160                1165                1170

Asp Asp  Asn Tyr Phe Tyr Ile  Asp Asp Asn Gly Ile  Val Gln Ile
    1175                1180                1185

Gly Val  Phe Asp Thr Ser Asp  Gly Tyr Lys Tyr Phe  Ala Pro Ala
    1190                1195                1200

Asn Thr  Val Asn Asp Asn Ile  Tyr Gly Gln Ala Val  Glu Tyr Ser
    1205                1210                1215
```

Gly Leu Val Arg Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu Thr
1220 1225 1230

Tyr Thr Ile Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser
1235 1240 1245

Asp Lys Tyr Tyr Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly
1250 1255 1260

Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly
1265 1270 1275

Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr
1280 1285 1290

Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile Asn Ile Glu
1295 1300 1305

Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met Gln Ile Gly
1310 1315 1320

Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn
1325 1330 1335

Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr Gly
1340 1345 1350

Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp Glu Tyr
1355 1360 1365

Ile Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr Tyr
1370 1375 1380

Phe Asp Pro Asp Thr Ala Gln Leu Val Ile Ser Glu
1385 1390 1395

<210> 55
<211> 1383
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 55

His His His His His His Ser His Met Ala Ser Asp Lys Ile Ile His
1 5 10 15

Leu Thr Asp Asp Ser Phe Asp Thr Asp Val Leu Lys Ala Asp Gly Ala
20 25 30

Ile Leu Val Asp Phe Trp Ala Glu Trp Cys Gly Pro Cys Lys Met Ile

```
        35                  40                  45

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

Val Ala Lys Leu Asn Ile Asp Gln Asn Pro Gly Thr Ala Pro Lys Tyr
65                  70                  75                  80

Gly Ile Arg Gly Ile Pro Thr Leu Leu Leu Phe Lys Asn Gly Glu Val
                85                  90                  95

Ala Ala Thr Lys Val Gly Ala Leu Ser Lys Gly Gln Leu Lys Glu Phe
            100                 105                 110

Leu Asp Ala Asn Leu Ala Arg Ala Leu Gly Gly Ser Gly Gly Ser Gly
        115                 120                 125

Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly Ser Gly Gly
    130                 135                 140

Ser Gly Gly Ser Leu Val Pro Arg Gly Ser Gly Ser Ala Ala Gly Gly
145                 150                 155                 160

Ser Met Pro Gln Asp Asp Leu Val Ile Ser Glu Ile Asp Phe Asn Asn
                165                 170                 175

Asn Ser Ile Val Leu Gly Lys Cys Glu Ile Trp Arg Met Glu Gly Gly
            180                 185                 190

Ser Gly His Thr Val Thr Asp Asp Ile Asp His Phe Phe Ser Ala Pro
        195                 200                 205

Ser Ile Thr Tyr Arg Glu Pro His Leu Ser Ile Tyr Asp Val Leu Glu
    210                 215                 220

Val Gln Lys Glu Glu Leu Asp Leu Ser Lys Asp Leu Met Val Leu Pro
225                 230                 235                 240

Asn Ala Pro Asn Arg Val Phe Ala Trp Glu Thr Gly Trp Thr Pro Gly
                245                 250                 255

Leu Arg Ser Leu Glu Asn Asp Gly Thr Lys Leu Leu Asp Arg Ile Arg
            260                 265                 270

Asp Asn Tyr Glu Gly Glu Phe Tyr Trp Arg Tyr Phe Ala Phe Ile Ala
        275                 280                 285

Asp Ala Leu Ile Thr Thr Leu Lys Pro Arg Tyr Glu Asp Thr Asn Ile
    290                 295                 300

Arg Ile Asn Leu Asp Ser Asn Thr Arg Ser Phe Ile Val Pro Ile Ile
```

305 310 315 320

Thr Thr Glu Tyr Ile Arg Glu Lys Leu Ser Tyr Ser Phe Tyr Gly Ser
325 330 335

Gly Gly Thr Tyr Ala Leu Ser Leu Ser Gln Tyr Asn Met Gly Ile Asn
340 345 350

Ile Glu Leu Ser Glu Ser Asp Val Trp Ile Ile Asp Val Asp Asn Val
355 360 365

Val Arg Asp Val Thr Ile Glu Ser Asp Lys Ile Lys Lys Gly Asp Leu
370 375 380

Ile Glu Gly Ile Leu Ser Thr Leu Ser Ile Glu Glu Asn Lys Ile Ile
385 390 395 400

Leu Asn Ser His Glu Ile Asn Phe Ser Gly Glu Val Asn Gly Ser Asn
405 410 415

Gly Phe Val Ser Leu Thr Phe Ser Ile Leu Glu Gly Ile Asn Ala Ile
420 425 430

Ile Glu Val Asp Leu Leu Ser Lys Ser Tyr Lys Leu Leu Ile Ser Gly
435 440 445

Glu Leu Lys Ile Leu Met Leu Asn Ser Asn His Ile Gln Gln Lys Ile
450 455 460

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

Phe Val Asp Ser Glu Gly Lys Glu Asn Gly Phe Ile Asn Gly Ser Thr
485 490 495

Lys Glu Gly Leu Phe Val Ser Glu Leu Pro Asp Val Val Leu Ile Ser
500 505 510

Lys Val Tyr Met Asp Asp Ser Lys Pro Ser Phe Gly Tyr Tyr Ser Asn
515 520 525

Asn Leu Lys Asp Val Lys Val Ile Thr Lys Asp Asn Val Asn Ile Leu
530 535 540

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

Leu Gln Asp Glu Lys Thr Ile Lys Leu Asn Ser Val His Leu Asp Glu
565 570 575

Ser Gly Val Ala Glu Ile Leu Lys Phe Met Asn Arg Lys Gly Asn Thr

580 585 590

Asn Thr Ser Asp Ser Leu Met Ser Phe Leu Glu Ser Met Asn Ile Lys
595 600 605

Ser Ile Phe Val Asn Phe Leu Gln Ser Asn Ile Lys Phe Ile Leu Asp
610 615 620

Ala Asn Phe Ile Ile Ser Gly Thr Thr Ser Ile Gly Gln Phe Glu Phe
625 630 635 640

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

Thr Leu Glu Thr Asn Tyr Thr Leu Tyr Val Gly Asn Arg Gln Asn Met
660 665 670

Ile Val Glu Pro Asn Tyr Asp Leu Asp Asp Ser Gly Asp Ile Ser Ser
675 680 685

Thr Val Ile Asn Phe Ser Gln Lys Tyr Leu Tyr Gly Ile Asp Ser Cys
690 695 700

Val Asn Lys Val Val Ile Ser Pro Asn Ile Tyr Thr Asp Glu Ile Asn
705 710 715 720

Ile Thr Pro Val Tyr Glu Thr Asn Asn Thr Tyr Pro Glu Val Ile Val
725 730 735

Leu Asp Ala Asn Tyr Ile Asn Glu Lys Ile Asn Val Asn Ile Asn Asp
740 745 750

Leu Ser Ile Arg Tyr Val Trp Ser Asn Asp Gly Asn Asp Phe Ile Leu
755 760 765

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

Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu Ser Phe Asn
785 790 795 800

Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile Ile Leu Ser Phe
805 810 815

Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly Tyr Asp Leu Gly Leu
820 825 830

Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile Asn Asn Phe Gly Met Met
835 840 845

Val Ser Gly Leu Ile Tyr Ile Asn Asp Ser Leu Tyr Tyr Phe Lys Pro

```
    850                 855                 860

Pro Val Asn Asn Leu Ile Thr Gly Phe Val Thr Val Gly Asp Asp Lys
865                 870                 875                 880

Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile Gly Glu Thr
                885                 890                 895

Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly Val Leu Gln
            900                 905                 910

Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe Ala Pro Ala
        915                 920                 925

Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp Phe Thr Gly
    930                 935                 940

Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp Asn Tyr Arg
945                 950                 955                 960

Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His Tyr Phe Ser
                965                 970                 975

Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile Gly Asp Tyr
            980                 985                 990

Lys Tyr Tyr Phe Asn Ser Asp Gly  Val Met Gln Lys Gly  Phe Val Ser
        995                 1000                1005

Ile Asn  Asp Asn Lys His Tyr  Phe Asp Asp Ser Gly  Val Met Lys
    1010                1015                1020

Val Gly  Tyr Thr Glu Ile Asp  Gly Lys His Phe Tyr  Phe Ala Glu
    1025                1030                1035

Asn Gly  Glu Met Gln Ile Gly  Val Phe Asn Thr Glu  Asp Gly Phe
    1040                1045                1050

Lys Tyr  Phe Ala His His Asn  Glu Asp Leu Gly Asn  Glu Glu Gly
    1055                1060                1065

Glu Glu  Ile Ser Tyr Ser Gly  Ile Leu Asn Phe Asn  Asn Lys Ile
    1070                1075                1080

Tyr Tyr  Phe Asp Asp Ser Phe  Thr Ala Val Val Gly  Trp Lys Asp
    1085                1090                1095

Leu Glu  Asp Gly Ser Lys Tyr  Tyr Phe Asp Glu Asp  Thr Ala Glu
    1100                1105                1110

Ala Tyr  Ile Gly Leu Ser Leu  Ile Asn Asp Gly Gln  Tyr Tyr Phe
```

1115 1120 1125

Asn Asp Asp Gly Ile Met Gln Val Gly Phe Val Thr Ile Asn Asp
1130 1135 1140

Lys Val Phe Tyr Phe Ser Asp Ser Gly Ile Ile Glu Ser Gly Val
1145 1150 1155

Gln Asn Ile Asp Asp Asn Tyr Phe Tyr Ile Asp Asp Asn Gly Ile
1160 1165 1170

Val Gln Ile Gly Val Phe Asp Thr Ser Asp Gly Tyr Lys Tyr Phe
1175 1180 1185

Ala Pro Ala Asn Thr Val Asn Asp Asn Ile Tyr Gly Gln Ala Val
1190 1195 1200

Glu Tyr Ser Gly Leu Val Arg Val Gly Glu Asp Val Tyr Tyr Phe
1205 1210 1215

Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile Tyr Asp Met Glu
1220 1225 1230

Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr Lys Lys Ala
1235 1240 1245

Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr Phe Asp
1250 1255 1260

Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn Asn
1265 1270 1275

Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr Ile
1280 1285 1290

Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val Met
1295 1300 1305

Gln Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala
1310 1315 1320

His Gln Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn
1325 1330 1335

Tyr Thr Gly Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr
1340 1345 1350

Asp Glu Tyr Ile Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu
1355 1360 1365

Glu Tyr Tyr Phe Asp Pro Asp Thr Ala Gln Leu Val Ile Ser Glu

1370 1375 1380

<210> 56
<211> 2317
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 56

Met Gly Ser Ser His His His His His His Ser His Met Ala Ser Asn
1 5 10 15

Lys Glu Ile Leu Ala Val Val Glu Ala Val Ser Asn Glu Lys Ala Leu
20 25 30

Pro Arg Glu Lys Ile Phe Glu Ala Leu Glu Ser Ala Leu Ala Thr Ala
35 40 45

Thr Lys Lys Lys Tyr Glu Gln Glu Ile Asp Val Arg Val Gln Ile Asp
50 55 60

Arg Lys Ser Gly Asp Phe Asp Thr Phe Arg Arg Trp Leu Val Val Asp
65 70 75 80

Glu Val Thr Gln Pro Thr Lys Glu Ile Thr Leu Glu Ala Ala Arg Tyr
85 90 95

Glu Asp Glu Ser Leu Asn Leu Gly Asp Tyr Val Glu Asp Gln Ile Glu
100 105 110

Ser Val Thr Phe Asp Arg Ile Thr Thr Gln Thr Ala Lys Gln Val Ile
115 120 125

Val Gln Lys Val Arg Glu Ala Glu Arg Ala Met Val Val Asp Gln Phe
130 135 140

Arg Glu His Glu Gly Glu Ile Ile Thr Gly Val Val Lys Lys Val Asn
145 150 155 160

Arg Asp Asn Ile Ser Leu Asp Leu Gly Asn Asn Ala Glu Ala Val Ile
165 170 175

Leu Arg Glu Asp Met Leu Pro Arg Glu Asn Phe Arg Pro Gly Asp Arg
180 185 190

Val Arg Gly Val Leu Tyr Ser Val Arg Pro Glu Ala Arg Gly Ala Gln
195 200 205

Leu Phe Val Thr Arg Ser Lys Pro Glu Met Leu Ile Glu Leu Phe Arg
210 215 220

```
Ile Glu Val Pro Glu Ile Gly Glu Glu Val Ile Glu Ile Lys Ala Ala
225                 230                 235                 240

Ala Arg Asp Pro Gly Ser Arg Ala Lys Ile Ala Val Lys Thr Asn Asp
                245                 250                 255

Lys Arg Ile Asp Pro Val Gly Ala Cys Val Gly Met Arg Gly Ala Arg
            260                 265                 270

Val Gln Ala Val Ser Thr Glu Leu Gly Gly Glu Arg Ile Asp Ile Val
        275                 280                 285

Leu Trp Asp Asp Asn Pro Ala Gln Phe Val Ile Asn Ala Met Ala Pro
    290                 295                 300

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

Ile Ala Val Glu Ala Gly Asn Leu Ala Gln Ala Ile Gly Arg Asn Gly
                325                 330                 335

Gln Asn Val Arg Leu Ala Ser Gln Leu Ser Gly Trp Glu Leu Asn Val
            340                 345                 350

Met Thr Val Asp Asp Leu Gln Ala Lys His Gln Ala Glu Ala His Ala
        355                 360                 365

Ala Ile Asp Thr Phe Thr Lys Tyr Leu Asp Ile Asp Glu Asp Phe Ala
    370                 375                 380

Thr Val Leu Val Glu Glu Gly Phe Ser Thr Leu Glu Glu Leu Ala Tyr
385                 390                 395                 400

Val Pro Met Lys Glu Leu Leu Glu Ile Glu Gly Leu Asp Glu Pro Thr
                405                 410                 415

Val Glu Ala Leu Arg Glu Arg Ala Lys Asn Ala Leu Ala Thr Ile Ala
            420                 425                 430

Gln Ala Gln Glu Glu Ser Leu Gly Asp Asn Lys Pro Ala Asp Asp Leu
        435                 440                 445

Leu Asn Leu Glu Gly Val Asp Arg Asp Leu Ala Phe Lys Leu Ala Ala
    450                 455                 460

Arg Gly Val Cys Thr Leu Glu Asp Leu Ala Glu Gln Gly Ile Asp Asp
465                 470                 475                 480

Leu Ala Asp Ile Glu Gly Leu Thr Asp Glu Lys Ala Gly Ala Leu Ile
                485                 490                 495
```

```
Met Ala Ala Arg Asn Ile Cys Trp Phe Gly Asp Glu Ala Ser Gly Ala
            500                 505                 510

Leu Arg Thr Arg Val Lys Val Val Lys Asn Lys Ala Leu Ala Glu Gly
        515                 520                 525

Thr Arg Ile Phe Asp Pro Val Thr Gly Thr Thr His Arg Ile Glu Asp
    530                 535                 540

Val Val Asp Gly Arg Lys Pro Ile His Val Val Ala Ala Ala Lys Asp
545                 550                 555                 560

Gly Thr Leu His Ala Arg Pro Val Val Ser Trp Phe Asp Gln Gly Thr
                565                 570                 575

Arg Asp Val Ile Gly Leu Arg Ile Ala Gly Gly Ala Ile Leu Trp Ala
            580                 585                 590

Thr Pro Asp His Lys Val Leu Thr Glu Tyr Gly Trp Arg Ala Ala Gly
        595                 600                 605

Glu Leu Arg Lys Gly Asp Arg Val Ala Gln Pro Arg Arg Phe Asp Gly
    610                 615                 620

Phe Gly Asp Ser Ala Pro Ile Pro Ala Arg Val Gln Ala Leu Ala Asp
625                 630                 635                 640

Ala Leu Asp Asp Lys Phe Leu His Asp Met Leu Ala Glu Glu Leu Arg
                645                 650                 655

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

Gly Leu Glu Val Glu Glu Leu His Thr Leu Val Ala Glu Gly Val Val
        675                 680                 685

Val His Asn Ser Ser Pro Pro Phe Lys Gln Ala Glu Phe Gly Ser Ala
    690                 695                 700

Ala Ala Pro Phe Thr Met Ser Ile Ile Lys Asp Ile Ser Ser Lys Glu
705                 710                 715                 720

Tyr Ile Ser Phe Asn Pro Lys Glu Asn Lys Ile Thr Val Lys Ser Lys
                725                 730                 735

Asn Leu Pro Glu Leu Ser Thr Leu Leu Gln Glu Ile Arg Asn Asn Ser
            740                 745                 750

Asn Ser Ser Asp Ile Glu Leu Glu Glu Lys Val Met Leu Thr Glu Cys
        755                 760                 765
```

```
Glu Ile Asn Val Ile Ser Asn Ile Asp Thr Gln Ile Val Glu Glu Arg
    770                 775                 780

Ile Glu Glu Ala Lys Asn Leu Thr Ser Asp Ser Ile Asn Tyr Ile Lys
785                 790                 795                 800

Asp Glu Phe Lys Leu Ile Glu Ser Ile Ser Asp Ala Leu Cys Asp Leu
                805                 810                 815

Lys Gln Gln Asn Glu Leu Glu Asp Ser His Phe Ile Ser Phe Glu Asp
            820                 825                 830

Ile Ser Glu Thr Asp Glu Gly Phe Ser Ile Arg Phe Ile Asn Lys Glu
        835                 840                 845

Thr Gly Glu Ser Ile Phe Val Glu Thr Glu Lys Thr Ile Phe Ser Glu
    850                 855                 860

Tyr Ala Asn His Ile Thr Glu Glu Ile Ser Lys Ile Lys Gly Thr Ile
865                 870                 875                 880

Phe Asp Thr Val Asn Gly Lys Leu Val Lys Lys Val Asn Leu Asp Thr
                885                 890                 895

Thr His Glu Val Asn Thr Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu
            900                 905                 910

Ile Glu Tyr Asn Ser Ser Lys Glu Ser Leu Ser Asn Leu Ser Val Ala
        915                 920                 925

Met Lys Val Gln Val Tyr Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr
    930                 935                 940

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

Glu Thr Ile Asp Leu Leu Pro Thr Leu Ser Glu Gly Leu Pro Ile Ile
                965                 970                 975

Ala Thr Ile Ile Asp Gly Val Ser Leu Gly Ala Ala Ile Lys Glu Leu
            980                 985                 990

Ser Glu Thr Ser Asp Pro Leu Leu  Arg Gln Glu Ile Glu  Ala Lys Ile
        995                 1000                1005

Gly Ile  Met Ala Val Asn Leu  Thr Thr Ala Thr Thr  Ala Ile Ile
    1010                1015                1020

Thr Ser  Ser Leu Gly Ile Ala  Ser Gly Phe Ser Ile  Leu Leu Val
    1025                1030                1035
```

```
Pro Leu  Ala Gly Ile Ser Ala  Gly Ile Pro Ser Leu  Val Asn Asn
    1040                1045                1050

Glu Leu  Val Leu Arg Asp Lys  Ala Thr Lys Val Val  Asp Tyr Phe
    1055                1060                1065

Lys His  Val Ser Leu Val Glu  Thr Glu Gly Val Phe  Thr Leu Leu
    1070                1075                1080

Asp Asp  Lys Ile Met Met Pro  Gln Asp Asp Leu Val  Ile Ser Glu
    1085                1090                1095

Ile Asp  Phe Asn Asn Asn Ser  Ile Val Leu Gly Lys  Cys Glu Ile
    1100                1105                1110

Trp Arg  Met Glu Gly Gly Ser  Gly His Thr Val Thr  Asp Asp Ile
    1115                1120                1125

Asp His  Phe Phe Ser Ala Pro  Ser Ile Thr Tyr Arg  Glu Pro His
    1130                1135                1140

Leu Ser  Ile Tyr Asp Val Leu  Glu Val Gln Lys Glu  Glu Leu Asp
    1145                1150                1155

Leu Ser  Lys Asp Leu Met Val  Leu Pro Asn Ala Pro  Asn Arg Val
    1160                1165                1170

Phe Ala  Trp Glu Thr Gly Trp  Thr Pro Gly Leu Arg  Ser Leu Glu
    1175                1180                1185

Asn Asp  Gly Thr Lys Leu Leu  Asp Arg Ile Arg Asp  Asn Tyr Glu
    1190                1195                1200

Gly Glu  Phe Tyr Trp Arg Tyr  Phe Ala Phe Ile Ala  Asp Ala Leu
    1205                1210                1215

Ile Thr  Thr Leu Lys Pro Arg  Tyr Glu Asp Thr Asn  Ile Arg Ile
    1220                1225                1230

Asn Leu  Asp Ser Asn Thr Arg  Ser Phe Ile Val Pro  Ile Ile Thr
    1235                1240                1245

Thr Glu  Tyr Ile Arg Glu Lys  Leu Ser Tyr Ser Phe  Tyr Gly Ser
    1250                1255                1260

Gly Gly  Thr Tyr Ala Leu Ser  Leu Ser Gln Tyr Asn  Met Gly Ile
    1265                1270                1275

Asn Ile  Glu Leu Ser Glu Ser  Asp Val Trp Ile Ile  Asp Val Asp
    1280                1285                1290
```

```
Asn Val  Val Arg Asp Val Thr  Ile Glu Ser Asp Lys  Ile Lys Lys
    1295                 1300                 1305

Gly Asp  Leu Ile Glu Gly Ile  Leu Ser Thr Leu Ser  Ile Glu Glu
    1310                 1315                 1320

Asn Lys  Ile Ile Leu Asn Ser  His Glu Ile Asn Phe  Ser Gly Glu
    1325                 1330                 1335

Val Asn  Gly Ser Asn Gly Phe  Val Ser Leu Thr Phe  Ser Ile Leu
    1340                 1345                 1350

Glu Gly  Ile Asn Ala Ile Ile  Glu Val Asp Leu Leu  Ser Lys Ser
    1355                 1360                 1365

Tyr Lys  Leu Leu Ile Ser Gly  Glu Leu Lys Ile Leu  Met Leu Asn
    1370                 1375                 1380

Ser Asn  His Ile Gln Gln Lys  Ile Asp Tyr Ile Gly  Phe Asn Ser
    1385                 1390                 1395

Glu Leu  Gln Lys Asn Ile Pro  Tyr Ser Phe Val Asp  Ser Glu Gly
    1400                 1405                 1410

Lys Glu  Asn Gly Phe Ile Asn  Gly Ser Thr Lys Glu  Gly Leu Phe
    1415                 1420                 1425

Val Ser  Glu Leu Pro Asp Val  Val Leu Ile Ser Lys  Val Tyr Met
    1430                 1435                 1440

Asp Asp  Ser Lys Pro Ser Phe  Gly Tyr Tyr Ser Asn  Asn Leu Lys
    1445                 1450                 1455

Asp Val  Lys Val Ile Thr Lys  Asp Asn Val Asn Ile  Leu Thr Gly
    1460                 1465                 1470

Tyr Tyr  Leu Lys Asp Asp Ile  Lys Ile Ser Leu Ser  Leu Thr Leu
    1475                 1480                 1485

Gln Asp  Glu Lys Thr Ile Lys  Leu Asn Ser Val His  Leu Asp Glu
    1490                 1495                 1500

Ser Gly  Val Ala Glu Ile Leu  Lys Phe Met Asn Arg  Lys Gly Asn
    1505                 1510                 1515

Thr Asn  Thr Ser Asp Ser Leu  Met Ser Phe Leu Glu  Ser Met Asn
    1520                 1525                 1530

Ile Lys  Ser Ile Phe Val Asn  Phe Leu Gln Ser Asn  Ile Lys Phe
    1535                 1540                 1545
```

```
Ile Leu  Asp Ala Asn Phe Ile  Ile Ser Gly Thr Thr  Ser Ile Gly
    1550                 1555                 1560

Gln Phe  Glu Phe Ile Cys Asp  Glu Asn Asp Asn Ile  Gln Pro Tyr
    1565                 1570                 1575

Phe Ile  Lys Phe Asn Thr Leu  Glu Thr Asn Tyr Thr  Leu Tyr Val
    1580                 1585                 1590

Gly Asn  Arg Gln Asn Met Ile  Val Glu Pro Asn Tyr  Asp Leu Asp
    1595                 1600                 1605

Asp Ser  Gly Asp Ile Ser Ser  Thr Val Ile Asn Phe  Ser Gln Lys
    1610                 1615                 1620

Tyr Leu  Tyr Gly Ile Asp Ser  Cys Val Asn Lys Val  Val Ile Ser
    1625                 1630                 1635

Pro Asn  Ile Tyr Thr Asp Glu  Ile Asn Ile Thr Pro  Val Tyr Glu
    1640                 1645                 1650

Thr Asn  Asn Thr Tyr Pro Glu  Val Ile Val Leu Asp  Ala Asn Tyr
    1655                 1660                 1665

Ile Asn  Glu Lys Ile Asn Val  Asn Ile Asn Asp Leu  Ser Ile Arg
    1670                 1675                 1680

Tyr Val  Trp Ser Asn Asp Gly  Asn Asp Phe Ile Leu  Met Ser Thr
    1685                 1690                 1695

Ser Glu  Glu Asn Lys Val Ser  Gln Val Lys Ile Arg  Phe Val Asn
    1700                 1705                 1710

Val Phe  Lys Asp Lys Thr Leu  Ala Asn Lys Leu Ser  Phe Asn Phe
    1715                 1720                 1725

Ser Asp  Lys Gln Asp Val Pro  Val Ser Glu Ile Ile  Leu Ser Phe
    1730                 1735                 1740

Thr Pro  Ser Tyr Tyr Glu Asp  Gly Leu Ile Gly Tyr  Asp Leu Gly
    1745                 1750                 1755

Leu Val  Ser Leu Tyr Asn Glu  Lys Phe Tyr Ile Asn  Asn Phe Gly
    1760                 1765                 1770

Met Met  Val Ser Gly Leu Ile  Tyr Ile Asn Asp Ser  Leu Tyr Tyr
    1775                 1780                 1785

Phe Lys  Pro Pro Val Asn Asn  Leu Ile Thr Gly Phe  Val Thr Val
    1790                 1795                 1800
```

```
Gly Asp  Asp Lys Tyr Tyr Phe  Asn Pro Ile Asn Gly  Gly Ala Ala
    1805                 1810                 1815

Ser Ile  Gly Glu Thr Ile Ile  Asp Asp Lys Asn Tyr  Tyr Phe Asn
    1820                 1825                 1830

Gln Ser  Gly Val Leu Gln Thr  Gly Val Phe Ser Thr  Glu Asp Gly
    1835                 1840                 1845

Phe Lys  Tyr Phe Ala Pro Ala  Asn Thr Leu Asp Glu  Asn Leu Glu
    1850                 1855                 1860

Gly Glu  Ala Ile Asp Phe Thr  Gly Lys Leu Ile Ile  Asp Glu Asn
    1865                 1870                 1875

Ile Tyr  Tyr Phe Asp Asp Asn  Tyr Arg Gly Ala Val  Glu Trp Lys
    1880                 1885                 1890

Glu Leu  Asp Gly Glu Met His  Tyr Phe Ser Pro Glu  Thr Gly Lys
    1895                 1900                 1905

Ala Phe  Lys Gly Leu Asn Gln  Ile Gly Asp Tyr Lys  Tyr Tyr Phe
    1910                 1915                 1920

Asn Ser  Asp Gly Val Met Gln  Lys Gly Phe Val Ser  Ile Asn Asp
    1925                 1930                 1935

Asn Lys  His Tyr Phe Asp Asp  Ser Gly Val Met Lys  Val Gly Tyr
    1940                 1945                 1950

Thr Glu  Ile Asp Gly Lys His  Phe Tyr Phe Ala Glu  Asn Gly Glu
    1955                 1960                 1965

Met Gln  Ile Gly Val Phe Asn  Thr Glu Asp Gly Phe  Lys Tyr Phe
    1970                 1975                 1980

Ala His  His Asn Glu Asp Leu  Gly Asn Glu Glu Gly  Glu Glu Ile
    1985                 1990                 1995

Ser Tyr  Ser Gly Ile Leu Asn  Phe Asn Asn Lys Ile  Tyr Tyr Phe
    2000                 2005                 2010

Asp Asp  Ser Phe Thr Ala Val  Val Gly Trp Lys Asp  Leu Glu Asp
    2015                 2020                 2025

Gly Ser  Lys Tyr Tyr Phe Asp  Glu Asp Thr Ala Glu  Ala Tyr Ile
    2030                 2035                 2040

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

```
Gly Ile  Met Gln Val Gly Phe  Val Thr Ile Asn Asp  Lys Val Phe
    2060                 2065                 2070

Tyr Phe  Ser Asp Ser Gly Ile  Ile Glu Ser Gly Val  Gln Asn Ile
    2075                 2080                 2085

Asp Asp  Asn Tyr Phe Tyr Ile  Asp Asp Asn Gly Ile  Val Gln Ile
    2090                 2095                 2100

Gly Val  Phe Asp Thr Ser Asp  Gly Tyr Lys Tyr Phe  Ala Pro Ala
    2105                 2110                 2115

Asn Thr  Val Asn Asp Asn Ile  Tyr Gly Gln Ala Val  Glu Tyr Ser
    2120                 2125                 2130

Gly Leu  Val Arg Val Gly Glu  Asp Val Tyr Tyr Phe  Gly Glu Thr
    2135                 2140                 2145

Tyr Thr  Ile Glu Thr Gly Trp  Ile Tyr Asp Met Glu  Asn Glu Ser
    2150                 2155                 2160

Asp Lys  Tyr Tyr Phe Asn Pro  Glu Thr Lys Lys Ala  Cys Lys Gly
    2165                 2170                 2175

Ile Asn  Leu Ile Asp Asp Ile  Lys Tyr Tyr Phe Asp  Glu Lys Gly
    2180                 2185                 2190

Ile Met  Arg Thr Gly Leu Ile  Ser Phe Glu Asn Asn  Asn Tyr Tyr
    2195                 2200                 2205

Phe Asn  Glu Asn Gly Glu Met  Gln Phe Gly Tyr Ile  Asn Ile Glu
    2210                 2215                 2220

Asp Lys  Met Phe Tyr Phe Gly  Glu Asp Gly Val Met  Gln Ile Gly
    2225                 2230                 2235

Val Phe  Asn Thr Pro Asp Gly  Phe Lys Tyr Phe Ala  His Gln Asn
    2240                 2245                 2250

Thr Leu  Asp Glu Asn Phe Glu  Gly Glu Ser Ile Asn  Tyr Thr Gly
    2255                 2260                 2265

Trp Leu  Asp Leu Asp Glu Lys  Arg Tyr Tyr Phe Thr  Asp Glu Tyr
    2270                 2275                 2280

Ile Ala  Ala Thr Gly Ser Val  Ile Ile Asp Gly Glu  Glu Tyr Tyr
    2285                 2290                 2295

Phe Asp  Pro Asp Thr Ala Gln  Leu Val Ile Ser Glu  Gly His His
    2300                 2305                 2310
```

His His His His
    2315

<210> 57
<211> 2321
<212> PRT
<213> Artificial Sequence

<220>
<223> Fusion protein

<400> 57

Met Gly Ser Ser His His His His His His Ser His Met Ala Ser Asn
1   5   10   15

Lys Glu Ile Leu Ala Val Val Glu Ala Val Ser Asn Glu Lys Ala Leu
            20   25   30

Pro Arg Glu Lys Ile Phe Glu Ala Leu Glu Ser Ala Leu Ala Thr Ala
        35   40   45

Thr Lys Lys Lys Tyr Glu Gln Glu Ile Asp Val Arg Val Gln Ile Asp
    50   55   60

Arg Lys Ser Gly Asp Phe Asp Thr Phe Arg Arg Trp Leu Val Val Asp
65   70   75   80

Glu Val Thr Gln Pro Thr Lys Glu Ile Thr Leu Glu Ala Ala Arg Tyr
                85   90   95

Glu Asp Glu Ser Leu Asn Leu Gly Asp Tyr Val Glu Asp Gln Ile Glu
            100   105   110

Ser Val Thr Phe Asp Arg Ile Thr Thr Gln Thr Ala Lys Gln Val Ile
        115   120   125

Val Gln Lys Val Arg Glu Ala Glu Arg Ala Met Val Val Asp Gln Phe
    130   135   140

Arg Glu His Glu Gly Glu Ile Ile Thr Gly Val Val Lys Lys Val Asn
145   150   155   160

Arg Asp Asn Ile Ser Leu Asp Leu Gly Asn Asn Ala Glu Ala Val Ile
                165   170   175

Leu Arg Glu Asp Met Leu Pro Arg Glu Asn Phe Arg Pro Gly Asp Arg
            180   185   190

Val Arg Gly Val Leu Tyr Ser Val Arg Pro Glu Ala Arg Gly Ala Gln
        195   200   205

Leu Phe Val Thr Arg Ser Lys Pro Glu Met Leu Ile Glu Leu Phe Arg

210 215 220

Ile Glu Val Pro Glu Ile Gly Glu Glu Val Ile Glu Ile Lys Ala Ala
225 230 235 240

Ala Arg Asp Pro Gly Ser Arg Ala Lys Ile Ala Val Lys Thr Asn Asp
245 250 255

Lys Arg Ile Asp Pro Val Gly Ala Cys Val Gly Met Arg Gly Ala Arg
260 265 270

Val Gln Ala Val Ser Thr Glu Leu Gly Gly Glu Arg Ile Asp Ile Val
275 280 285

Leu Trp Asp Asp Asn Pro Ala Gln Phe Val Ile Asn Ala Met Ala Pro
290 295 300

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

Ile Ala Val Glu Ala Gly Asn Leu Ala Gln Ala Ile Gly Arg Asn Gly
325 330 335

Gln Asn Val Arg Leu Ala Ser Gln Leu Ser Gly Trp Glu Leu Asn Val
340 345 350

Met Thr Val Asp Asp Leu Gln Ala Lys His Gln Ala Glu Ala His Ala
355 360 365

Ala Ile Asp Thr Phe Thr Lys Tyr Leu Asp Ile Asp Glu Asp Phe Ala
370 375 380

Thr Val Leu Val Glu Glu Gly Phe Ser Thr Leu Glu Glu Leu Ala Tyr
385 390 395 400

Val Pro Met Lys Glu Leu Leu Glu Ile Glu Gly Leu Asp Glu Pro Thr
405 410 415

Val Glu Ala Leu Arg Glu Arg Ala Lys Asn Ala Leu Ala Thr Ile Ala
420 425 430

Gln Ala Gln Glu Glu Ser Leu Gly Asp Asn Lys Pro Ala Asp Asp Leu
435 440 445

Leu Asn Leu Glu Gly Val Asp Arg Asp Leu Ala Phe Lys Leu Ala Ala
450 455 460

Arg Gly Val Cys Thr Leu Glu Asp Leu Ala Glu Gln Gly Ile Asp Asp
465 470 475 480

Leu Ala Asp Ile Glu Gly Leu Thr Asp Glu Lys Ala Gly Ala Leu Ile

485 490 495

Met Ala Ala Arg Asn Ile Cys Trp Phe Gly Asp Glu Ala Ser Gly Ala
500 505 510

Leu Glu Val Phe Gly Glu Phe Gly Ser Gly Lys Ala Phe Ala Arg Asp
515 520 525

Thr Glu Val Tyr Tyr Glu Asn Asp Thr Val Pro His Met Glu Ser Ile
530 535 540

Glu Glu Met Tyr Ser Lys Tyr Ala Ser Met Asn Gly Glu Leu Pro Phe
545 550 555 560

Asp Asn Gly Tyr Ala Val Pro Leu Asp Asn Val Phe Val Tyr Thr Leu
565 570 575

Asp Ile Ala Ser Gly Glu Ile Lys Lys Thr Arg Ala Ser Tyr Ile Tyr
580 585 590

Arg Glu Lys Val Glu Lys Leu Ile Glu Ile Lys Leu Ser Ser Gly Tyr
595 600 605

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

Leu Gln Trp Val Pro Ala Ala Glu Val Lys Pro Gly Asp Val Val Val
625 630 635 640

Gly Val Arg Glu Glu Val Leu Arg Arg Arg Ile Ile Ser Lys Gly Glu
645 650 655

Leu Glu Phe His Glu Val Ser Ser Val Arg Ile Ile Asp Tyr Asn Asn
660 665 670

Trp Val Tyr Asp Leu Val Ile Pro Glu Thr His Asn Phe Ile Ala Pro
675 680 685

Asn Gly Leu Val Leu His Asn Thr Gln Leu Ala His Thr Leu Ala Val
690 695 700

Met Gly Ser Ala Ala Ala Pro Phe Thr Met Ser Ile Ile Lys Asp Ile
705 710 715 720

Ser Ser Lys Glu Tyr Ile Ser Phe Asn Pro Lys Glu Asn Lys Ile Thr
725 730 735

Val Lys Ser Lys Asn Leu Pro Glu Leu Ser Thr Leu Leu Gln Glu Ile
740 745 750

Arg Asn Asn Ser Asn Ser Ser Asp Ile Glu Leu Glu Glu Lys Val Met

```
        755                 760                 765

Leu Thr Glu Cys Glu Ile Asn Val Ile Ser Asn Ile Asp Thr Gln Ile
    770                 775                 780

Val Glu Glu Arg Ile Glu Glu Ala Lys Asn Leu Thr Ser Asp Ser Ile
785                 790                 795                 800

Asn Tyr Ile Lys Asp Glu Phe Lys Leu Ile Glu Ser Ile Ser Asp Ala
                805                 810                 815

Leu Cys Asp Leu Lys Gln Gln Asn Glu Leu Glu Asp Ser His Phe Ile
            820                 825                 830

Ser Phe Glu Asp Ile Ser Glu Thr Asp Glu Gly Phe Ser Ile Arg Phe
        835                 840                 845

Ile Asn Lys Glu Thr Gly Glu Ser Ile Phe Val Glu Thr Glu Lys Thr
    850                 855                 860

Ile Phe Ser Glu Tyr Ala Asn His Ile Thr Glu Glu Ile Ser Lys Ile
865                 870                 875                 880

Lys Gly Thr Ile Phe Asp Thr Val Asn Gly Lys Leu Val Lys Lys Val
                885                 890                 895

Asn Leu Asp Thr Thr His Glu Val Asn Thr Leu Asn Ala Ala Phe Phe
            900                 905                 910

Ile Gln Ser Leu Ile Glu Tyr Asn Ser Ser Lys Glu Ser Leu Ser Asn
        915                 920                 925

Leu Ser Val Ala Met Lys Val Gln Val Tyr Ala Gln Leu Phe Ser Thr
    930                 935                 940

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

Thr Ala Leu Asp Glu Thr Ile Asp Leu Leu Pro Thr Leu Ser Glu Gly
                965                 970                 975

Leu Pro Ile Ile Ala Thr Ile Ile Asp Gly Val Ser Leu Gly Ala Ala
            980                 985                 990

Ile Lys Glu Leu Ser Glu Thr Ser  Asp Pro Leu Leu Arg  Gln Glu Ile
        995                 1000                1005

Glu Ala  Lys Ile Gly Ile Met  Ala Val Asn Leu Thr  Thr Ala Thr
    1010                1015                1020

Thr Ala  Ile Ile Thr Ser Ser  Leu Gly Ile Ala Ser  Gly Phe Ser
```

1025 1030 1035

Ile Leu Leu Val Pro Leu Ala Gly Ile Ser Ala Gly Ile Pro Ser
1040 1045 1050

Leu Val Asn Asn Glu Leu Val Leu Arg Asp Lys Ala Thr Lys Val
1055 1060 1065

Val Asp Tyr Phe Lys His Val Ser Leu Val Glu Thr Glu Gly Val
1070 1075 1080

Phe Thr Leu Leu Asp Asp Lys Ile Met Met Pro Gln Asp Asp Leu
1085 1090 1095

Val Ile Ser Glu Ile Asp Phe Asn Asn Asn Ser Ile Val Leu Gly
1100 1105 1110

Lys Cys Glu Ile Trp Arg Met Glu Gly Gly Ser Gly His Thr Val
1115 1120 1125

Thr Asp Asp Ile Asp His Phe Phe Ser Ala Pro Ser Ile Thr Tyr
1130 1135 1140

Arg Glu Pro His Leu Ser Ile Tyr Asp Val Leu Glu Val Gln Lys
1145 1150 1155

Glu Glu Leu Asp Leu Ser Lys Asp Leu Met Val Leu Pro Asn Ala
1160 1165 1170

Pro Asn Arg Val Phe Ala Trp Glu Thr Gly Trp Thr Pro Gly Leu
1175 1180 1185

Arg Ser Leu Glu Asn Asp Gly Thr Lys Leu Leu Asp Arg Ile Arg
1190 1195 1200

Asp Asn Tyr Glu Gly Glu Phe Tyr Trp Arg Tyr Phe Ala Phe Ile
1205 1210 1215

Ala Asp Ala Leu Ile Thr Thr Leu Lys Pro Arg Tyr Glu Asp Thr
1220 1225 1230

Asn Ile Arg Ile Asn Leu Asp Ser Asn Thr Arg Ser Phe Ile Val
1235 1240 1245

Pro Ile Ile Thr Thr Glu Tyr Ile Arg Glu Lys Leu Ser Tyr Ser
1250 1255 1260

Phe Tyr Gly Ser Gly Gly Thr Tyr Ala Leu Ser Leu Ser Gln Tyr
1265 1270 1275

Asn Met Gly Ile Asn Ile Glu Leu Ser Glu Ser Asp Val Trp Ile

1280 1285 1290

Ile Asp Val Asp Asn Val Val Arg Asp Val Thr Ile Glu Ser Asp
1295 1300 1305

Lys Ile Lys Lys Gly Asp Leu Ile Glu Gly Ile Leu Ser Thr Leu
1310 1315 1320

Ser Ile Glu Glu Asn Lys Ile Ile Leu Asn Ser His Glu Ile Asn
1325 1330 1335

Phe Ser Gly Glu Val Asn Gly Ser Asn Gly Phe Val Ser Leu Thr
1340 1345 1350

Phe Ser Ile Leu Glu Gly Ile Asn Ala Ile Ile Glu Val Asp Leu
1355 1360 1365

Leu Ser Lys Ser Tyr Lys Leu Leu Ile Ser Gly Glu Leu Lys Ile
1370 1375 1380

Leu Met Leu Asn Ser Asn His Ile Gln Gln Lys Ile Asp Tyr Ile
1385 1390 1395

Gly Phe Asn Ser Glu Leu Gln Lys Asn Ile Pro Tyr Ser Phe Val
1400 1405 1410

Asp Ser Glu Gly Lys Glu Asn Gly Phe Ile Asn Gly Ser Thr Lys
1415 1420 1425

Glu Gly Leu Phe Val Ser Glu Leu Pro Asp Val Val Leu Ile Ser
1430 1435 1440

Lys Val Tyr Met Asp Asp Ser Lys Pro Ser Phe Gly Tyr Tyr Ser
1445 1450 1455

Asn Asn Leu Lys Asp Val Lys Val Ile Thr Lys Asp Asn Val Asn
1460 1465 1470

Ile Leu Thr Gly Tyr Tyr Leu Lys Asp Asp Ile Lys Ile Ser Leu
1475 1480 1485

Ser Leu Thr Leu Gln Asp Glu Lys Thr Ile Lys Leu Asn Ser Val
1490 1495 1500

His Leu Asp Glu Ser Gly Val Ala Glu Ile Leu Lys Phe Met Asn
1505 1510 1515

Arg Lys Gly Asn Thr Asn Thr Ser Asp Ser Leu Met Ser Phe Leu
1520 1525 1530

Glu Ser Met Asn Ile Lys Ser Ile Phe Val Asn Phe Leu Gln Ser

1535 1540 1545

Asn Ile Lys Phe Ile Leu Asp Ala Asn Phe Ile Ile Ser Gly Thr
1550 1555 1560

Thr Ser Ile Gly Gln Phe Glu Phe Ile Cys Asp Glu Asn Asp Asn
1565 1570 1575

Ile Gln Pro Tyr Phe Ile Lys Phe Asn Thr Leu Glu Thr Asn Tyr
1580 1585 1590

Thr Leu Tyr Val Gly Asn Arg Gln Asn Met Ile Val Glu Pro Asn
1595 1600 1605

Tyr Asp Leu Asp Asp Ser Gly Asp Ile Ser Ser Thr Val Ile Asn
1610 1615 1620

Phe Ser Gln Lys Tyr Leu Tyr Gly Ile Asp Ser Cys Val Asn Lys
1625 1630 1635

Val Val Ile Ser Pro Asn Ile Tyr Thr Asp Glu Ile Asn Ile Thr
1640 1645 1650

Pro Val Tyr Glu Thr Asn Asn Thr Tyr Pro Glu Val Ile Val Leu
1655 1660 1665

Asp Ala Asn Tyr Ile Asn Glu Lys Ile Asn Val Asn Ile Asn Asp
1670 1675 1680

Leu Ser Ile Arg Tyr Val Trp Ser Asn Asp Gly Asn Asp Phe Ile
1685 1690 1695

Leu Met Ser Thr Ser Glu Glu Asn Lys Val Ser Gln Val Lys Ile
1700 1705 1710

Arg Phe Val Asn Val Phe Lys Asp Lys Thr Leu Ala Asn Lys Leu
1715 1720 1725

Ser Phe Asn Phe Ser Asp Lys Gln Asp Val Pro Val Ser Glu Ile
1730 1735 1740

Ile Leu Ser Phe Thr Pro Ser Tyr Tyr Glu Asp Gly Leu Ile Gly
1745 1750 1755

Tyr Asp Leu Gly Leu Val Ser Leu Tyr Asn Glu Lys Phe Tyr Ile
1760 1765 1770

Asn Asn Phe Gly Met Met Val Ser Gly Leu Ile Tyr Ile Asn Asp
1775 1780 1785

Ser Leu Tyr Tyr Phe Lys Pro Pro Val Asn Asn Leu Ile Thr Gly

1790 1795 1800

Phe Val Thr Val Gly Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn
1805 1810 1815

Gly Gly Ala Ala Ser Ile Gly Glu Thr Ile Ile Asp Asp Lys Asn
1820 1825 1830

Tyr Tyr Phe Asn Gln Ser Gly Val Leu Gln Thr Gly Val Phe Ser
1835 1840 1845

Thr Glu Asp Gly Phe Lys Tyr Phe Ala Pro Ala Asn Thr Leu Asp
1850 1855 1860

Glu Asn Leu Glu Gly Glu Ala Ile Asp Phe Thr Gly Lys Leu Ile
1865 1870 1875

Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp Asn Tyr Arg Gly Ala
1880 1885 1890

Val Glu Trp Lys Glu Leu Asp Gly Glu Met His Tyr Phe Ser Pro
1895 1900 1905

Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile Gly Asp Tyr
1910 1915 1920

Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly Phe Val
1925 1930 1935

Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val Met
1940 1945 1950

Lys Val Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala
1955 1960 1965

Glu Asn Gly Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly
1970 1975 1980

Phe Lys Tyr Phe Ala His His Asn Glu Asp Leu Gly Asn Glu Glu
1985 1990 1995

Gly Glu Glu Ile Ser Tyr Ser Gly Ile Leu Asn Phe Asn Asn Lys
2000 2005 2010

Ile Tyr Tyr Phe Asp Asp Ser Phe Thr Ala Val Val Gly Trp Lys
2015 2020 2025

Asp Leu Glu Asp Gly Ser Lys Tyr Tyr Phe Asp Glu Asp Thr Ala
2030 2035 2040

Glu Ala Tyr Ile Gly Leu Ser Leu Ile Asn Asp Gly Gln Tyr Tyr

2045 2050 2055

Phe Asn Asp Asp Gly Ile Met Gln Val Gly Phe Val Thr Ile Asn
2060 2065 2070

Asp Lys Val Phe Tyr Phe Ser Asp Ser Gly Ile Ile Glu Ser Gly
2075 2080 2085

Val Gln Asn Ile Asp Asp Asn Tyr Phe Tyr Ile Asp Asp Asn Gly
2090 2095 2100

Ile Val Gln Ile Gly Val Phe Asp Thr Ser Asp Gly Tyr Lys Tyr
2105 2110 2115

Phe Ala Pro Ala Asn Thr Val Asn Asp Asn Ile Tyr Gly Gln Ala
2120 2125 2130

Val Glu Tyr Ser Gly Leu Val Arg Val Gly Glu Asp Val Tyr Tyr
2135 2140 2145

Phe Gly Glu Thr Tyr Thr Ile Glu Thr Gly Trp Ile Tyr Asp Met
2150 2155 2160

Glu Asn Glu Ser Asp Lys Tyr Tyr Phe Asn Pro Glu Thr Lys Lys
2165 2170 2175

Ala Cys Lys Gly Ile Asn Leu Ile Asp Asp Ile Lys Tyr Tyr Phe
2180 2185 2190

Asp Glu Lys Gly Ile Met Arg Thr Gly Leu Ile Ser Phe Glu Asn
2195 2200 2205

Asn Asn Tyr Tyr Phe Asn Glu Asn Gly Glu Met Gln Phe Gly Tyr
2210 2215 2220

Ile Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly Val
2225 2230 2235

Met Gln Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe
2240 2245 2250

Ala His Gln Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile
2255 2260 2265

Asn Tyr Thr Gly Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe
2270 2275 2280

Thr Asp Glu Tyr Ile Ala Ala Thr Gly Ser Val Ile Ile Asp Gly
2285 2290 2295

Glu Glu Tyr Tyr Phe Asp Pro Asp Thr Ala Gln Leu Val Ile Ser

2300 2305 2310

Glu Gly His His His His His His
2315 2320

<210> 58
<211> 2099
<212> PRT
<213> Clostridium difficile

<400> 58

Met Gly Ser Ser His His His His His His Ser His Met Ala Ser Asp
1 5 10 15

Lys Ile Ile His Leu Thr Asp Asp Ser Phe Asp Thr Asp Val Leu Lys
20 25 30

Ala Asp Gly Ala Ile Leu Val Asp Phe Trp Ala Glu Trp Cys Gly Pro
35 40 45

Cys Lys Met Ile Ala Pro Ile Leu Asp Glu Ile Ala Asp Glu Tyr Gln
50 55 60

Gly Lys Leu Thr Val Ala Lys Leu Asn Ile Asp Gln Asn Pro Gly Thr
65 70 75 80

Ala Pro Lys Tyr Gly Ile Arg Gly Ile Pro Thr Leu Leu Leu Phe Lys
85 90 95

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

Leu Lys Glu Phe Leu Asp Ala Asn Leu Ala Arg Ala Leu Glu Val Leu
115 120 125

Phe Gln Gly Pro Gly Gly Ser Ala Asp Ala Arg Ala Lys Ala Gln Phe
130 135 140

Glu Glu Tyr Lys Arg Asn Tyr Phe Glu Gly Ala Gly Gly Ser Ile Met
145 150 155 160

Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe Asp Ser Ile Asp Asn
165 170 175

Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly Leu Ala Ser Ile Ser
180 185 190

Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser Val Ser Pro Asp Thr
195 200 205

Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile Glu Ser Ser Ile Gly
210 215 220

```
Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val Lys Asn Ile Ile His
225                 230                 235                 240

Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn Leu Leu Glu Asn Val
                245                 250                 255

Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn Asn Leu Asp Glu Lys
            260                 265                 270

Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn Asn Ser Thr Tyr Ser
        275                 280                 285

Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser Val Tyr Val Glu Thr
    290                 295                 300

Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His Ile Thr Lys Glu Ile
305                 310                 315                 320

Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val Asn Gly Asn Leu Leu
                325                 330                 335

Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val Asn Thr Leu Asn Ala
            340                 345                 350

Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser Ser Asn Lys Asp Val
        355                 360                 365

Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln Leu Tyr Ala Gln Leu
    370                 375                 380

Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser Ile Gln Leu Val Asn
385                 390                 395                 400

Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn Val Leu Pro Thr Ile
                405                 410                 415

Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu Asp Gly Ile Asn Leu
            420                 425                 430

Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His Asp Pro Leu Leu Lys
        435                 440                 445

Lys Glu Leu Glu Ala Lys Val Gly Val Leu Ala Ile Asn Met Ser Leu
    450                 455                 460

Ser Ile Ala Ala Thr Val Ala Ser Ile Val Gly Ile Gly Ala Glu Val
465                 470                 475                 480

Thr Ile Phe Leu Leu Pro Ile Ala Gly Ile Ser Ala Gly Ile Pro Ser
                485                 490                 495
```

```
Leu Val Asn Asn Glu Leu Ile Leu His Asp Lys Ala Thr Ser Val Val
            500                 505                 510

Asn Tyr Phe Asn His Leu Ser Glu Ser Lys Lys Tyr Gly Pro Leu Lys
        515                 520                 525

Thr Glu Asp Asp Lys Ile Leu Val Pro Ile Asp Asp Leu Val Ile Ser
    530                 535                 540

Glu Ile Asp Phe Asn Asn Asn Ser Ile Lys Leu Gly Thr Cys Asn Ile
545                 550                 555                 560

Leu Ala Met Glu Gly Gly Ser Gly His Thr Val Thr Gly Asn Ile Asp
                565                 570                 575

His Phe Phe Ser Ser Pro Ser Ile Ser Ser His Ile Pro Ser Leu Ser
            580                 585                 590

Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn Leu Asp Phe Ser Lys
        595                 600                 605

Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg Val Phe Trp Trp Glu
    610                 615                 620

Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu Asn Asp Gly Thr Arg
625                 630                 635                 640

Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly Lys Phe Tyr Trp Arg
                645                 650                 655

Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr Leu Lys Pro Val Tyr
            660                 665                 670

Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys Asp Thr Arg Asn Phe
        675                 680                 685

Ile Met Pro Thr Ile Thr Thr Asn Glu Ile Arg Asn Lys Leu Ser Tyr
    690                 695                 700

Ser Phe Asp Gly Ala Gly Gly Thr Tyr Ser Leu Leu Leu Ser Ser Tyr
705                 710                 715                 720

Pro Ile Ser Thr Asn Ile Asn Leu Ser Lys Asp Asp Leu Trp Ile Phe
                725                 730                 735

Asn Ile Asp Asn Glu Val Arg Glu Ile Ser Ile Glu Asn Gly Thr Ile
            740                 745                 750

Lys Lys Gly Lys Leu Ile Lys Asp Val Leu Ser Lys Ile Asp Ile Asn
        755                 760                 765
```

```
Lys Asn Lys Leu Ile Ile Gly Asn Gln Thr Ile Asp Phe Ser Gly Asp
    770                 775                 780

Ile Asp Asn Lys Asp Arg Tyr Ile Phe Leu Thr Cys Glu Leu Asp Asp
785                 790                 795                 800

Lys Ile Ser Leu Ile Ile Glu Ile Asn Leu Val Ala Lys Ser Tyr Ser
                805                 810                 815

Leu Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile Ser Asn Leu Ser Asn
            820                 825                 830

Ile Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp Ser Lys Asn Ile Ala
        835                 840                 845

Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr Phe Gly Ala Ile Ser
    850                 855                 860

Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys Lys Asp Ser Lys Asn
865                 870                 875                 880

Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu Phe Asn Ser Lys Asp
                885                 890                 895

Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys Asp Asp Ile Asn Thr
            900                 905                 910

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

Phe Ser Ile Ser Leu Val Ser Lys Asn Gln Val Lys Val Asn Gly Leu
    930                 935                 940

Tyr Leu Asn Glu Ser Val Tyr Ser Ser Tyr Leu Asp Phe Val Lys Asn
945                 950                 955                 960

Ser Asp Gly His His Asn Thr Ser Asn Phe Met Asn Leu Phe Leu Asp
                965                 970                 975

Asn Ile Ser Phe Trp Lys Leu Phe Gly Phe Glu Asn Ile Asn Phe Val
            980                 985                 990

Ile Asp Lys Tyr Phe Thr Leu Val  Gly Lys Thr Asn Leu  Gly Tyr Val
        995                 1000                1005

Glu Phe  Ile Cys Asp Asn Asn  Lys Asn Ile Asp Ile  Tyr Phe Gly
    1010                1015                1020

Glu Trp  Lys Thr Ser Ser Ser  Lys Ser Thr Ile Phe  Ser Gly Asn
    1025                1030                1035
```

```
Gly Arg  Asn Val Val Val Glu  Pro Ile Tyr Asn Pro  Asp Thr Gly
    1040                1045                1050

Glu Asp  Ile Ser Thr Ser Leu  Asp Phe Ser Tyr Glu  Pro Leu Tyr
    1055                1060                1065

Gly Ile  Asp Arg Tyr Ile Asn  Lys Val Leu Ile Ala  Pro Asp Leu
    1070                1075                1080

Tyr Thr  Ser Leu Ile Asn Ile  Asn Thr Asn Tyr Tyr  Ser Asn Glu
    1085                1090                1095

Tyr Tyr  Pro Glu Ile Ile Val  Leu Asn Pro Asn Thr  Phe His Lys
    1100                1105                1110

Lys Val  Asn Ile Asn Leu Asp  Ser Ser Ser Phe Glu  Tyr Lys Trp
    1115                1120                1125

Ser Thr  Glu Gly Ser Asp Phe  Ile Leu Val Arg Tyr  Leu Glu Glu
    1130                1135                1140

Ser Asn  Lys Lys Ile Leu Gln  Lys Ile Arg Ile Lys  Gly Ile Leu
    1145                1150                1155

Ser Asn  Thr Gln Ser Phe Asn  Lys Met Ser Ile Asp  Phe Lys Asp
    1160                1165                1170

Ile Lys  Lys Leu Ser Leu Gly  Tyr Ile Met Ser Asn  Phe Lys Ser
    1175                1180                1185

Phe Asn  Ser Glu Asn Glu Leu  Asp Arg Asp His Leu  Gly Phe Lys
    1190                1195                1200

Ile Ile  Asp Asn Lys Thr Tyr  Tyr Tyr Asp Glu Asp  Ser Lys Leu
    1205                1210                1215

Val Lys  Gly Leu Ile Asn Ile  Asn Asn Ser Leu Phe  Tyr Phe Asp
    1220                1225                1230

Pro Ile  Glu Phe Asn Leu Val  Thr Gly Trp Gln Thr  Ile Asn Gly
    1235                1240                1245

Lys Lys  Tyr Tyr Phe Asp Ile  Asn Thr Gly Ala Ala  Leu Ile Ser
    1250                1255                1260

Tyr Lys  Ile Ile Asn Gly Lys  His Phe Tyr Phe Asn  Asn Asp Gly
    1265                1270                1275

Val Met  Gln Leu Gly Val Phe  Lys Gly Pro Asp Gly  Phe Glu Tyr
    1280                1285                1290
```

```
Phe Ala  Pro Ala Asn Thr Gln  Asn Asn Asn Ile Glu  Gly Gln Ala
    1295                 1300                 1305

Ile Val  Tyr Gln Ser Lys Phe  Leu Thr Leu Asn Gly  Lys Lys Tyr
    1310                 1315                 1320

Tyr Phe  Asp Asn Asp Ser Lys  Ala Val Thr Gly Trp  Arg Ile Ile
    1325                 1330                 1335

Asn Asn  Glu Lys Tyr Tyr Phe  Asn Pro Asn Asn Ala  Ile Ala Ala
    1340                 1345                 1350

Val Gly  Leu Gln Val Ile Asp  Asn Asn Lys Tyr Tyr  Phe Asn Pro
    1355                 1360                 1365

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

Arg Tyr  Tyr Phe Asp Thr Asp  Thr Ala Ile Ala Phe  Asn Gly Tyr
    1385                 1390                 1395

Lys Thr  Ile Asp Gly Lys His  Phe Tyr Phe Asp Ser  Asp Cys Val
    1400                 1405                 1410

Val Lys  Ile Gly Val Phe Ser  Thr Ser Asn Gly Phe  Glu Tyr Phe
    1415                 1420                 1425

Ala Pro  Ala Asn Thr Tyr Asn  Asn Asn Ile Glu Gly  Gln Ala Ile
    1430                 1435                 1440

Val Tyr  Gln Ser Lys Phe Leu  Thr Leu Asn Gly Lys  Lys Tyr Tyr
    1445                 1450                 1455

Phe Asp  Asn Asn Ser Lys Ala  Val Thr Gly Trp Gln  Thr Ile Asp
    1460                 1465                 1470

Ser Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr Ala Glu  Ala Ala Thr
    1475                 1480                 1485

Gly Trp  Gln Thr Ile Asp Gly  Lys Lys Tyr Tyr Phe  Asn Thr Asn
    1490                 1495                 1500

Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr Ile Asp  Gly Lys Lys
    1505                 1510                 1515

Tyr Tyr  Phe Asn Thr Asn Thr  Ala Ile Ala Ser Thr  Gly Tyr Thr
    1520                 1525                 1530

Ile Ile  Asn Gly Lys His Phe  Tyr Phe Asn Thr Asp  Gly Ile Met
    1535                 1540                 1545
```

```
Gln Ile  Gly Val Phe Lys Gly  Pro Asn Gly Phe Glu  Tyr Phe Ala
    1550                1555                1560

Pro Ala  Asn Thr Asp Ala Asn  Asn Ile Glu Gly Gln  Ala Ile Leu
    1565                1570                1575

Tyr Gln  Asn Glu Phe Leu Thr  Leu Asn Gly Lys Lys  Tyr Tyr Phe
    1580                1585                1590

Gly Ser  Asp Ser Lys Ala Val  Thr Gly Trp Arg Ile  Ile Asn Asn
    1595                1600                1605

Lys Lys  Tyr Tyr Phe Asn Pro  Asn Asn Ala Ile Ala  Ala Ile His
    1610                1615                1620

Leu Cys  Thr Ile Asn Asn Asp  Lys Tyr Tyr Phe Ser  Tyr Asp Gly
    1625                1630                1635

Ile Leu  Gln Asn Gly Tyr Ile  Thr Ile Glu Arg Asn  Asn Phe Tyr
    1640                1645                1650

Phe Asp  Ala Asn Asn Glu Ser  Lys Met Val Thr Gly  Val Phe Lys
    1655                1660                1665

Gly Pro  Asn Gly Phe Glu Tyr  Phe Ala Pro Ala Asn  Thr His Asn
    1670                1675                1680

Asn Asn  Ile Glu Gly Gln Ala  Ile Val Tyr Gln Asn  Lys Phe Leu
    1685                1690                1695

Thr Leu  Asn Gly Lys Lys Tyr  Tyr Phe Asp Asn Asp  Ser Lys Ala
    1700                1705                1710

Val Thr  Gly Trp Gln Thr Ile  Asp Gly Lys Lys Tyr  Tyr Phe Asn
    1715                1720                1725

Leu Asn  Thr Ala Glu Ala Ala  Thr Gly Trp Gln Thr  Ile Asp Gly
    1730                1735                1740

Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala Glu Ala  Ala Thr Gly
    1745                1750                1755

Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr
    1760                1765                1770

Phe Ile  Ala Ser Thr Gly Tyr  Thr Ser Ile Asn Gly  Lys His Phe
    1775                1780                1785

Tyr Phe  Asn Thr Asp Gly Ile  Met Gln Ile Gly Val  Phe Lys Gly
    1790                1795                1800
```

```
Pro Asn  Gly Phe Glu Tyr Phe  Ala Pro Ala Asn Thr  His Asn Asn
    1805                 1810                 1815

Asn Ile  Glu Gly Gln Ala Ile  Leu Tyr Gln Asn Lys  Phe Leu Thr
    1820                 1825                 1830

Leu Asn  Gly Lys Lys Tyr Tyr  Phe Gly Ser Asp Ser  Lys Ala Val
    1835                 1840                 1845

Thr Gly  Leu Arg Thr Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr
    1850                 1855                 1860

Asn Thr  Ala Val Ala Val Thr  Gly Trp Gln Thr Ile  Asn Gly Lys
    1865                 1870                 1875

Lys Tyr  Tyr Phe Asn Thr Asn  Thr Ser Ile Ala Ser  Thr Gly Tyr
    1880                 1885                 1890

Thr Ile  Ile Ser Gly Lys His  Phe Tyr Phe Asn Thr  Asp Gly Ile
    1895                 1900                 1905

Met Gln  Ile Gly Val Phe Lys  Gly Pro Asp Gly Phe  Glu Tyr Phe
    1910                 1915                 1920

Ala Pro  Ala Asn Thr Asp Ala  Asn Asn Ile Glu Gly  Gln Ala Ile
    1925                 1930                 1935

Arg Tyr  Gln Asn Arg Phe Leu  Tyr Leu His Asp Asn  Ile Tyr Tyr
    1940                 1945                 1950

Phe Gly  Asn Asn Ser Lys Ala  Ala Thr Gly Trp Val  Thr Ile Asp
    1955                 1960                 1965

Gly Asn  Arg Tyr Tyr Phe Glu  Pro Asn Thr Ala Met  Gly Ala Asn
    1970                 1975                 1980

Gly Tyr  Lys Thr Ile Asp Asn  Lys Asn Phe Tyr Phe  Arg Asn Gly
    1985                 1990                 1995

Leu Pro  Gln Ile Gly Val Phe  Lys Gly Ser Asn Gly  Phe Glu Tyr
    2000                 2005                 2010

Phe Ala  Pro Ala Asn Thr Asp  Ala Asn Asn Ile Glu  Gly Gln Ala
    2015                 2020                 2025

Ile Arg  Tyr Gln Asn Arg Phe  Leu His Leu Leu Gly  Lys Ile Tyr
    2030                 2035                 2040

Tyr Phe  Gly Asn Asn Ser Lys  Ala Val Thr Gly Trp  Gln Thr Ile
    2045                 2050                 2055
```

Asn Gly Lys Val Tyr Tyr Phe Met Pro Asp Thr Ala Met Ala Ala
2060 2065 2070

Ala Gly Gly Leu Phe Glu Ile Asp Gly Val Ile Tyr Phe Phe Gly
2075 2080 2085

Val Asp Gly Val Lys Ala Pro Gly Ile Tyr Gly
2090 2095

<210> 59
<211> 1783
<212> PRT
<213> Clostridium difficile

<400> 59

Met Gly Ser Ser His His His His His His Ser His Met Ala Ser Asp
1 5 10 15

Lys Ile Ile His Leu Thr Asp Asp Ser Phe Asp Thr Asp Val Leu Lys
20 25 30

Ala Asp Gly Ala Ile Leu Val Asp Phe Trp Ala Glu Trp Cys Gly Pro
35 40 45

Cys Lys Met Ile Ala Pro Ile Leu Asp Glu Ile Ala Asp Glu Tyr Gln
50 55 60

Gly Lys Leu Thr Val Ala Lys Leu Asn Ile Asp Gln Asn Pro Gly Thr
65 70 75 80

Ala Pro Lys Tyr Gly Ile Arg Gly Ile Pro Thr Leu Leu Leu Phe Lys
85 90 95

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

Leu Lys Glu Phe Leu Asp Ala Asn Leu Ala Arg Ala Leu Val Pro Arg
115 120 125

Gly Ser Gly Gly Ser Ala Asp Ala Arg Ala Lys Ala Gln Phe Glu Glu
130 135 140

Tyr Lys Arg Asn Tyr Phe Glu Gly Ala Gly Gly Ser Ala Ala Ala Pro
145 150 155 160

Phe Thr Met Ile Met Ser Asp Leu Ser Ser Lys Glu Tyr Ile Phe Phe
165 170 175

Asp Ser Ile Asp Asn Lys Leu Lys Ala Lys Ser Lys Asn Ile Pro Gly
180 185 190

```
Leu Ala Ser Ile Ser Glu Asp Ile Lys Thr Leu Leu Leu Asp Ala Ser
        195                 200                 205

Val Ser Pro Asp Thr Lys Phe Ile Leu Asn Asn Leu Lys Leu Asn Ile
    210                 215                 220

Glu Ser Ser Ile Gly Asp Tyr Ile Tyr Tyr Glu Lys Leu Glu Pro Val
225                 230                 235                 240

Lys Asn Ile Ile His Asn Ser Ile Asp Asp Leu Ile Asp Glu Phe Asn
                245                 250                 255

Leu Leu Glu Asn Val Ser Asp Glu Leu Tyr Glu Leu Lys Lys Leu Asn
            260                 265                 270

Asn Leu Asp Glu Lys Tyr Leu Ile Ser Phe Glu Asp Ile Ser Lys Asn
        275                 280                 285

Asn Ser Thr Tyr Ser Val Arg Phe Ile Asn Lys Ser Asn Gly Glu Ser
    290                 295                 300

Val Tyr Val Glu Thr Glu Lys Glu Ile Phe Ser Lys Tyr Ser Glu His
305                 310                 315                 320

Ile Thr Lys Glu Ile Ser Thr Ile Lys Asn Ser Ile Ile Thr Asp Val
                325                 330                 335

Asn Gly Asn Leu Leu Asp Asn Ile Gln Leu Asp His Thr Ser Gln Val
            340                 345                 350

Asn Thr Leu Asn Ala Ala Phe Phe Ile Gln Ser Leu Ile Asp Tyr Ser
        355                 360                 365

Ser Asn Lys Asp Val Leu Asn Asp Leu Ser Thr Ser Val Lys Val Gln
    370                 375                 380

Leu Tyr Ala Gln Leu Phe Ser Thr Gly Leu Asn Thr Ile Tyr Asp Ser
385                 390                 395                 400

Ile Gln Leu Val Asn Leu Ile Ser Asn Ala Val Asn Asp Thr Ile Asn
                405                 410                 415

Val Leu Pro Thr Ile Thr Glu Gly Ile Pro Ile Val Ser Thr Ile Leu
            420                 425                 430

Asp Gly Ile Asn Leu Gly Ala Ala Ile Lys Glu Leu Leu Asp Glu His
        435                 440                 445

Asp Pro Leu Leu Lys Lys Glu Leu Glu Ala Lys Val Gly Val Leu Ala
    450                 455                 460
```

```
Ile Asn Met Ser Leu Ser Ile Ala Ala Thr Val Ala Ser Ile Val Gly
465                 470                 475                 480

Ile Gly Ala Glu Val Thr Ile Phe Leu Leu Pro Ile Ala Gly Ile Ser
                485                 490                 495

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

Ala Thr Ser Val Val Asn Tyr Phe Asn His Leu Ser Glu Ser Lys Lys
        515                 520                 525

Tyr Gly Pro Leu Lys Thr Glu Asp Asp Lys Ile Leu Val Pro Ile Asp
    530                 535                 540

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

Gly Thr Cys Asn Ile Leu Ala Met Glu Gly Gly Ser Gly His Thr Val
                565                 570                 575

Thr Gly Asn Ile Asp His Phe Phe Ser Ser Pro Ser Ile Ser Ser His
            580                 585                 590

Ile Pro Ser Leu Ser Ile Tyr Ser Ala Ile Gly Ile Glu Thr Glu Asn
        595                 600                 605

Leu Asp Phe Ser Lys Lys Ile Met Met Leu Pro Asn Ala Pro Ser Arg
    610                 615                 620

Val Phe Trp Trp Glu Thr Gly Ala Val Pro Gly Leu Arg Ser Leu Glu
625                 630                 635                 640

Asn Asp Gly Thr Arg Leu Leu Asp Ser Ile Arg Asp Leu Tyr Pro Gly
                645                 650                 655

Lys Phe Tyr Trp Arg Phe Tyr Ala Phe Phe Asp Tyr Ala Ile Thr Thr
            660                 665                 670

Leu Lys Pro Val Tyr Glu Asp Thr Asn Ile Lys Ile Lys Leu Asp Lys
        675                 680                 685

Asp Thr Arg Asn Phe Ile Met Pro Thr Ile Thr Thr Asn Glu Ile Arg
    690                 695                 700

Asn Lys Leu Ser Tyr Ser Phe Asp Gly Ala Gly Gly Thr Tyr Ser Leu
705                 710                 715                 720

Leu Leu Ser Ser Tyr Pro Ile Ser Thr Asn Ile Asn Leu Ser Lys Asp
                725                 730                 735
```

```
Asp Leu Trp Ile Phe Asn Ile Asp Asn Glu Val Arg Glu Ile Ser Ile
            740                 745                 750

Glu Asn Gly Thr Ile Lys Lys Gly Lys Leu Ile Lys Asp Val Leu Ser
        755                 760                 765

Lys Ile Asp Ile Asn Lys Asn Lys Leu Ile Ile Gly Asn Gln Thr Ile
    770                 775                 780

Asp Phe Ser Gly Asp Ile Asp Asn Lys Asp Arg Tyr Ile Phe Leu Thr
785                 790                 795                 800

Cys Glu Leu Asp Asp Lys Ile Ser Leu Ile Ile Glu Ile Asn Leu Val
                805                 810                 815

Ala Lys Ser Tyr Ser Leu Leu Leu Ser Gly Asp Lys Asn Tyr Leu Ile
            820                 825                 830

Ser Asn Leu Ser Asn Ile Ile Glu Lys Ile Asn Thr Leu Gly Leu Asp
        835                 840                 845

Ser Lys Asn Ile Ala Tyr Asn Tyr Thr Asp Glu Ser Asn Asn Lys Tyr
    850                 855                 860

Phe Gly Ala Ile Ser Lys Thr Ser Gln Lys Ser Ile Ile His Tyr Lys
865                 870                 875                 880

Lys Asp Ser Lys Asn Ile Leu Glu Phe Tyr Asn Asp Ser Thr Leu Glu
                885                 890                 895

Phe Asn Ser Lys Asp Phe Ile Ala Glu Asp Ile Asn Val Phe Met Lys
            900                 905                 910

Asp Asp Ile Asn Thr Ile Thr Gly Lys Tyr Tyr Val Asp Asn Asn Thr
        915                 920                 925

Asp Lys Ser Ile Asp Phe Ser Ile Ser Leu Val Ser Lys Asn Gln Val
    930                 935                 940

Lys Val Asn Gly Leu Tyr Leu Asn Glu Ser Val Tyr Ser Ser Tyr Leu
945                 950                 955                 960

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

Asn Leu Phe Leu Asp Asn Ile Ser Phe Trp Lys Leu Phe Gly Phe Glu
            980                 985                 990

Asn Ile Asn Phe Val Ile Asp Lys  Tyr Phe Thr Leu Val  Gly Lys Thr
        995                 1000                1005
```

```
Asn Leu  Gly Tyr Val Glu Phe  Ile Cys Asp Asn Asn  Lys Asn Ile
    1010                1015                1020

Asp Ile  Tyr Phe Gly Glu Trp  Lys Thr Ser Ser Ser  Lys Ser Thr
    1025                1030                1035

Ile Phe  Ser Gly Asn Gly Arg  Asn Val Val Val Glu  Pro Ile Tyr
    1040                1045                1050

Asn Pro  Asp Thr Gly Glu Asp  Ile Ser Thr Ser Leu  Asp Phe Ser
    1055                1060                1065

Tyr Glu  Pro Leu Tyr Gly Ile  Asp Arg Tyr Ile Asn  Lys Val Leu
    1070                1075                1080

Ile Ala  Pro Asp Leu Tyr Thr  Ser Leu Ile Asn Ile  Asn Thr Asn
    1085                1090                1095

Tyr Tyr  Ser Asn Glu Tyr Tyr  Pro Glu Ile Ile Val  Leu Asn Pro
    1100                1105                1110

Asn Thr  Phe His Lys Lys Val  Asn Ile Asn Leu Asp  Ser Ser Ser
    1115                1120                1125

Phe Glu  Tyr Lys Trp Ser Thr  Glu Gly Ser Asp Phe  Ile Leu Val
    1130                1135                1140

Arg Tyr  Leu Glu Glu Ser Asn  Lys Lys Ile Leu Gln  Lys Ile Arg
    1145                1150                1155

Ile Lys  Gly Ile Leu Ser Asn  Thr Gln Ser Phe Asn  Lys Met Ser
    1160                1165                1170

Ile Asp  Phe Lys Asp Ile Lys  Lys Leu Ser Leu Gly  Tyr Ile Met
    1175                1180                1185

Ser Asn  Phe Lys Ser Phe Asn  Ser Glu Asn Glu Leu  Asp Arg Asp
    1190                1195                1200

His Leu  Gly Phe Lys Ile Ile  Asp Asn Lys Thr Tyr  Tyr Tyr Asp
    1205                1210                1215

Glu Asp  Ser Lys Leu Val Lys  Gly Leu Ile Asn Ile  Asn Asn Ser
    1220                1225                1230

Leu Phe  Tyr Phe Asp Pro Ile  Glu Phe Asn Leu Val  Thr Gly Trp
    1235                1240                1245

Gln Thr  Ile Asn Gly Lys Lys  Tyr Tyr Phe Asp Ile  Asn Thr Gly
    1250                1255                1260
```

```
Ala Ala  Leu Ile Ser Tyr Lys  Ile Ile Asn Gly Lys  His Phe Tyr
    1265                 1270                 1275

Phe Asn  Asn Asp Gly Val Met  Gln Leu Gly Val Phe  Lys Gly Pro
    1280                 1285                 1290

Asp Gly  Phe Glu Tyr Phe Ala  Pro Ala Asn Thr Gln  Asn Asn Asn
    1295                 1300                 1305

Ile Glu  Gly Gln Ala Ile Val  Tyr Gln Ser Lys Phe  Leu Thr Leu
    1310                 1315                 1320

Asn Gly  Lys Lys Tyr Tyr Phe  Asp Asn Asp Ser Lys  Ala Val Thr
    1325                 1330                 1335

Gly Trp  Arg Ile Ile Asn Asn  Glu Lys Tyr Tyr Phe  Asn Pro Asn
    1340                 1345                 1350

Asn Ala  Ile Ala Ala Val Gly  Leu Gln Val Ile Asp  Asn Asn Lys
    1355                 1360                 1365

Tyr Tyr  Phe Asn Pro Asp Thr  Ala Ile Ile Ser Lys  Gly Trp Gln
    1370                 1375                 1380

Thr Val  Asn Gly Ser Arg Tyr  Tyr Phe Asp Thr Asp  Thr Ala Ile
    1385                 1390                 1395

Ala Phe  Asn Gly Tyr Lys Thr  Ile Asp Gly Lys His  Phe Tyr Phe
    1400                 1405                 1410

Asp Ser  Asp Cys Val Val Lys  Ile Gly Val Phe Ser  Thr Ser Asn
    1415                 1420                 1425

Gly Phe  Glu Tyr Phe Ala Pro  Ala Asn Thr Tyr Asn  Asn Asn Ile
    1430                 1435                 1440

Glu Gly  Gln Ala Ile Val Tyr  Gln Ser Lys Phe Leu  Thr Leu Asn
    1445                 1450                 1455

Gly Lys  Lys Tyr Tyr Phe Asp  Asn Asn Ser Lys Ala  Val Thr Gly
    1460                 1465                 1470

Trp Gln  Thr Ile Asp Ser Lys  Lys Tyr Tyr Phe Asn  Thr Asn Thr
    1475                 1480                 1485

Ala Glu  Ala Ala Thr Gly Trp  Gln Thr Ile Asp Gly  Lys Lys Tyr
    1490                 1495                 1500

Tyr Phe  Asn Thr Asn Thr Ala  Glu Ala Ala Thr Gly  Trp Gln Thr
    1505                 1510                 1515
```

```
Ile Asp  Gly Lys Lys Tyr Tyr  Phe Asn Thr Asn Thr  Ala Ile Ala
    1520                1525                1530

Ser Thr  Gly Tyr Thr Ile Ile  Asn Gly Lys His Phe  Tyr Phe Asn
    1535                1540                1545

Thr Asp  Gly Ile Met Gln Ile  Gly Val Phe Lys Gly  Pro Asn Gly
    1550                1555                1560

Phe Glu  Tyr Phe Ala Pro Ala  Asn Thr Asp Ala Asn  Asn Ile Glu
    1565                1570                1575

Gly Gln  Ala Ile Leu Tyr Gln  Asn Glu Phe Leu Thr  Leu Asn Gly
    1580                1585                1590

Lys Lys  Tyr Tyr Phe Gly Ser  Asp Ser Lys Ala Val  Thr Gly Trp
    1595                1600                1605

Arg Ile  Ile Asn Asn Lys Lys  Tyr Tyr Phe Asn Pro  Asn Asn Ala
    1610                1615                1620

Ile Ala  Ala Ile His Leu Cys  Thr Ile Asn Asn Asp  Lys Tyr Tyr
    1625                1630                1635

Phe Ser  Tyr Asp Gly Ile Leu  Gln Asn Gly Tyr Ile  Thr Ile Glu
    1640                1645                1650

Arg Asn  Asn Phe Tyr Phe Asp  Ala Asn Asn Glu Ser  Lys Met Val
    1655                1660                1665

Thr Gly  Val Phe Lys Gly Pro  Asn Gly Phe Glu Tyr  Phe Ala Pro
    1670                1675                1680

Ala Asn  Thr His Asn Asn Asn  Ile Glu Gly Gln Ala  Ile Val Tyr
    1685                1690                1695

Gln Asn  Lys Phe Leu Thr Leu  Asn Gly Lys Lys Tyr  Tyr Phe Asp
    1700                1705                1710

Asn Asp  Ser Lys Ala Val Thr  Gly Trp Gln Thr Ile  Asp Gly Lys
    1715                1720                1725

Lys Tyr  Tyr Phe Asn Leu Asn  Thr Ala Glu Ala Ala  Thr Gly Trp
    1730                1735                1740

Gln Thr  Ile Asp Gly Lys Lys  Tyr Tyr Phe Asn Leu  Asn Thr Ala
    1745                1750                1755

Glu Ala  Ala Thr Gly Trp Gln  Thr Ile Asp Gly Lys  Lys Tyr Tyr
    1760                1765                1770
```

```
Phe Asn  Thr Asn Thr Phe Ile  Ala Ser Thr
    1775                1780


<210>  60
<211>  31
<212>  PRT
<213>  Clostridium difficile

<400>  60

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1               5                   10                  15


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


<210>  61
<211>  157
<212>  PRT
<213>  Clostridium difficile

<400>  61

Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Lys Tyr Tyr Phe Asp Ile
1               5                   10                  15


Asn Thr Gly Ala Ala Leu Thr Ser Tyr Lys Ile Ile Asn Gly Lys His
            20                  25                  30


Phe Tyr Phe Asn Asn Asp Gly Val Met Gln Leu Gly Val Phe Lys Gly
        35                  40                  45


Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn Thr Gln Asn Asn Asn
    50                  55                  60


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


Gly Lys Lys Tyr Tyr Phe Asp Asn Asn Ser Lys Ala Val Thr Gly Trp
                85                  90                  95


Arg Ile Ile Asn Asn Glu Lys Tyr Tyr Phe Asn Pro Asn Asn Ala Ile
            100                 105                 110


Ala Ala Val Gly Leu Gln Val Ile Asp Asn Asn Lys Tyr Tyr Phe Asn
        115                 120                 125


Pro Asp Thr Ala Ile Ile Ser Lys Gly Trp Gln Thr Val Asn Gly Ser
    130                 135                 140


Arg Tyr Tyr Phe Asp Thr Asp Thr Ala Ile Ala Phe Asn
145                 150                 155


<210>  62
```

<211> 31
<212> PRT
<213> Clostridium difficile

<400> 62

Gly Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1 5 10 15

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

<210> 63
<211> 134
<212> PRT
<213> Clostridium difficile

<400> 63

Gly Tyr Lys Thr Ile Asp Gly Lys His Phe Tyr Phe Asp Ser Asp Cys
1 5 10 15

Val Val Lys Ile Gly Val Phe Ser Thr Ser Asn Gly Phe Glu Tyr Phe
20 25 30

Ala Pro Ala Asn Thr Tyr Asn Asn Asn Ile Glu Gly Gln Ala Ile Val
35 40 45

Tyr Gln Ser Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Asp
50 55 60

Asn Asn Ser Lys Ala Val Thr Gly Leu Gln Thr Ile Asp Ser Lys Lys
65 70 75 80

Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala Thr Gly Trp Gln Thr
85 90 95

Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ala Glu Ala Ala
100 105 110

Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Thr Asn
115 120 125

Thr Ala Ile Ala Ser Thr
130

<210> 64
<211> 31
<212> PRT
<213> Clostridium difficile

<400> 64

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1 5 10 15

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn
20 25 30

<210> 65
<211> 112
<212> PRT
<213> Clostridium difficile

<400> 65

Gly Tyr Thr Ile Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly
1 5 10 15

Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
20 25 30

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu
35 40 45

Tyr Gln Asn Glu Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly
50 55 60

Ser Asp Ser Lys Ala Val Thr Gly Trp Arg Ile Ile Asn Asn Lys Lys
65 70 75 80

Tyr Tyr Phe Asn Pro Asn Asn Ala Ile Ala Ala Ile His Leu Cys Thr
85 90 95

Ile Asn Asn Asp Lys Tyr Tyr Phe Ser Tyr Asp Gly Ile Leu Gln Asn
100 105 110

<210> 66
<211> 31
<212> PRT
<213> Clostridium difficile

<400> 66

Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1 5 10 15

Thr His Asn Asn Asn Ile Glu Gly Gln Ala Ile Val Tyr Gln Asn
20 25 30

<210> 67
<211> 136
<212> PRT
<213> Clostridium difficile

<400> 67

Gly Tyr Ile Thr Ile Glu Arg Asn Asn Phe Tyr Phe Asp Ala Asn Asn
1 5 10 15

Glu Ser Lys Met Val Thr Gly Val Phe Lys Gly Pro Asn Gly Phe Glu
20 25 30

```
Tyr Phe Ala Pro Ala Asn Thr His Asn Asn Asn Ile Glu Gly Gln Ala
        35                  40                  45

Ile Val Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr
    50                  55                  60

Phe Asp Asn Asp Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asp Gly
65                  70                  75                  80

Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu Ala Ala Thr Gly Trp
                85                  90                  95

Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn Leu Asn Thr Ala Glu
            100                 105                 110

Ala Ala Thr Gly Trp Gln Thr Ile Asp Gly Lys Lys Tyr Tyr Phe Asn
        115                 120                 125

Thr Asn Thr Phe Ile Ala Ser Thr
    130                 135
```

<210> 68
<211> 31
<212> PRT
<213> Clostridium difficile

<400> 68

```
Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1               5                   10                  15

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu Tyr Gln Asn
            20                  25                  30
```

<210> 69
<211> 113
<212> PRT
<213> Clostridium difficile

<400> 69

```
Gly Tyr Thr Ser Ile Asn Gly Lys His Phe Tyr Phe Asn Thr Asp Gly
1               5                   10                  15

Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asn Gly Phe Glu Tyr Phe
            20                  25                  30

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Leu
        35                  40                  45

Tyr Gln Asn Lys Phe Leu Thr Leu Asn Gly Lys Lys Tyr Tyr Phe Gly
    50                  55                  60

Ser Asp Ser Lys Ala Val Thr Gly Leu Arg Thr Ile Asp Gly Lys Lys
```

65 70 75 80

Tyr Tyr Phe Asn Thr Asn Thr Ala Val Ala Val Thr Gly Trp Gln Thr
85 90 95

Ile Asn Gly Lys Lys Tyr Tyr Phe Asn Thr Asn Thr Ser Ile Ala Ser
100 105 110

Thr

<210> 70
<211> 31
<212> PRT
<213> Clostridium difficile

<400> 70

Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1 5 10 15

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
20 25 30

<210> 71
<211> 92
<212> PRT
<213> Clostridium difficile

<400> 71

Gly Tyr Thr Ile Ile Ser Gly Lys His Phe Tyr Phe Asn Thr Asp Gly
1 5 10 15

Ile Met Gln Ile Gly Val Phe Lys Gly Pro Asp Gly Phe Glu Tyr Phe
20 25 30

Ala Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg
35 40 45

Tyr Gln Asn Arg Phe Leu Tyr Leu His Asp Asn Ile Tyr Tyr Phe Gly
50 55 60

Asn Asn Ser Lys Ala Ala Thr Gly Trp Val Thr Ile Asp Gly Asn Arg
65 70 75 80

Tyr Tyr Phe Glu Pro Asn Thr Ala Met Gly Ala Asn
85 90

<210> 72
<211> 31
<212> PRT
<213> Clostridium difficile

<400> 72

Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala Pro Ala Asn
1 5 10 15

Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr Gln Asn
20 25 30

<210> 73
<211> 116
<212> PRT
<213> Clostridium difficile

<400> 73

Gly Tyr Lys Thr Ile Asp Asn Lys Asn Phe Tyr Phe Arg Asn Gly Leu
1 5 10 15

Pro Gln Ile Gly Val Phe Lys Gly Ser Asn Gly Phe Glu Tyr Phe Ala
20 25 30

Pro Ala Asn Thr Asp Ala Asn Asn Ile Glu Gly Gln Ala Ile Arg Tyr
35 40 45

Gln Asn Arg Phe Leu His Leu Leu Gly Lys Ile Tyr Tyr Phe Gly Asn
50 55 60

Asn Ser Lys Ala Val Thr Gly Trp Gln Thr Ile Asn Gly Lys Val Tyr
65 70 75 80

Tyr Phe Met Pro Asp Thr Ala Met Ala Ala Ala Gly Gly Leu Phe Glu
85 90 95

Ile Asp Gly Val Ile Tyr Phe Phe Gly Val Asp Gly Val Lys Ala Pro
100 105 110

Gly Ile Tyr Gly
115

<210> 74
<211> 147
<212> PRT
<213> Clostridium difficile

<400> 74

Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
1 5 10 15

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
20 25 30

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
35 40 45

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
50 55 60

```
Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
65                  70                  75                  80

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
                85                  90                  95

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
            100                 105                 110

Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
        115                 120                 125

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
    130                 135                 140

Met Lys Val
145
```

<210> 75
<211> 147
<212> PRT
<213> Clostridium difficile

<400> 75

```
Asp Asp Lys Tyr Tyr Phe Asn Pro Ile Asn Gly Gly Ala Ala Ser Ile
1               5                   10                  15

Gly Glu Thr Ile Ile Asp Asp Lys Asn Tyr Tyr Phe Asn Gln Ser Gly
            20                  25                  30

Val Leu Gln Thr Gly Val Phe Ser Thr Glu Asp Gly Phe Lys Tyr Phe
        35                  40                  45

Ala Pro Ala Asn Thr Leu Asp Glu Asn Leu Glu Gly Glu Ala Ile Asp
    50                  55                  60

Phe Thr Gly Lys Leu Ile Ile Asp Glu Asn Ile Tyr Tyr Phe Asp Asp
65                  70                  75                  80

Asn Tyr Arg Gly Ala Val Glu Trp Lys Glu Leu Asp Gly Glu Met His
                85                  90                  95

Tyr Phe Ser Pro Glu Thr Gly Lys Ala Phe Lys Gly Leu Asn Gln Ile
            100                 105                 110

Gly Asp Tyr Lys Tyr Tyr Phe Asn Ser Asp Gly Val Met Gln Lys Gly
        115                 120                 125

Phe Val Ser Ile Asn Asp Asn Lys His Tyr Phe Asp Asp Ser Gly Val
    130                 135                 140
```

Met Lys Val
145

<210> 76
<211> 30
<212> PRT
<213> Clostridium difficile

<400> 76

Gly Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe Ala His His Asn
1 5 10 15

Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser Tyr Ser
20 25 30

<210> 77
<211> 132
<212> PRT
<213> Clostridium difficile

<400> 77

Gly Tyr Thr Glu Ile Asp Gly Lys His Phe Tyr Phe Ala Glu Asn Gly
1 5 10 15

Glu Met Gln Ile Gly Val Phe Asn Thr Glu Asp Gly Phe Lys Tyr Phe
20 25 30

Ala His His Asn Glu Asp Leu Gly Asn Glu Glu Gly Glu Glu Ile Ser
35 40 45

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

Ser Phe Thr Ala Val Val Gly Trp Lys Asp Leu Glu Asp Gly Ser Lys
65 70 75 80

Tyr Tyr Phe Asp Glu Asp Thr Ala Glu Ala Tyr Ile Gly Leu Ser Leu
85 90 95

Ile Asn Asp Gly Gln Tyr Tyr Phe Asn Asp Asp Gly Ile Met Gln Val
100 105 110

Gly Phe Val Thr Ile Asn Asp Lys Val Phe Tyr Phe Ser Asp Ser Gly
115 120 125

Ile Ile Glu Ser
130

<210> 78
<211> 30
<212> PRT
<213> Clostridium difficile

<400> 78

Gly Val Phe Asp Thr Ser Asp Gly Tyr Lys Tyr Phe Ala Pro Ala Asn
1 5 10 15

Thr Val Asn Asp Asn Ile Tyr Gly Gln Ala Val Glu Tyr Ser
20 25 30

<210> 79
<211> 134
<212> PRT
<213> Clostridium difficile

<400> 79

Gly Val Gln Asn Ile Asp Asp Asn Tyr Phe Tyr Ile Asp Asp Asn Gly
1 5 10 15

Ile Val Gln Ile Gly Val Phe Asp Thr Ser Asp Gly Tyr Lys Tyr Phe
20 25 30

Ala Pro Ala Asn Thr Val Asn Asp Asn Ile Tyr Gly Gln Ala Val Glu
35 40 45

Tyr Ser Gly Leu Val Arg Val Gly Glu Asp Val Tyr Tyr Phe Gly Glu
50 55 60

Thr Tyr Thr Ile Glu Thr Gly Trp Ile Tyr Asp Met Glu Asn Glu Ser
65 70 75 80

Asp Lys Tyr Tyr Phe Asn Pro Glu Thr Lys Lys Ala Cys Lys Gly Ile
85 90 95

Asn Leu Ile Asp Asp Ile Lys Tyr Tyr Phe Asp Glu Lys Gly Ile Met
100 105 110

Arg Thr Gly Leu Ile Ser Phe Glu Asn Asn Asn Tyr Tyr Phe Asn Glu
115 120 125

Asn Gly Glu Met Gln Phe
130

<210> 80
<211> 30
<212> PRT
<213> Clostridium difficile

<400> 80

Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe Ala His Gln Asn
1 5 10 15

Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn Tyr Thr
20 25 30

<210> 81
<211> 93
<212> PRT
<213> Clostridium difficile

<400> 81

Gly Tyr Ile Asn Ile Glu Asp Lys Met Phe Tyr Phe Gly Glu Asp Gly
1 5 10 15

Val Met Gln Ile Gly Val Phe Asn Thr Pro Asp Gly Phe Lys Tyr Phe
20 25 30

Ala His Gln Asn Thr Leu Asp Glu Asn Phe Glu Gly Glu Ser Ile Asn
35 40 45

Tyr Thr Gly Trp Leu Asp Leu Asp Glu Lys Arg Tyr Tyr Phe Thr Asp
50 55 60

Glu Tyr Ile Ala Ala Thr Gly Ser Val Ile Ile Asp Gly Glu Glu Tyr
65 70 75 80

Tyr Phe Asp Pro Asp Thr Ala Gln Leu Val Ile Ser Glu
85 90