eolf-seql

SEQUENCE LISTING

<110> HANSA MEDICAL AB

<120> CYSTEINE PROTEASE

<130> N404881WO

<160> 55

<170> PatentIn version 3.5

<210> 1
<211> 339
<212> PRT
<213> Streptococcus pyogenes

<400> 1

```
Met Arg Lys Arg Cys Tyr Ser Thr Ser Ala Ala Val Leu Ala Ala Val
1               5                  10                  15


Thr Leu Phe Val Leu Ser Val Asp Arg Gly Val Ile Ala Asp Ser Phe
            20                  25                  30


Ser Ala Asn Gln Glu Ile Arg Tyr Ser Glu Val Thr Pro Tyr His Val
        35                  40                  45


Thr Ser Val Trp Thr Lys Gly Val Thr Pro Pro Ala Asn Phe Thr Gln
    50                  55                  60


Gly Glu Asp Val Phe His Ala Pro Tyr Val Ala Asn Gln Gly Trp Tyr
65                  70                  75                  80


Asp Ile Thr Lys Thr Phe Asn Gly Lys Asp Asp Leu Leu Cys Gly Ala
                85                  90                  95


Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp Gln Asn Lys Asp
            100                 105                 110


Gln Ile Lys Arg Tyr Leu Glu Glu His Pro Glu Lys Gln Lys Ile Asn
```

```
        115                 120                 125

Phe Asn Gly Glu Gln Met Phe Asp Val Lys Glu Ala Ile Asp Thr Lys
    130                 135                 140

Asn His Gln Leu Asp Ser Lys Leu Phe Glu Tyr Phe Lys Glu Lys Ala
145                 150                 155                 160

Phe Pro Tyr Leu Ser Thr Lys His Leu Gly Val Phe Pro Asp His Val
                165                 170                 175

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

Pro Thr Pro Val Lys Glu Gly Ser Lys Asp Pro Arg Gly Gly Ile Phe
        195                 200                 205

Asp Ala Val Phe Thr Arg Gly Asp Gln Ser Lys Leu Leu Thr Ser Arg
    210                 215                 220

His Asp Phe Lys Glu Lys Asn Leu Lys Glu Ile Ser Asp Leu Ile Lys
225                 230                 235                 240

Lys Glu Leu Thr Glu Gly Lys Ala Leu Gly Leu Ser His Thr Tyr Ala
                245                 250                 255

Asn Val Arg Ile Asn His Val Ile Asn Leu Trp Gly Ala Asp Phe Asp
            260                 265                 270

Ser Asn Gly Asn Leu Lys Ala Ile Tyr Val Thr Asp Ser Asp Ser Asn
        275                 280                 285

Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly Val Asn Ser Ala Gly
    290                 295                 300

Lys Val Ala Ile Ser Ala Lys Glu Ile Lys Glu Asp Asn Ile Gly Ala
```

305 310 315 320

Gln Val Leu Gly Leu Phe Thr Leu Ser Thr Gly Gln Asp Ser Trp Asn
325 330 335

Gln Thr Asn

<210> 2
<211> 310
<212> PRT
<213> Streptococcus pyogenes

<400> 2

Asp Ser Phe Ser Ala Asn Gln Glu Ile Arg Tyr Ser Glu Val Thr Pro
1 5 10 15

Tyr His Val Thr Ser Val Trp Thr Lys Gly Val Thr Pro Pro Ala Asn
20 25 30

Phe Thr Gln Gly Glu Asp Val Phe His Ala Pro Tyr Val Ala Asn Gln
35 40 45

Gly Trp Tyr Asp Ile Thr Lys Thr Phe Asn Gly Lys Asp Asp Leu Leu
50 55 60

Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp Gln
65 70 75 80

Asn Lys Asp Gln Ile Lys Arg Tyr Leu Glu Glu His Pro Glu Lys Gln
85 90 95

Lys Ile Asn Phe Asn Gly Glu Gln Met Phe Asp Val Lys Glu Ala Ile
100 105 110

Asp Thr Lys Asn His Gln Leu Asp Ser Lys Leu Phe Glu Tyr Phe Lys
115 120 125

```
Glu Lys Ala Phe Pro Tyr Leu Ser Thr Lys His Leu Gly Val Phe Pro
    130                 135                 140

Asp His Val Ile Asp Met Phe Ile Asn Gly Tyr Arg Leu Ser Leu Thr
145                 150                 155                 160

Asn His Gly Pro Thr Pro Val Lys Glu Gly Ser Lys Asp Pro Arg Gly
                165                 170                 175

Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asp Gln Ser Lys Leu Leu
            180                 185                 190

Thr Ser Arg His Asp Phe Lys Glu Lys Asn Leu Lys Glu Ile Ser Asp
        195                 200                 205

Leu Ile Lys Lys Glu Leu Thr Glu Gly Lys Ala Leu Gly Leu Ser His
    210                 215                 220

Thr Tyr Ala Asn Val Arg Ile Asn His Val Ile Asn Leu Trp Gly Ala
225                 230                 235                 240

Asp Phe Asp Ser Asn Gly Asn Leu Lys Ala Ile Tyr Val Thr Asp Ser
                245                 250                 255

Asp Ser Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly Val Asn
            260                 265                 270

Ser Ala Gly Lys Val Ala Ile Ser Ala Lys Glu Ile Lys Glu Asp Asn
        275                 280                 285

Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Thr Gly Gln Asp
    290                 295                 300

Ser Trp Asn Gln Thr Asn
305                 310
```

<210> 3
<211> 349
<212> PRT
<213> Streptococcus pyogenes

<400> 3

```
Met Lys Thr Ile Ala Tyr Pro Asn Lys Pro His Ser Leu Ser Ala Gly
1               5                  10                  15


Leu Leu Thr Ala Ile Ala Ile Phe Ser Leu Ala Ser Ser Asn Ile Thr
            20                  25                  30


Tyr Ala Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu
        35                  40                  45


Val Pro His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Leu
    50                  55                  60


Thr Pro Glu Gln Phe Arg Tyr Asn Asn Glu Asp Val Ile His Ala Pro
65                  70                  75                  80


Tyr Leu Ala His Gln Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly
                85                  90                  95


Lys Asp Asn Leu Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His
            100                 105                 110


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


His Pro Glu Lys Gln Lys Ile Ile Phe Asn Asn Gln Glu Leu Phe Asp
    130                 135                 140


Leu Lys Ala Ala Ile Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu
145                 150                 155                 160
```

```
Phe Asn Tyr Phe Arg Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln
                165                 170                 175

Leu Gly Val Met Pro Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr
            180                 185                 190

Tyr Leu Asn Val Phe Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr
        195                 200                 205

Gln Asp Lys Asp Lys Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg
    210                 215                 220

Gly Asp Gln Thr Thr Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys
225                 230                 235                 240

Gly Leu Asn Asp Ile Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly
                245                 250                 255

Arg Ala Leu Ala Leu Ser His Thr Tyr Ala Asn Val Ser Ile Ser His
            260                 265                 270

Val Ile Asn Leu Trp Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu
        275                 280                 285

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

Lys Tyr Phe Val Gly Ile Asn Ala His Gly His Val Ala Ile Ser Ala
305                 310                 315                 320

Lys Lys Ile Glu Gly Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe
                325                 330                 335

Thr Leu Ser Ser Gly Lys Asp Ile Trp Gln Lys Leu Ser
            340                 345
```

<210> 4
<211> 315
<212> PRT
<213> Streptococcus pyogenes

<400> 4

```
Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro
1               5                  10                  15


His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Leu Thr Pro
            20                  25                  30


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


Ala His Gln Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys Asp
    50                  55                  60


Asn Leu Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp
65                  70                  75                  80


Phe Asp Gln Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His Pro
                85                  90                  95


Glu Lys Gln Lys Ile Ile Phe Asn Asn Gln Glu Leu Phe Asp Leu Lys
            100                 105                 110


Ala Ala Ile Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn
        115                 120                 125


Tyr Phe Arg Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu Gly
    130                 135                 140


Val Met Pro Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu
145                 150                 155                 160
```

Asn Val Phe Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp
165 170 175

Lys Asp Lys Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asp
180 185 190

Gln Thr Thr Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu
195 200 205

Asn Asp Ile Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala
210 215 220

Leu Ala Leu Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile
225 230 235 240

Asn Leu Trp Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile
245 250 255

Tyr Val Thr Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr
260 265 270

Phe Val Gly Ile Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys
275 280 285

Ile Glu Gly Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu
290 295 300

Ser Ser Gly Lys Asp Ile Trp Gln Lys Leu Ser
305 310 315

<210> 5
<211> 313
<212> PRT
<213> Streptococcus pyogenes

<400> 5

Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro

```
1               5                   10                  15

His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Leu Thr Pro
            20                  25                  30

Glu Gln Phe Arg Tyr Asn Asn Glu Asp Val Phe His Ala Pro Tyr Val
        35                  40                  45

Ala Asn Gln Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys Asp
    50                  55                  60

Asn Leu Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp
65                  70                  75                  80

Phe Asp Gln Asn Lys Asp Gln Ile Lys Arg Tyr Leu Glu Glu His Pro
                85                  90                  95

Glu Lys Gln Lys Ile Asn Phe Asn Gly Asp Asn Met Phe Asp Val Lys
            100                 105                 110

Lys Ala Ile Asp Thr Lys Asn His Gln Leu Asp Ser Lys Leu Phe Asn
        115                 120                 125

Tyr Phe Lys Glu Lys Ala Phe Pro Gly Leu Ser Ala Arg Arg Ile Gly
    130                 135                 140

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

Ser Leu Thr Asn His Gly Pro Thr Pro Val Lys Glu Gly Ser Lys Asp
                165                 170                 175

Pro Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asn Gln Ser
            180                 185                 190

Lys Leu Leu Thr Ser Arg His Asp Phe Lys Asn Lys Asn Leu Asn Asp
```

195 200 205

Ile Ser Thr Ile Ile Lys Gln Glu Leu Thr Lys Gly Lys Ala Leu Gly
210 215 220

Leu Ser His Thr Tyr Ala Asn Val Ser Ile Asn His Val Ile Asn Leu
225 230 235 240

Trp Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr Val
245 250 255

Thr Asp Ser Asp Ser Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val
260 265 270

Gly Val Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu
275 280 285

Gly Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Thr
290 295 300

Gly Gln Asp Ser Trp Gln Lys Leu Ser
305 310

<210> 6
<211> 315
<212> PRT
<213> Streptococcus pyogenes

<400> 6

Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro
1 5 10 15

His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Leu Thr Pro
20 25 30

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

```
Ala Asn Gln Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys Asp
    50                  55                  60

Asn Leu Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp
65                  70                  75                  80

Phe Asp Gln Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His Pro
                85                  90                  95

Glu Lys Gln Lys Ile Ile Phe Arg Asn Gln Glu Leu Phe Asp Leu Lys
            100                 105                 110

Glu Ala Ile Arg Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Glu
        115                 120                 125

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

Val Met Pro Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu
145                 150                 155                 160

Asn Val Phe Lys Thr Gln Ser Thr Asp Val Lys Arg Pro Tyr Gln Asp
                165                 170                 175

Lys Asp Lys Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asn
            180                 185                 190

Gln Thr Thr Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu
        195                 200                 205

Asn Asp Ile Ser Thr Ile Ile Lys Glu Glu Leu Thr Lys Gly Arg Ala
    210                 215                 220

Leu Ala Leu Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile
225                 230                 235                 240
```

```
Asn Leu Trp Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile
                245                 250                 255


Tyr Val Thr Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr
            260                 265                 270


Phe Val Gly Ile Asn Lys His Gly His Val Ala Ile Ser Ala Lys Lys
        275                 280                 285


Ile Glu Gly Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu
    290                 295                 300


Ser Ser Gly Lys Asp Ile Trp Gln Lys Leu Asn
305                 310                 315
```

<210> 7
<211> 315
<212> PRT
<213> Streptococcus pyogenes

<400> 7

```
Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro
1               5                   10                  15


His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Leu Thr Pro
            20                  25                  30


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


Ala His Gln Gly Trp Tyr Asp Ile Thr Lys Thr Phe Asn Gly Lys Asp
    50                  55                  60


Asn Leu Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp
65                  70                  75                  80
```

```
Phe Asp Gln Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His Pro
                85                  90                  95

Glu Lys Gln Lys Ile Ile Phe Asn Asn Glu Glu Leu Phe Asp Leu Lys
            100                 105                 110

Ala Ala Ile Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn
        115                 120                 125

Tyr Phe Lys Glu Lys Ala Phe Pro Asn Leu Ser Thr Arg Gln Leu Gly
    130                 135                 140

Val Met Pro Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu
145                 150                 155                 160

Asn Val Phe Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp
                165                 170                 175

Lys Asp Lys Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asn
            180                 185                 190

Gln Thr Thr Leu Leu Thr Ala Arg His Asp Phe Lys Glu Lys Gly Leu
        195                 200                 205

Lys Asp Ile Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala
    210                 215                 220

Leu Ala Leu Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile
225                 230                 235                 240

Asn Leu Trp Gly Ala Asp Phe Asp Ala Glu Gly Asn Leu Lys Ala Ile
                245                 250                 255

Tyr Val Thr Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr
            260                 265                 270
```

```
Phe Val Gly Ile Asn Ala His Gly Lys Val Ala Ile Ser Ala Lys Lys
        275                 280                 285


Ile Glu Gly Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu
    290                 295                 300


Ser Ser Gly Lys Asp Ile Trp Gln Gln Leu Ser
305                 310                 315


<210>  8
<211>  315
<212>  PRT
<213>  Streptococcus pyogenes

<400>  8

Asp Ser Phe Ser Ala Asn Gln Glu Ile Arg Tyr Ser Glu Val Thr Pro
1               5                   10                  15


Tyr His Val Thr Ser Val Trp Thr Lys Gly Val Thr Pro Leu Thr Pro
            20                  25                  30


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


Ala His Gln Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys Asp
    50                  55                  60


Asn Leu Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp
65                  70                  75                  80


Phe Asp Gln Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His Pro
                85                  90                  95


Glu Lys Gln Lys Ile Ile Phe Asn Asn Gln Glu Leu Phe Asp Leu Lys
            100                 105                 110
```

```
Ala Ala Ile Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn
        115                 120                 125

Tyr Phe Arg Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu Gly
    130                 135                 140

Val Met Pro Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu
145                 150                 155                 160

Asn Val Phe Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp
                165                 170                 175

Lys Asp Lys Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asp
            180                 185                 190

Gln Thr Thr Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu
        195                 200                 205

Asn Asp Ile Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala
    210                 215                 220

Leu Ala Leu Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile
225                 230                 235                 240

Asn Leu Trp Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile
                245                 250                 255

Tyr Val Thr Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr
            260                 265                 270

Phe Val Gly Ile Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys
        275                 280                 285

Ile Glu Gly Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu
    290                 295                 300
```

Ser Ser Gly Lys Asp Ile Trp Gln Lys Leu Ser
305 310 315

<210> 9
<211> 295
<212> PRT
<213> Streptococcus pyogenes

<400> 9

Ser Val Trp Thr Lys Gly Val Thr Pro Leu Thr Pro Glu Gln Phe Arg
1 5 10 15

Tyr Asn Asn Glu Asp Val Ile His Ala Pro Tyr Leu Ala His Gln Gly
20 25 30

Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys Asp Asn Leu Leu Cys
35 40 45

Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp Gln Asn
50 55 60

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

Ile Ile Phe Asn Asn Gln Glu Leu Phe Asp Leu Lys Ala Ala Ile Asp
85 90 95

Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn Tyr Phe Arg Asp
100 105 110

Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu Gly Val Met Pro Asp
115 120 125

Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn Val Phe Lys
130 135 140

Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp Lys Asp Lys Arg

145 150 155 160

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

Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu Asn Asp Ile Ser
180 185 190

Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala Leu Ala Leu Ser
195 200 205

His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile Asn Leu Trp Gly
210 215 220

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

Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly Ile
245 250 255

Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu Gly Glu
260 265 270

Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Ser Gly Lys
275 280 285

Asp Ile Trp Gln Lys Leu Ser
290 295

<210> 10
<211> 314
<212> PRT
<213> Streptococcus pyogenes

<400> 10

Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro
1 5 10 15

```
His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Leu Thr Pro
            20                  25                  30

Glu Gln Phe Thr Gln Gly Glu Asp Val Ile His Ala Pro Tyr Leu Ala
        35                  40                  45

His Gln Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys Asp Asn
    50                  55                  60

Leu Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe
65                  70                  75                  80

Asp Gln Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His Pro Glu
                85                  90                  95

Lys Gln Lys Ile Ile Phe Asn Asn Gln Glu Leu Phe Asp Leu Lys Ala
            100                 105                 110

Ala Ile Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn Tyr
        115                 120                 125

Phe Arg Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu Gly Val
    130                 135                 140

Met Pro Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn
145                 150                 155                 160

Val Phe Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp Lys
                165                 170                 175

Asp Lys Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asp Gln
            180                 185                 190

Thr Thr Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu Asn
        195                 200                 205
```

```
Asp Ile Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala Leu
    210                 215                 220

Ala Leu Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile Asn
225                 230                 235                 240

Leu Trp Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr
                245                 250                 255

Val Thr Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe
            260                 265                 270

Val Gly Ile Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys Ile
        275                 280                 285

Glu Gly Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser
    290                 295                 300

Ser Gly Lys Asp Ile Trp Gln Lys Leu Ser
305                 310
```

<210> 11
<211> 312
<212> PRT
<213> Streptococcus pyogenes

<400> 11

```
Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro
1               5                   10                  15

His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Pro Glu Gln
            20                  25                  30

Phe Thr Gln Gly Glu Asp Val Ile His Ala Pro Tyr Leu Ala His Gln
        35                  40                  45
```

```
Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys Asp Asn Leu Leu
    50                  55                  60

Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp Gln
65                  70                  75                  80

Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His Pro Glu Lys Gln
                85                  90                  95

Lys Ile Ile Phe Asn Asn Gln Glu Leu Phe Asp Leu Lys Ala Ala Ile
            100                 105                 110

Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn Tyr Phe Arg
        115                 120                 125

Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu Gly Val Met Pro
    130                 135                 140

Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn Val Phe
145                 150                 155                 160

Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp Lys Asp Lys
                165                 170                 175

Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asp Gln Thr Thr
            180                 185                 190

Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu Asn Asp Ile
        195                 200                 205

Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala Leu Ala Leu
    210                 215                 220

Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile Asn Leu Trp
225                 230                 235                 240
```

```
Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr Val Thr
                245                 250                 255


Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly
            260                 265                 270


Ile Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu Gly
        275                 280                 285


Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Ser Gly
    290                 295                 300


Lys Asp Ile Trp Gln Lys Leu Ser
305                 310
```

<210> 12
<211> 313
<212> PRT
<213> Streptococcus pyogenes

<400> 12

```
Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro
1               5                   10                  15


His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Pro Glu Gln
            20                  25                  30


Phe Arg Tyr Asn Asn Glu Asp Val Ile His Ala Pro Tyr Leu Ala His
        35                  40                  45


Gln Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys Asp Asn Leu
    50                  55                  60


Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp
65                  70                  75                  80
```

```
Gln Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His Pro Glu Lys
                85                  90                  95

Gln Lys Ile Ile Phe Asn Asn Gln Glu Leu Phe Asp Leu Lys Ala Ala
            100                 105                 110

Ile Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn Tyr Phe
        115                 120                 125

Arg Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu Gly Val Met
    130                 135                 140

Pro Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn Val
145                 150                 155                 160

Phe Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp Lys Asp
                165                 170                 175

Lys Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asp Gln Thr
            180                 185                 190

Thr Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu Asn Asp
        195                 200                 205

Ile Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala Leu Ala
    210                 215                 220

Leu Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile Asn Leu
225                 230                 235                 240

Trp Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr Val
                245                 250                 255

Thr Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val
            260                 265                 270
```

Gly Ile Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu
        275   280   285

Gly Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Ser
    290   295   300

Gly Lys Asp Ile Trp Gln Lys Leu Ser
305   310

<210> 13
<211> 312
<212> PRT
<213> Streptococcus pyogenes

<400> 13

Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro
1   5   10   15

His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Pro Glu Gln
            20   25   30

Phe Thr Gln Gly Glu Asp Val Ile His Ala Pro Tyr Leu Ala His Gln
        35   40   45

Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys Asp Asn Leu Leu
    50   55   60

Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp Gln
65   70   75   80

Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His Pro Glu Lys Gln
                85   90   95

Lys Ile Ile Ile Asn Asn Gln Glu Leu Phe Asp Leu Lys Ala Ala Ile
            100   105   110

Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn Tyr Phe Arg

```
        115                 120                 125

Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu Gly Val Met Pro
    130                 135                 140

Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn Val Phe
145                 150                 155                 160

Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp Lys Asp Lys
                165                 170                 175

Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asp Gln Thr Thr
            180                 185                 190

Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu Asn Asp Ile
        195                 200                 205

Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala Leu Ala Leu
    210                 215                 220

Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile Asn Leu Trp
225                 230                 235                 240

Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr Val Thr
                245                 250                 255

Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly
            260                 265                 270

Ile Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu Gly
        275                 280                 285

Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Ser Gly
    290                 295                 300

Lys Asp Ile Trp Gln Lys Leu Ser
```

305 310

<210> 14
<211> 312
<212> PRT
<213> Streptococcus pyogenes

<400> 14

Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro
1 5 10 15

His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Pro Glu Gln
20 25 30

Phe Thr Gln Gly Glu Asp Val Ile His Ala Pro Tyr Leu Ala His Gln
35 40 45

Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys Asp Asn Leu Leu
50 55 60

Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp Gln
65 70 75 80

Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His Pro Glu Lys Gln
85 90 95

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

Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn Tyr Phe Arg
115 120 125

Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu Gly Val Met Pro
130 135 140

Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn Val Phe
145 150 155 160

```
Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp Lys Asp Lys
                165                 170                 175

Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asp Gln Thr Thr
            180                 185                 190

Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu Asn Asp Ile
        195                 200                 205

Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala Leu Ala Leu
    210                 215                 220

Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile Asn Leu Trp
225                 230                 235                 240

Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr Val Thr
                245                 250                 255

Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly
            260                 265                 270

Ile Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu Gly
        275                 280                 285

Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Ser Gly
    290                 295                 300

Lys Asp Ile Trp Gln Lys Leu Ser
305                 310
```

<210> 15
<211> 312
<212> PRT
<213> Streptococcus pyogenes

<400> 15

```
Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro
1               5                  10                  15

His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Pro Glu Gln
            20                  25                  30

Phe Thr Gln Gly Glu Asp Val Ile His Ala Pro Tyr Leu Ala His Gln
        35                  40                  45

Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys Asp Asn Leu Leu
    50                  55                  60

Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp Gln
65                  70                  75                  80

Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His Pro Glu Lys Gln
                85                  90                  95

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

Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn Tyr Phe Arg
        115                 120                 125

Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu Gly Val Met Pro
    130                 135                 140

Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn Val Phe
145                 150                 155                 160

Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp Lys Asp Lys
                165                 170                 175

Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asp Gln Thr Thr
            180                 185                 190
```

```
Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu Asn Asp Ile
        195                 200                 205

Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala Leu Ala Leu
    210                 215                 220

Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile Asn Leu Trp
225                 230                 235                 240

Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr Val Thr
                245                 250                 255

Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly
            260                 265                 270

Ile Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu Gly
        275                 280                 285

Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Ser Gly
    290                 295                 300

Lys Asp Ile Trp Gln Lys Leu Ser
305                 310
```

<210> 16
<211> 312
<212> PRT
<213> Streptococcus pyogenes

<400> 16

```
Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro
1               5                   10                  15

His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Pro Glu Gln
            20                  25                  30
```

```
Phe Thr Gln Gly Glu Asp Val Ile His Ala Pro Tyr Leu Ala Asn Gln
        35                  40                  45

Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys Asp Asn Leu Leu
    50                  55                  60

Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp Gln
65                  70                  75                  80

Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His Pro Glu Lys Gln
                85                  90                  95

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

Arg Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Glu Tyr Phe Arg
        115                 120                 125

Asp Lys Ala Phe Pro Tyr Leu Ser Ala Arg Gln Leu Gly Val Met Pro
    130                 135                 140

Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn Val Phe
145                 150                 155                 160

Lys Thr Gln Ser Thr Asp Val Lys Arg Pro Tyr Gln Asp Lys Asp Lys
                165                 170                 175

Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asn Gln Thr Thr
            180                 185                 190

Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu Asn Asp Ile
        195                 200                 205

Ser Thr Ile Ile Lys Glu Glu Leu Thr Lys Gly Arg Ala Leu Ala Leu
    210                 215                 220
```

```
Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile Asn Leu Trp
225                 230                 235                 240


Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr Val Thr
                245                 250                 255


Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly
            260                 265                 270


Ile Asn Lys His Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu Gly
        275                 280                 285


Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Ser Gly
    290                 295                 300


Lys Asp Ile Trp Gln Lys Leu Asn
305                 310
```

<210> 17
<211> 292
<212> PRT
<213> Streptococcus pyogenes

<400> 17

```
Ser Val Trp Thr Lys Gly Val Thr Pro Pro Glu Gln Phe Thr Gln Gly
1               5                   10                  15


Glu Asp Val Ile His Ala Pro Tyr Leu Ala His Gln Gly Trp Tyr Asp
            20                  25                  30


Ile Thr Lys Ala Phe Asp Gly Lys Asp Asn Leu Leu Cys Gly Ala Ala
        35                  40                  45


Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp Gln Asn Lys Thr Glu
    50                  55                  60


Ile Glu Ala Tyr Leu Ser Lys His Pro Glu Lys Gln Lys Ile Ile Phe
```

```
65                  70                  75                  80

Arg Asn Gln Glu Leu Phe Asp Leu Lys Ala Ala Ile Asp Thr Lys Asp
                85                  90                  95

Ser Gln Thr Asn Ser Gln Leu Phe Asn Tyr Phe Arg Asp Lys Ala Phe
            100                 105                 110

Pro Asn Leu Ser Ala Arg Gln Leu Gly Val Met Pro Asp Leu Val Leu
        115                 120                 125

Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn Val Phe Lys Thr Gln Ser
    130                 135                 140

Thr Asp Val Asn Arg Pro Tyr Gln Asp Lys Asp Lys Arg Gly Gly Ile
145                 150                 155                 160

Phe Asp Ala Val Phe Thr Arg Gly Asn Gln Thr Thr Leu Leu Thr Ala
                165                 170                 175

Arg His Asp Leu Lys Asn Lys Gly Leu Asn Asp Ile Ser Thr Ile Ile
            180                 185                 190

Lys Gln Glu Leu Thr Glu Gly Arg Ala Leu Ala Leu Ser His Thr Tyr
        195                 200                 205

Ala Asn Val Ser Ile Ser His Val Ile Asn Leu Trp Gly Ala Asp Phe
    210                 215                 220

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

Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly Ile Asn Ala His
                245                 250                 255

Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu Gly Glu Asn Ile Gly
```

260 265 270

Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Ser Gly Lys Asp Ile Trp
275 280 285

Gln Lys Leu Ser
290

<210> 18
<211> 312
<212> PRT
<213> Streptococcus pyogenes

<400> 18

Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro
1 5 10 15

His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Pro Glu Gln
20 25 30

Phe Thr Gln Gly Glu Asp Val Ile His Ala Pro Tyr Leu Ala His Gln
35 40 45

Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Ala Asp Asn Leu Leu
50 55 60

Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp Gln
65 70 75 80

Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His Pro Glu Lys Gln
85 90 95

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

Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn Tyr Phe Arg
115 120 125

```
Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu Gly Val Met Pro
    130                 135                 140

Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn Val Phe
145                 150                 155                 160

Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp Lys Asp Lys
                165                 170                 175

Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asn Gln Thr Thr
            180                 185                 190

Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu Asn Asp Ile
        195                 200                 205

Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala Leu Ala Leu
    210                 215                 220

Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile Asn Leu Trp
225                 230                 235                 240

Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr Val Thr
                245                 250                 255

Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly
            260                 265                 270

Ile Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu Gly
        275                 280                 285

Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Ser Gly
    290                 295                 300

Lys Asp Ile Trp Gln Lys Leu Ser
305                 310
```

<210> 19
<211> 292
<212> PRT
<213> Streptococcus pyogenes

<400> 19

```
Ser Val Trp Thr Lys Gly Val Thr Pro Pro Glu Gln Phe Thr Gln Gly
1               5                  10                  15


Glu Asp Val Ile His Ala Pro Tyr Leu Ala His Gln Gly Trp Tyr Asp
            20                  25                  30


Ile Thr Lys Ala Phe Asp Gly Ala Asp Asn Leu Leu Cys Gly Ala Ala
        35                  40                  45


Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp Gln Asn Lys Thr Glu
    50                  55                  60


Ile Glu Ala Tyr Leu Ser Lys His Pro Glu Lys Gln Lys Ile Ile Phe
65                  70                  75                  80


Arg Asn Gln Glu Leu Phe Asp Leu Lys Ala Ala Ile Asp Thr Lys Asp
                85                  90                  95


Ser Gln Thr Asn Ser Gln Leu Phe Asn Tyr Phe Arg Asp Lys Ala Phe
            100                 105                 110


Pro Asn Leu Ser Ala Arg Gln Leu Gly Val Met Pro Asp Leu Val Leu
        115                 120                 125


Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn Val Phe Lys Thr Gln Ser
    130                 135                 140


Thr Asp Val Asn Arg Pro Tyr Gln Asp Lys Asp Lys Arg Gly Gly Ile
145                 150                 155                 160
```

```
Phe Asp Ala Val Phe Thr Arg Gly Asn Gln Thr Thr Leu Leu Thr Ala
                165                 170                 175


Arg His Asp Leu Lys Asn Lys Gly Leu Asn Asp Ile Ser Thr Ile Ile
            180                 185                 190


Lys Gln Glu Leu Thr Glu Gly Arg Ala Leu Ala Leu Ser His Thr Tyr
        195                 200                 205


Ala Asn Val Ser Ile Ser His Val Ile Asn Leu Trp Gly Ala Asp Phe
    210                 215                 220


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


Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly Ile Asn Ala His
                245                 250                 255


Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu Gly Glu Asn Ile Gly
            260                 265                 270


Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Ser Gly Lys Asp Ile Trp
        275                 280                 285


Gln Lys Leu Ser
    290
```

<210> 20
<211> 312
<212> PRT
<213> Streptococcus pyogenes

<400> 20

```
Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro
1               5                   10                  15
```

```
His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Pro Glu Gln
            20                  25                  30

Phe Thr Gln Gly Glu Asp Val Ile His Ala Pro Tyr Leu Ala His Gln
        35                  40                  45

Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys Asp Asn Leu Leu
    50                  55                  60

Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp Gln
65                  70                  75                  80

Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His Pro Glu Lys Gln
                85                  90                  95

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

Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe Asn Tyr Phe Arg
        115                 120                 125

Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu Gly Val Met Pro
    130                 135                 140

Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr Leu Asn Val Phe
145                 150                 155                 160

Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln Asp Lys Asp Lys
                165                 170                 175

Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asn Gln Thr Thr
            180                 185                 190

Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly Leu Asn Asp Ile
        195                 200                 205
```

Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg Ala Leu Ala Leu
210 215 220

Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val Ile Asn Leu Trp
225 230 235 240

Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr Val Thr
245 250 255

Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly
260 265 270

Ile Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu Gly
275 280 285

Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Ser Gly
290 295 300

Lys Asp Ile Trp Gln Lys Leu Ser
305 310

<210> 21
<211> 312
<212> PRT
<213> Streptococcus pyogenes

<400> 21

Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro
1 5 10 15

His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Leu Thr Pro
20 25 30

Glu Gln Phe Thr Gln Gly Glu Asp Val Phe His Ala Pro Tyr Val Ala
35 40 45

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

```
    50                  55                  60

Leu Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe
65                  70                  75                  80

Asp Gln Asn Lys Asp Gln Ile Lys Arg Tyr Leu Glu Glu His Pro Glu
                85                  90                  95

Lys Gln Lys Ile Asn Phe Asn Gly Glu Asn Met Phe Asp Val Lys Lys
            100                 105                 110

Ala Ile Asp Thr Lys Asn His Gln Leu Asp Ser Lys Leu Phe Asn Tyr
        115                 120                 125

Phe Lys Glu Lys Ala Phe Pro Tyr Leu Ser Ala Lys His Leu Gly Val
    130                 135                 140

Phe Pro Asp His Val Ile Asp Met Phe Ile Asn Gly Tyr Arg Leu Ser
145                 150                 155                 160

Leu Thr Asn His Gly Pro Thr Pro Val Lys Glu Gly Ser Lys Asp Pro
                165                 170                 175

Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asn Gln Ser Lys
            180                 185                 190

Leu Leu Thr Ser Arg His Asp Phe Lys Asn Lys Asn Leu Asn Asp Ile
        195                 200                 205

Ser Thr Ile Ile Lys Gln Glu Leu Thr Lys Gly Lys Ala Leu Gly Leu
    210                 215                 220

Ser His Thr Tyr Ala Asn Val Arg Ile Asn His Val Ile Asn Leu Trp
225                 230                 235                 240

Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr Val Thr
```

245 250 255

Asp Ser Asp Ser Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly
260 265 270

Val Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu Gly
275 280 285

Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Thr Gly
290 295 300

Gln Asp Ser Trp Gln Lys Leu Ser
305 310

<210> 22
<211> 312
<212> PRT
<213> Streptococcus pyogenes

<400> 22

Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro
1 5 10 15

His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Leu Thr Pro
20 25 30

Glu Gln Phe Thr Gln Gly Glu Asp Val Phe His Ala Pro Tyr Val Ala
35 40 45

Asn Gln Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys Asp Asn
50 55 60

Leu Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe
65 70 75 80

Asp Gln Asn Lys Asp Gln Ile Lys Arg Tyr Leu Glu Glu His Pro Glu
85 90 95

```
Lys Gln Lys Ile Asn Phe Arg Gly Glu Asn Met Phe Asp Val Lys Glu
            100                 105                 110

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

Phe Lys Glu Lys Ala Phe Pro Tyr Leu Ser Ala Lys His Leu Gly Val
    130                 135                 140

Phe Pro Asp His Val Ile Asp Met Phe Ile Asn Gly Tyr Arg Leu Ser
145                 150                 155                 160

Leu Thr Asn His Gly Pro Thr Pro Val Lys Lys Gly Ser Lys Asp Pro
                165                 170                 175

Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asn Gln Ser Lys
            180                 185                 190

Leu Leu Thr Ser Arg His Asp Phe Lys Asn Lys Asn Leu Asn Asp Ile
        195                 200                 205

Ser Thr Ile Ile Lys Ser Glu Leu Thr Asn Gly Lys Ala Leu Gly Leu
    210                 215                 220

Ser His Thr Tyr Ala Asn Val Arg Ile Asn His Val Ile Asn Leu Trp
225                 230                 235                 240

Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr Val Thr
                245                 250                 255

Asp Ser Asp Ser Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly
            260                 265                 270

Val Asn Lys His Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu Gly
        275                 280                 285
```

```
Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Thr Gly
    290                 295                 300

Gln Asp Ser Trp Gln Lys Leu Asn
305                 310
```

<210> 23
<211> 312
<212> PRT
<213> Streptococcus pyogenes

<400> 23

```
Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro
1               5                   10                  15

His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Leu Thr Pro
            20                  25                  30

Glu Gln Phe Thr Gln Gly Glu Asp Val Phe His Ala Pro Tyr Val Ala
        35                  40                  45

Asn Gln Gly Trp Tyr Asp Ile Thr Lys Thr Phe Asn Gly Lys Asp Asp
    50                  55                  60

Leu Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe
65                  70                  75                  80

Asp Gln Asn Lys Asp Gln Ile Lys Arg Tyr Leu Glu Glu His Pro Glu
                85                  90                  95

Lys Gln Lys Ile Asn Phe Asn Gly Glu Gln Met Phe Asp Val Lys Glu
            100                 105                 110

Ala Ile Asp Thr Lys Asn His Gln Leu Asp Ser Lys Leu Phe Glu Tyr
        115                 120                 125
```

```
Phe Lys Glu Lys Ala Phe Pro Tyr Leu Ser Thr Lys His Leu Gly Val
    130                 135                 140

Phe Pro Asp His Val Ile Asp Met Phe Ile Asn Gly Tyr Arg Leu Ser
145                 150                 155                 160

Leu Thr Asn His Gly Pro Thr Pro Val Lys Glu Gly Ser Lys Asp Pro
                165                 170                 175

Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asn Gln Ser Lys
            180                 185                 190

Leu Leu Thr Ser Arg His Asp Phe Lys Glu Lys Asn Leu Lys Glu Ile
        195                 200                 205

Ser Asp Leu Ile Lys Gln Glu Leu Thr Glu Gly Lys Ala Leu Gly Leu
    210                 215                 220

Ser His Thr Tyr Ala Asn Val Arg Ile Asn His Val Ile Asn Leu Trp
225                 230                 235                 240

Gly Ala Asp Phe Asp Ala Glu Gly Asn Leu Lys Ala Ile Tyr Val Thr
                245                 250                 255

Asp Ser Asp Ser Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly
            260                 265                 270

Val Asn Ala Ala Gly Lys Val Ala Ile Ser Ala Lys Lys Ile Glu Gly
        275                 280                 285

Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Thr Gly
    290                 295                 300

Gln Asp Ser Trp Asn Gln Thr Ser
305                 310
```

<210> 24
<211> 312
<212> PRT
<213> Streptococcus pyogenes

<400> 24

```
Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro
1               5                   10                  15


His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Leu Thr Pro
            20                  25                  30


Glu Gln Phe Thr Gln Gly Glu Asp Val Phe His Ala Pro Tyr Val Ala
        35                  40                  45


Asn Gln Gly Trp Tyr Asp Ile Thr Lys Thr Phe Asn Gly Lys Asp Asp
    50                  55                  60


Leu Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe
65                  70                  75                  80


Asp Gln Asn Lys Asp Gln Ile Lys Arg Tyr Leu Glu Glu His Pro Glu
                85                  90                  95


Lys Gln Lys Ile Asn Phe Arg Gly Glu Gln Met Phe Asp Val Lys Glu
            100                 105                 110


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


Phe Lys Glu Lys Ala Phe Pro Tyr Leu Ser Thr Lys His Leu Gly Val
    130                 135                 140


Phe Pro Asp His Val Ile Asp Met Phe Ile Asn Gly Tyr Arg Leu Ser
145                 150                 155                 160
```

Leu Thr Asn His Gly Pro Thr Pro Val Lys Lys Gly Ser Lys Asp Pro
165 170 175

Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asn Gln Ser Lys
180 185 190

Leu Leu Thr Ser Arg His Asp Phe Lys Glu Lys Asn Leu Lys Glu Ile
195 200 205

Ser Asp Leu Ile Lys Glu Glu Leu Thr Lys Gly Lys Ala Leu Gly Leu
210 215 220

Ser His Thr Tyr Ala Asn Val Arg Ile Asn His Val Ile Asn Leu Trp
225 230 235 240

Gly Ala Asp Phe Asp Ala Glu Gly Asn Leu Lys Ala Ile Tyr Val Thr
245 250 255

Asp Ser Asp Ser Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly
260 265 270

Val Asn Lys Ala Gly Lys Val Ala Ile Ser Ala Lys Lys Ile Glu Gly
275 280 285

Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Thr Gly
290 295 300

Gln Asp Ser Trp Asn Gln Thr Asn
305 310

<210> 25
<211> 310
<212> PRT
<213> Streptococcus pyogenes

<400> 25

Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro

```
1               5                   10                  15

His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Pro Glu Gln
            20                  25                  30

Phe Thr Gln Gly Glu Asp Val Ile His Ala Pro Tyr Val Ala Asn Gln
        35                  40                  45

Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys Asp Asn Leu Leu
    50                  55                  60

Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp Gln
65                  70                  75                  80

Asn Lys Asp Gln Ile Lys Arg Tyr Leu Glu Glu His Pro Glu Lys Gln
                85                  90                  95

Lys Ile Asn Phe Arg Gly Glu Gln Met Phe Asp Val Lys Lys Ala Ile
            100                 105                 110

Asp Thr Lys Asn His Gln Leu Asp Ser Lys Leu Phe Asn Tyr Phe Lys
        115                 120                 125

Glu Lys Ala Phe Pro Gly Leu Ser Ala Arg Arg Ile Gly Val Phe Pro
    130                 135                 140

Asp His Val Ile Asp Met Phe Ile Asn Gly Tyr Arg Leu Ser Leu Thr
145                 150                 155                 160

Asn His Gly Pro Thr Pro Val Lys Glu Gly Ser Lys Asp Pro Arg Gly
                165                 170                 175

Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asn Gln Ser Lys Leu Leu
            180                 185                 190

Thr Ser Arg His Asp Phe Lys Asn Lys Asn Leu Asn Asp Ile Ser Thr
```

195 200 205

Ile Ile Lys Gln Glu Leu Thr Lys Gly Lys Ala Leu Gly Leu Ser His
210 215 220

Thr Tyr Ala Asn Val Ser Ile Asn His Val Ile Asn Leu Trp Gly Ala
225 230 235 240

Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr Val Thr Asp Ser
245 250 255

Asp Ser Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly Val Asn
260 265 270

Ala His Gly His Val Ala Ile Ser Ala Lys Lys Ile Glu Gly Glu Asn
275 280 285

Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Thr Gly Gln Asp
290 295 300

Ser Trp Gln Lys Leu Ser
305 310

<210> 26
<211> 320
<212> PRT
<213> Streptococcus pyogenes

<400> 26

Met Asp Ser Phe Ser Ala Asn Gln Glu Ile Arg Tyr Ser Glu Val Thr
1 5 10 15

Pro Tyr His Val Thr Ser Val Trp Thr Lys Gly Val Thr Pro Pro Ala
20 25 30

Asn Phe Thr Gln Gly Glu Asp Val Phe His Ala Pro Tyr Val Ala Asn
35 40 45

```
Gln Gly Trp Tyr Asp Ile Thr Lys Thr Phe Asn Gly Lys Asp Asp Leu
    50                  55                  60

Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp Trp Phe Asp
65                  70                  75                  80

Gln Asn Lys Asp Gln Ile Lys Arg Tyr Leu Glu Glu His Pro Glu Lys
                85                  90                  95

Gln Lys Ile Asn Phe Asn Gly Glu Gln Met Phe Asp Val Lys Glu Ala
            100                 105                 110

Ile Asp Thr Lys Asn His Gln Leu Asp Ser Lys Leu Phe Glu Tyr Phe
        115                 120                 125

Lys Glu Lys Ala Phe Pro Tyr Leu Ser Thr Lys His Leu Gly Val Phe
    130                 135                 140

Pro Asp His Val Ile Asp Met Phe Ile Asn Gly Tyr Arg Leu Ser Leu
145                 150                 155                 160

Thr Asn His Gly Pro Thr Pro Val Lys Glu Gly Ser Lys Asp Pro Arg
                165                 170                 175

Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asp Gln Ser Lys Leu
            180                 185                 190

Leu Thr Ser Arg His Asp Phe Lys Glu Lys Asn Leu Lys Glu Ile Ser
        195                 200                 205

Asp Leu Ile Lys Lys Glu Leu Thr Glu Gly Lys Ala Leu Gly Leu Ser
    210                 215                 220

His Thr Tyr Ala Asn Val Arg Ile Asn His Val Ile Asn Leu Trp Gly
225                 230                 235                 240
```

```
Ala Asp Phe Asp Ser Asn Gly Asn Leu Lys Ala Ile Tyr Val Thr Asp
                245                 250                 255


Ser Asp Ser Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe Val Gly Val
            260                 265                 270


Asn Ser Ala Gly Lys Val Ala Ile Ser Ala Lys Glu Ile Lys Glu Asp
        275                 280                 285


Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser Thr Gly Gln
    290                 295                 300


Asp Ser Trp Asn Gln Thr Asn Gly Gly Gly His His His His His His
305                 310                 315                 320


<210>  27
<211>  325
<212>  PRT
<213>  Streptococcus pyogenes

<400>  27

Met Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val
1               5                   10                  15


Pro His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Leu Thr
            20                  25                  30


Pro Glu Gln Phe Arg Tyr Asn Asn Glu Asp Val Ile His Ala Pro Tyr
        35                  40                  45


Leu Ala His Gln Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys
    50                  55                  60


Asp Asn Leu Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp
65                  70                  75                  80
```

```
Trp Phe Asp Gln Asn Lys Thr Glu Ile Glu Ala Tyr Leu Ser Lys His
                85                  90                  95

Pro Glu Lys Gln Lys Ile Ile Phe Asn Asn Gln Glu Leu Phe Asp Leu
            100                 105                 110

Lys Ala Ala Ile Asp Thr Lys Asp Ser Gln Thr Asn Ser Gln Leu Phe
        115                 120                 125

Asn Tyr Phe Arg Asp Lys Ala Phe Pro Asn Leu Ser Ala Arg Gln Leu
    130                 135                 140

Gly Val Met Pro Asp Leu Val Leu Asp Met Phe Ile Asn Gly Tyr Tyr
145                 150                 155                 160

Leu Asn Val Phe Lys Thr Gln Ser Thr Asp Val Asn Arg Pro Tyr Gln
                165                 170                 175

Asp Lys Asp Lys Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly
            180                 185                 190

Asp Gln Thr Thr Leu Leu Thr Ala Arg His Asp Leu Lys Asn Lys Gly
        195                 200                 205

Leu Asn Asp Ile Ser Thr Ile Ile Lys Gln Glu Leu Thr Glu Gly Arg
    210                 215                 220

Ala Leu Ala Leu Ser His Thr Tyr Ala Asn Val Ser Ile Ser His Val
225                 230                 235                 240

Ile Asn Leu Trp Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala
                245                 250                 255

Ile Tyr Val Thr Asp Ser Asp Ala Asn Ala Ser Ile Gly Met Lys Lys
            260                 265                 270
```

```
Tyr Phe Val Gly Ile Asn Ala His Gly His Val Ala Ile Ser Ala Lys
        275                 280                 285


Lys Ile Glu Gly Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr
    290                 295                 300


Leu Ser Ser Gly Lys Asp Ile Trp Gln Lys Leu Ser Gly Gly Gly His
305                 310                 315                 320


His His His His His
                325


<210>  28
<211>  323
<212>  PRT
<213>  Streptococcus pyogenes

<400>  28

Met Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val
1               5                   10                  15


Pro His Gln Ile Thr Ser Val Trp Thr Lys Gly Val Thr Pro Leu Thr
            20                  25                  30


Pro Glu Gln Phe Arg Tyr Asn Asn Glu Asp Val Phe His Ala Pro Tyr
        35                  40                  45


Val Ala Asn Gln Gly Trp Tyr Asp Ile Thr Lys Ala Phe Asp Gly Lys
    50                  55                  60


Asp Asn Leu Leu Cys Gly Ala Ala Thr Ala Gly Asn Met Leu His Trp
65                  70                  75                  80


Trp Phe Asp Gln Asn Lys Asp Gln Ile Lys Arg Tyr Leu Glu Glu His
                85                  90                  95
```

```
Pro Glu Lys Gln Lys Ile Asn Phe Asn Gly Asp Asn Met Phe Asp Val
            100                 105                 110

Lys Lys Ala Ile Asp Thr Lys Asn His Gln Leu Asp Ser Lys Leu Phe
        115                 120                 125

Asn Tyr Phe Lys Glu Lys Ala Phe Pro Gly Leu Ser Ala Arg Arg Ile
    130                 135                 140

Gly Val Phe Pro Asp His Val Ile Asp Met Phe Ile Asn Gly Tyr Arg
145                 150                 155                 160

Leu Ser Leu Thr Asn His Gly Pro Thr Pro Val Lys Glu Gly Ser Lys
                165                 170                 175

Asp Pro Arg Gly Gly Ile Phe Asp Ala Val Phe Thr Arg Gly Asn Gln
            180                 185                 190

Ser Lys Leu Leu Thr Ser Arg His Asp Phe Lys Asn Lys Asn Leu Asn
        195                 200                 205

Asp Ile Ser Thr Ile Ile Lys Gln Glu Leu Thr Lys Gly Lys Ala Leu
    210                 215                 220

Gly Leu Ser His Thr Tyr Ala Asn Val Ser Ile Asn His Val Ile Asn
225                 230                 235                 240

Leu Trp Gly Ala Asp Phe Asn Ala Glu Gly Asn Leu Glu Ala Ile Tyr
                245                 250                 255

Val Thr Asp Ser Asp Ser Asn Ala Ser Ile Gly Met Lys Lys Tyr Phe
            260                 265                 270

Val Gly Val Asn Ala His Gly His Val Ala Ile Ser Ala Lys Lys Ile
        275                 280                 285
```

Glu Gly Glu Asn Ile Gly Ala Gln Val Leu Gly Leu Phe Thr Leu Ser
290 295 300

Thr Gly Gln Asp Ser Trp Gln Lys Leu Ser Gly Gly Gly His His His
305 310 315 320

His His His

<210> 29
<211> 11
<212> PRT
<213> Streptococcus pyogenes

<400> 29

Pro Leu Thr Pro Glu Gln Phe Arg Tyr Asn Asn
1 5 10

<210> 30
<211> 8
<212> PRT
<213> Streptococcus pyogenes

<400> 30

Pro Pro Ala Asn Phe Thr Gln Gly
1 5

<210> 31
<211> 20
<212> PRT
<213> Streptococcus pyogenes

<400> 31

Asp Asp Tyr Gln Arg Asn Ala Thr Glu Ala Tyr Ala Lys Glu Val Pro
1 5 10 15

His Gln Ile Thr
20

<210> 32
<211> 20
<212> PRT
<213> Streptococcus pyogenes

<400> 32

Asp Ser Phe Ser Ala Asn Gln Glu Ile Arg Tyr Ser Glu Val Thr Pro
1 5 10 15

Tyr His Val Thr
20

<210> 33
<211> 963
<212> DNA
<213> Streptococcus pyogenes

<400> 33
atggatagtt tttctgctaa tcaagagatt agatattcgg aagtaacacc ttatcacgtt 60

acttccgttt ggaccaaagg agttactcct ccagcaaact tcactcaagg tgaagatgtt 120

tttcacgctc cttatgttgc taaccaagga tggtatgata ttaccaaaac attcaatgga 180

aaagacgatc ttctttgcgg ggctgccaca gcagggaata tgcttcactg gtggttcgat 240

caaaacaaag accaaattaa acgttatttg gaagagcatc cagaaaagca aaaaataaac 300

ttcaatggcg aacagatgtt tgacgtaaaa gaagctatcg acactaaaaa ccaccagcta 360

gatagtaaat tatttgaata ttttaaagaa aaagctttcc cttatctatc tactaaacac 420

ctaggagttt tccctgatca tgtaattgat atgttcatta acggctaccg ccttagtcta 480

actaaccacg gtccaacgcc agtaaaagaa ggtagtaaag atccccgagg tggtattttt 540

gacgccgtat ttacaagagg tgatcaaagt aagctattga caagtcgtca tgattttaaa 600

gaaaaaaatc tcaaagaaat cagtgatctc attaagaaag agttaaccga aggcaaggct 660

ctaggcctat cacacaccta cgctaacgta cgcatcaacc atgttataaa cctgtgggga 720

gctgactttg attctaacgg gaaccttaaa gctatttatg taacagactc tgatagtaat 780

gcatctattg gtatgaagaa atactttgtt ggtgttaatt ccgctggaaa agtagctatt 840

tctgctaaag aaataaaaga agataatata ggtgctcaag tactagggtt atttacactt 900

tcaacagggc aagatagttg gaatcagacc aatggcggtg gccatcatca ccatcaccac 960

taa 963

<210> 34
<211> 978
<212> DNA
<213> Streptococcus pyogenes

<400> 34
atggacgatt accaaaggaa tgctacggaa gcttatgcca aagaagtacc acatcagatc 60

acttctgtat ggaccaaagg tgttacacca ctaacacccg agcagtttcg atataataac 120

gaagatgtga tccatgcgcc atatcttgct catcaaggct ggtacgatat caccaaggcc 180

ttcgatggga aggataatct cttgtgtggc gcagcaacgg caggtaatat gctgcattgg 240

tggtttgatc aaaataaaac agagattgaa gcctatttaa gtaaacaccc tgaaaagcaa 300

aaaatcattt ttaacaacca agagctattt gatttgaaag ctgctatcga taccaaggac 360

agtcaaacca atagtcagct ttttaattat tttagagata aagcctttcc aaatctatca 420

gcacgtcaac tcggggttat gcctgatctt gttctagata tgtttatcaa tggttactac 480

ttaaatgtgt ttaaaacaca gtctactgat gtcaatcgac cttatcagga caaggacaaa 540

cgaggtggta ttttcgatgc tgttttcacc agaggagatc agacaacgct cttgacagct 600

cgtcatgatt taaaaaataa aggactaaat gacatcagca ccattatcaa gcaagaactg 660

actgaaggaa gagcccttgc tttatcacat acctacgcca atgttagcat tagccatgtg 720

attaacttgt ggggagctga ttttaatgct gaaggaaacc ttgaggccat ctatgtcaca 780

gactcagatg ctaatgcgtc tattggtatg aaaaaatatt ttgtcggcat taatgctcat 840

ggacatgtcg ccatttctgc caagaaaata gaaggagaaa acattggcgc tcaagtatta 900

ggcttattta cgctttccag tggcaaggac atttggcaga aactgagcgg cggtggccat 960

catcaccatc accactaa 978

<210> 35
<211> 972
<212> DNA
<213> Streptococcus pyogenes

<400> 35
atggatgatt atcagcgcaa cgcgaccgaa gcgtatgcga aagaagtgcc gcatcagatt 60

accagcgtgt ggaccaaagg cgtgaccccg ctgaccccgg aacagtttcg ctataacaac 120

gaagatgtgt ttcatgcgcc gtatgtggcg aaccagggct ggtatgatat taccaaagcg 180

tttgatggca aagataacct gctgtgcggc gcggcgaccg cgggcaacat gctgcattgg 240

tggtttgatc agaacaaaga tcagattaaa cgctatctgg aagaacatcc ggaaaaacag 300

aaaattaact ttaacggcga taacatgttt gatgtgaaaa aagcgattga taccaaaaac 360

catcagctgg atagcaaact gtttaactat tttaaagaaa aagcgtttcc gggcctgagc 420

gcgcgccgca ttggcgtgtt tccggatcat gtgattgata tgtttattaa cggctatcgc 480

ctgagcctga ccaaccatgg cccgaccccg gtgaaagaag gcagcaaaga tccgcgcggc 540

ggcatttttg atgcggtgtt tacccgcggc aaccagagca aactgctgac cagccgccat 600

gattttaaaa acaaaaacct gaacgatatt agcaccatta ttaaacagga actgaccaaa 660

ggcaaagcgc tgggcctgag ccatacctat gcgaacgtga gcattaacca tgtgattaac 720

ctgtggggcg cggattttaa cgcggaaggc aacctggaag cgatttatgt gaccgatagc 780

gatagcaacg cgagcattgg catgaaaaaa tattttgtgg gcgtgaacgc gcatggccat 840

gtggcgatta gcgcgaaaaa aattgaaggc gaaaacattg gcgcgcaggt gctgggcctg 900

tttaccctga gcaccggcca ggatagctgg cagaaactga gcggcggtgg ccatcatcac 960

catcaccact aa 972

<210> 36
<211> 978
<212> DNA
<213> Streptococcus pyogenes

<400> 36
atggatgatt atcagcgcaa cgcgaccgaa gcgtatgcga aagaagtgcc gcatcagatt 60

accagcgtgt ggaccaaagg cgtgaccccg ctgaccccgg aacagtttcg ctataacaac 120

gaagatgtga ttcatgcgcc gtatctggcg aaccagggct ggtatgatat taccaaagcg 180

tttgatggca aagataacct gctgtgcggc gcggcgaccg cgggcaacat gctgcattgg 240

tggtttgatc agaacaaaac cgaaattgaa gcgtatctga gcaaacatcc ggaaaaacag 300

aaaattattt ttcgcaacca ggaactgttt gatctgaaag aagcgattcg caccaaagat 360

agccagacca acagccagct gtttgaatat tttcgcgata aagcgtttcc gtatctgagc 420

gcgcgccagc tgggcgtgat gccggatctg gtgctggata tgtttattaa cggctattat 480

ctgaacgtgt ttaaaaccca gagcaccgat gtgaaacgcc cgtatcagga taaagataaa 540

cgcggcggca tttttgatgc ggtgtttacc cgcggcaacc agaccaccct gctgaccgcg 600

cgccatgatc tgaaaaacaa aggcctgaac gatattagca ccattattaa agaagaactg 660

accaaaggcc gcgcgctggc gctgagccat acctatgcga acgtgagcat tagccatgtg 720

attaacctgt ggggcgcgga ttttaacgcg gaaggcaacc tggaagcgat ttatgtgacc 780

gatagcgatg cgaacgcgag cattggcatg aaaaaatatt ttgtgggcat taacaaacat 840

ggccatgtgg cgattagcgc gaaaaaaatt gaaggcgaaa acattggcgc gcaggtgctg 900

ggcctgttta ccctgagcag cggcaaagat atttggcaga aactgaacgg cggtggccat 960

catcaccatc accactaa 978

<210> 37
<211> 978
<212> DNA
<213> Streptococcus pyogenes

<400> 37
atggatgatt atcagcgcaa cgcgaccgaa gcgtatgcga aagaagtgcc gcatcagatt 60

accagcgtgt ggaccaaagg cgtgaccccg ctgaccccgg aacagtttcg ctataacaac 120

gaagatgtga ttcatgcgcc gtatctggcg catcagggct ggtatgatat taccaaaacc 180

tttaacggca aagataacct gctgtgcggc gcggcgaccg cgggcaacat gctgcattgg 240

tggtttgatc agaacaaaac cgaaattgaa gcgtatctga gcaaacatcc ggaaaaacag 300

aaaattattt ttaacaacga agaactgttt gatctgaaag cggcgattga taccaaagat 360

agccagacca acagccagct gtttaactat tttaaagaaa aagcgtttcc gaacctgagc 420

acccgccagc tgggcgtgat gccggatctg gtgctggata tgtttattaa cggctattat 480

ctgaacgtgt ttaaaaccca gagcaccgat gtgaaccgcc cgtatcagga taaagataaa 540

cgcggcggca tttttgatgc ggtgtttacc cgcggcaacc agaccaccct gctgaccgcg 600

cgccatgatt ttaaagaaaa aggcctgaaa gatattagca ccattattaa acaggaactg 660

accgaaggcc gcgcgctggc gctgagccat acctatgcga acgtgagcat tagccatgtg 720

attaacctgt ggggcgcgga ttttgatgcg gaaggcaacc tgaaagcgat ttatgtgacc 780

gatagcgatg cgaacgcgag cattggcatg aaaaaatatt ttgtgggcat taacgcgcat 840

ggcaaagtgg cgattagcgc gaaaaaaatt gaaggcgaaa acattggcgc gcaggtgctg 900

ggcctgttta ccctgagcag cggcaaagat atttggcagc agctgagcgg cggtggccat 960

catcaccatc accactaa 978

<210> 38
<211> 978
<212> DNA
<213> Streptococcus pyogenes

<400> 38
atggatagct ttagcgcgaa ccaggaaatt cgctatagcg aagtgacccc gtatcatgtg 60

accagcgtgt ggaccaaagg cgtgaccccg ctgaccccgg aacagtttcg ctataacaac 120

gaagatgtga ttcatgcgcc gtatctggcg catcagggct ggtatgatat taccaaagcg 180

tttgatggca aagataacct gctgtgcggc gcggcgaccg cgggcaacat gctgcattgg 240

tggtttgatc agaacaaaac cgaaattgaa gcgtatctga gcaaacatcc ggaaaaacag 300

aaaattattt ttaacaacca ggaactgttt gatctgaaag cggcgattga taccaaagat 360

agccagacca acagccagct gtttaactat tttcgcgata aagcgtttcc gaacctgagc 420

gcgcgccagc tgggcgtgat gccggatctg gtgctggata tgtttattaa cggctattat 480

ctgaacgtgt ttaaaaccca gagcaccgat gtgaaccgcc cgtatcagga taaagataaa 540

cgcggcggca tttttgatgc ggtgtttacc cgcggcgatc agaccaccct gctgaccgcg 600

cgccatgatc tgaaaaacaa aggcctgaac gatattagca ccattattaa acaggaactg 660

accgaaggcc gcgcgctggc gctgagccat acctatgcga acgtgagcat tagccatgtg 720

attaacctgt ggggcgcgga ttttaacgcg gaaggcaacc tggaagcgat ttatgtgacc 780

gatagcgatg cgaacgcgag cattggcatg aaaaaatatt ttgtgggcat taacgcgcat 840

ggccatgtgg cgattagcgc gaaaaaaatt gaaggcgaaa acattggcgc gcaggtgctg 900

ggcctgttta ccctgagcag cggcaaagat atttggcaga aactgagcgg cggtggccat 960

catcaccatc accactaa 978

<210> 39
<211> 918
<212> DNA
<213> Streptococcus pyogenes

<400> 39
atgagcgtgt ggaccaaagg cgtgaccccg ctgaccccgg aacagtttcg ctataacaac 60

gaagatgtga ttcatgcgcc gtatctggcg catcagggct ggtatgatat taccaaagcg 120

tttgatggca aagataacct gctgtgcggc gcggcgaccg cgggcaacat gctgcattgg 180

tggtttgatc agaacaaaac cgaaattgaa gcgtatctga gcaaacatcc ggaaaaacag 240

aaaattattt ttaacaacca ggaactgttt gatctgaaag cggcgattga taccaaagat 300

agccagacca acagccagct gtttaactat tttcgcgata aagcgtttcc gaacctgagc 360

gcgcgccagc tgggcgtgat gccggatctg gtgctggata tgtttattaa cggctattat 420

ctgaacgtgt ttaaaaccca gagcaccgat gtgaaccgcc cgtatcagga taaagataaa 480

cgcggcggca tttttgatgc ggtgtttacc cgcggcgatc agaccaccct gctgaccgcg 540

cgccatgatc tgaaaaacaa aggcctgaac gatattagca ccattattaa acaggaactg 600

accgaaggcc gcgcgctggc gctgagccat acctatgcga acgtgagcat tagccatgtg 660

attaacctgt ggggcgcgga ttttaacgcg gaaggcaacc tggaagcgat ttatgtgacc 720

gatagcgatg cgaacgcgag cattggcatg aaaaaatatt ttgtgggcat taacgcgcat 780

ggccatgtgg cgattagcgc gaaaaaaatt gaaggcgaaa acattggcgc gcaggtgctg 840

ggcctgttta ccctgagcag cggcaaagat atttggcaga aactgagcgg cggtggccat 900

catcaccatc accactaa 918

<210> 40
<211> 975
<212> DNA
<213> Streptococcus pyogenes

<400> 40
atggacgatt accaaaggaa tgctacggaa gcttatgcca aagaagtacc acatcagatc 60

acttctgtat ggaccaaagg tgttacacca ctaacacccg agcagtttac tcaaggtgaa 120

gatgtgatcc atgcgccata tcttgctcat caaggctggt acgatatcac caaggccttc 180

gatgggaagg ataatctctt gtgtggcgca gcaacggcag gtaatatgct gcattggtgg 240

tttgatcaaa ataaaacaga gattgaagcc tatttaagta aacaccctga aaagcaaaaa 300

atcatttta acaaccaaga gctatttgat ttgaaagctg ctatcgatac caaggacagt 360

caaaccaata gtcagctttt taattatttt agagataaag cctttccaaa tctatcagca 420

cgtcaactcg gggttatgcc tgatcttgtt ctagatatgt ttatcaatgg ttactactta 480

aatgtgttta aaacacagtc tactgatgtc aatcgacctt atcaggacaa ggacaaacga 540

ggtggtattt tcgatgctgt tttcaccaga ggagatcaga caacgctctt gacagctcgt 600

catgatttaa aaaataaagg actaaatgac atcagcacca ttatcaagca agaactgact 660

gaaggaagag cccttgcttt atcacatacc tacgccaatg ttagcattag ccatgtgatt 720

aacttgtggg gagctgattt taatgctgaa ggaaaccttg aggccatcta tgtcacagac 780

tcagatgcta atgcgtctat tggtatgaaa aaatattttg tcggcattaa tgctcatgga 840

catgtcgcca tttctgccaa gaaaatagaa ggagaaaaca ttggcgctca agtattaggc 900

ttatttacgc tttccagtgg caaggacatt tggcagaaac tgagcggcgg tggccatcat 960

caccatcacc actaa 975

<210> 41
<211> 969
<212> DNA
<213> Streptococcus pyogenes

<400> 41
atggacgatt accaaaggaa tgctacggaa gcttatgcca aagaagtacc acatcagatc 60

acttctgtat ggaccaaagg tgttacacca cccgagcagt ttactcaagg tgaagatgtg 120

atccatgcgc catatcttgc tcatcaaggc tggtacgata tcaccaaggc cttcgatggg 180

aaggataatc tcttgtgtgg cgcagcaacg gcaggtaata tgctgcattg gtggtttgat 240

caaaataaaa cagagattga agcctattta agtaaacacc ctgaaaagca aaaaatcatt 300

tttaacaacc aagagctatt tgatttgaaa gctgctatcg ataccaagga cagtcaaacc 360

aatagtcagc tttttaatta ttttagagat aaagcctttc caaatctatc agcacgtcaa 420

ctcggggtta tgcctgatct tgttctagat atgtttatca atggttacta cttaaatgtg 480

tttaaaacac agtctactga tgtcaatcga ccttatcagg acaaggacaa acgaggtggt 540

attttcgatg ctgttttcac cagaggagat cagacaacgc tcttgacagc tcgtcatgat 600

ttaaaaaata aaggactaaa tgacatcagc accattatca agcaagaact gactgaagga 660

agagcccttg ctttatcaca tacctacgcc aatgttagca ttagccatgt gattaacttg 720

tggggagctg attttaatgc tgaaggaaac cttgaggcca tctatgtcac agactcagat 780

gctaatgcgt ctattggtat gaaaaaatat tttgtcggca ttaatgctca tggacatgtc 840

gccatttctg ccaagaaaat agaaggagaa aacattggcg ctcaagtatt aggcttattt 900

acgctttcca gtggcaagga catttggcag aaactgagcg gcggtggcca tcatcaccat 960

caccactaa 969

<210> 42

<211> 972
<212> DNA
<213> Streptococcus pyogenes

<400> 42
atggacgatt accaaaggaa tgctacggaa gcttatgcca aagaagtacc acatcagatc 60

acttctgtat ggaccaaagg tgttacacca cccgagcagt ttcgatataa taacgaagat 120

gtgatccatg cgccatatct tgctcatcaa ggctggtacg atatcaccaa ggccttcgat 180

gggaaggata atctcttgtg tggcgcagca acggcaggta atatgctgca ttggtggttt 240

gatcaaaata aaacagagat tgaagcctat ttaagtaaac accctgaaaa gcaaaaaatc 300

atttttaaca accaagagct atttgatttg aaagctgcta tcgataccaa ggacagtcaa 360

accaatagtc agctttttaa ttattttaga gataaagcct ttccaaatct atcagcacgt 420

caactcgggg ttatgcctga tcttgttcta gatatgttta tcaatggtta ctacttaaat 480

gtgtttaaaa cacagtctac tgatgtcaat cgaccttatc aggacaagga caaacgaggt 540

ggtattttcg atgctgtttt caccagagga gatcagacaa cgctcttgac agctcgtcat 600

gatttaaaaa ataaaggact aaatgacatc agcaccatta tcaagcaaga actgactgaa 660

ggaagagccc ttgctttatc acatacctac gccaatgtta gcattagcca tgtgattaac 720

ttgtggggag ctgattttaa tgctgaagga aaccttgagg ccatctatgt cacagactca 780

gatgctaatg cgtctattgg tatgaaaaaa tattttgtcg gcattaatgc tcatggacat 840

gtcgccattt ctgccaagaa aatagaagga gaaaacattg gcgctcaagt attaggctta 900

tttacgcttt ccagtggcaa ggacatttgg cagaaactga gcggcggtgg ccatcatcac 960

catcaccact aa 972

<210> 43
<211> 969
<212> DNA
<213> Streptococcus pyogenes

<400> 43
atggacgatt accaaaggaa tgctacggaa gcttatgcca aagaagtacc acatcagatc 60

acttctgtat ggaccaaagg tgttacacca cccgagcagt ttactcaagg tgaagatgtg 120

atccatgcgc catatcttgc tcatcaaggc tggtacgata tcaccaaggc cttcgatggg 180

aaggataatc tcttgtgtgg cgcagcaacg gcaggtaata tgctgcattg gtggtttgat 240

caaaataaaa cagagattga agcctattta agtaaacacc ctgaaaagca aaaaatcatt 300

attaacaacc aagagctatt tgatttgaaa gctgctatcg ataccaagga cagtcaaacc 360

aatagtcagc tttttaatta ttttagagat aaagcctttc caaatctatc agcacgtcaa 420

ctcggggtta tgcctgatct tgttctagat atgtttatca atggttacta cttaaatgtg 480

tttaaaacac agtctactga tgtcaatcga ccttatcagg acaaggacaa acgaggtggt 540

attttcgatg ctgttttcac cagaggagat cagacaacgc tcttgacagc tcgtcatgat 600

ttaaaaaata aaggactaaa tgacatcagc accattatca agcaagaact gactgaagga 660

agagcccttg ctttatcaca tacctacgcc aatgttagca ttagccatgt gattaacttg 720

tggggagctg attttaatgc tgaaggaaac cttgaggcca tctatgtcac agactcagat 780

gctaatgcgt ctattggtat gaaaaaatat tttgtcggca ttaatgctca tggacatgtc 840

gccatttctg ccaagaaaat agaaggagaa aacattggcg ctcaagtatt aggcttattt 900

acgctttcca gtggcaagga catttggcag aaactgagcg gcggtggcca tcatcaccat 960

caccactaa 969

<210> 44
<211> 969
<212> DNA
<213> Streptococcus pyogenes

<400> 44
atggacgatt accaaaggaa tgctacggaa gcttatgcca aagaagtacc acatcagatc 60

acttctgtat ggaccaaagg tgttacacca cccgagcagt ttactcaagg tgaagatgtg 120

atccatgcgc catatcttgc tcatcaaggc tggtacgata tcaccaaggc cttcgatggg 180

aaggataatc tcttgtgtgg cgcagcaacg gcaggtaata tgctgcattg gtggtttgat 240

caaaataaaa cagagattga agcctattta agtaaacacc ctgaaaagca aaaaatcatt 300

tttcgtaacc aagagctatt tgatttgaaa gctgctatcg ataccaagga cagtcaaacc 360

aatagtcagc tttttaatta ttttagagat aaagcctttc caaatctatc agcacgtcaa 420

ctcggggtta tgcctgatct tgttctagat atgtttatca atggttacta cttaaatgtg 480

tttaaaacac agtctactga tgtcaatcga ccttatcagg acaaggacaa acgaggtggt 540

attttcgatg ctgttttcac cagaggagat cagacaacgc tcttgacagc tcgtcatgat 600

ttaaaaaata aaggactaaa tgacatcagc accattatca agcaagaact gactgaagga 660

agagcccttg ctttatcaca tacctacgcc aatgttagca ttagccatgt gattaacttg 720

tggggagctg attttaatgc tgaaggaaac cttgaggcca tctatgtcac agactcagat 780

gctaatgcgt ctattggtat gaaaaaatat tttgtcggca ttaatgctca tggacatgtc 840

gccatttctg ccaagaaaat agaaggagaa aacattggcg ctcaagtatt aggcttattt 900

acgctttcca gtggcaagga catttggcag aaactgagcg gcggtggcca tcatcaccat 960

caccactaa 969

<210> 45
<211> 969
<212> DNA
<213> Streptococcus pyogenes

<400> 45
atggacgatt accaaaggaa tgctacggaa gcttatgcca aagaagtacc acatcagatc 60

acttctgtat ggaccaaagg tgttacacca cccgagcagt ttactcaagg tgaagatgtg 120

atccatgcgc catatcttgc tcatcaaggc tggtacgata tcaccaaggc cttcgatggg 180

aaggataatc tcttgtgtgg cgcagcaacg gcaggtaata tgctgcattg gtggtttgat 240

caaaataaaa cagagattga agcctattta agtaaacacc ctgaaaagca aaaaatcatt 300

attcgtaacc aagagctatt tgatttgaaa gctgctatcg ataccaagga cagtcaaacc 360

aatagtcagc tttttaatta ttttagagat aaagcctttc caaatctatc agcacgtcaa 420

ctcggggtta tgcctgatct tgttctagat atgtttatca atggttacta cttaaatgtg 480

tttaaaacac agtctactga tgtcaatcga ccttatcagg acaaggacaa acgaggtggt 540

attttcgatg ctgttttcac cagaggagat cagacaacgc tcttgacagc tcgtcatgat 600

ttaaaaaata aaggactaaa tgacatcagc accattatca agcaagaact gactgaagga 660

agagcccttg ctttatcaca tacctacgcc aatgttagca ttagccatgt gattaacttg 720

tggggagctg attttaatgc tgaaggaaac cttgaggcca tctatgtcac agactcagat 780

gctaatgcgt ctattggtat gaaaaaatat tttgtcggca ttaatgctca tggacatgtc 840

gccatttctg ccaagaaaat agaaggagaa aacattggcg ctcaagtatt aggcttattt 900

acgctttcca gtggcaagga catttggcag aaactgagcg gcggtggcca tcatcaccat 960

caccactaa 969

<210> 46
<211> 969
<212> DNA
<213> Streptococcus pyogenes

<400> 46
atggatgatt atcagcgcaa cgcgaccgaa gcgtatgcga aagaagtgcc gcatcagatt 60

accagcgtgt ggaccaaagg cgtgaccccg ccggaacagt ttactcaagg tgaagatgtg 120

attcatgcgc cgtatctggc gaaccagggc tggtatgata ttaccaaagc gtttgatggc 180

aaagataacc tgctgtgcgg cgcggcgacc gcgggcaaca tgctgcattg gtggtttgat 240

cagaacaaaa ccgaaattga agcgtatctg agcaaacatc cggaaaaaca gaaaattatt 300

tttcgcaacc aggaactgtt tgatctgaaa gaagcgattc gcaccaaaga tagccagacc 360

aacagccagc tgtttgaata ttttcgcgat aaagcgtttc cgtatctgag cgcgcgccag 420

ctgggcgtga tgccggatct ggtgctggat atgtttatta acggctatta tctgaacgtg 480

tttaaaaccc agagcaccga tgtgaaacgc ccgtatcagg ataaagataa acgcggcggc 540

atttttgatg cggtgtttac ccgcggcaac cagaccaccc tgctgaccgc gcgccatgat 600

ctgaaaaaca aaggcctgaa cgatattagc accattatta aagaagaact gaccaaaggc 660

cgcgcgctgg cgctgagcca tacctatgcg aacgtgagca ttagccatgt gattaacctg 720

tggggcgcgg attttaacgc ggaaggcaac ctggaagcga tttatgtgac cgatagcgat 780

gcgaacgcga gcattggcat gaaaaaatat tttgtgggca ttaacaaaca tggccatgtg 840

gcgattagcg cgaaaaaaat tgaaggcgaa aacattggcg cgcaggtgct gggcctgttt 900

accctgagca gcggcaaaga tatttggcag aaactgaacg gcggtggcca tcatcaccat 960

caccactaa 969

<210> 47
<211> 909
<212> DNA
<213> Streptococcus pyogenes

<400> 47
atgtctgtat ggaccaaagg tgttacacca cccgagcagt ttactcaagg tgaagatgtg 60

atccatgcgc catatcttgc tcatcaaggc tggtacgata tcaccaaggc cttcgatggg 120

aaggataatc tcttgtgtgg cgcagcaacg gcaggtaata tgctgcattg gtggtttgat 180

caaaataaaa cagagattga agcctattta agtaaacacc ctgaaaagca aaaaatcatt 240

tttcgtaacc aagagctatt tgatttgaaa gctgctatcg ataccaagga cagtcaaacc 300

aatagtcagc tttttaatta ttttagagat aaagcctttc caaatctatc agcacgtcaa 360

ctcggggtta tgcctgatct tgttctagat atgtttatca atggttacta cttaaatgtg 420

tttaaaacac agtctactga tgtcaatcga ccttatcagg acaaggacaa acgaggtggt 480

attttcgatg ctgttttcac cagaggaaac cagacaacgc tcttgacagc tcgtcatgat 540

ttaaaaaata aaggactaaa tgacatcagc accattatca agcaagaact gactgaagga 600

agagcccttg ctttatcaca tacctacgcc aatgttagca ttagccatgt gattaacttg 660

tggggagctg attttaatgc tgaaggaaac cttgaggcca tctatgtcac agactcagat 720

gctaatgcgt ctattggtat gaaaaaatat tttgtcggca ttaatgctca tggacatgtc 780

gccatttctg ccaagaaaat agaaggagaa aacattggcg ctcaagtatt aggcttattt 840

acgctttcca gtggcaagga catttggcag aaactgagcg gcggtggcca tcatcaccat 900

caccactaa 909

<210> 48
<211> 969
<212> DNA
<213> Streptococcus pyogenes

<400> 48
atggacgatt accaaaggaa tgctacggaa gcttatgcca aagaagtacc acatcagatc 60

acttctgtat ggaccaaagg tgttacacca cccgagcagt ttactcaagg tgaagatgtg 120

atccatgcgc catatcttgc tcatcaaggc tggtacgata tcaccaaggc cttcgatggg 180

gcggataatc tcttgtgtgg cgcagcaacg gcaggtaata tgctgcattg gtggtttgat 240

caaaataaaa cagagattga agcctattta agtaaacacc ctgaaaagca aaaaatcatt 300

tttcgtaacc aagagctatt tgatttgaaa gctgctatcg ataccaagga cagtcaaacc 360

aatagtcagc tttttaatta ttttagagat aaagcctttc caaatctatc agcacgtcaa 420

ctcggggtta tgcctgatct tgttctagat atgtttatca atggttacta cttaaatgtg 480

tttaaaacac agtctactga tgtcaatcga ccttatcagg acaaggacaa acgaggtggt 540

attttcgatg ctgttttcac cagaggaaat cagacaacgc tcttgacagc tcgtcatgat 600

ttaaaaaata aaggactaaa tgacatcagc accattatca agcaagaact gactgaagga 660

agagcccttg ctttatcaca tacctacgcc aatgttagca ttagccatgt gattaacttg 720

tggggagctg attttaatgc tgaaggaaac cttgaggcca tctatgtcac agactcagat 780

gctaatgcgt ctattggtat gaaaaaatat tttgtcggca ttaatgctca tggacatgtc 840

gccatttctg ccaagaaaat agaaggagaa aacattggcg ctcaagtatt aggcttattt 900

acgctttcca gtggcaagga catttggcag aaactgagcg gcggtggcca tcatcaccat 960

caccactaa 969

<210> 49
<211> 909
<212> DNA
<213> Streptococcus pyogenes

<400> 49
atgtctgtat ggaccaaagg tgttacacca cccgagcagt ttactcaagg tgaagatgtg 60

atccatgcgc catatcttgc tcatcaaggc tggtacgata tcaccaaggc cttcgatggg 120

gcggataatc tcttgtgtgg cgcagcaacg gcaggtaata tgctgcattg gtggtttgat 180

caaaataaaa cagagattga agcctattta agtaaacacc ctgaaaagca aaaaatcatt 240

tttcgtaacc aagagctatt tgatttgaaa gctgctatcg ataccaagga cagtcaaacc 300

aatagtcagc tttttaatta ttttagagat aaagcctttc caaatctatc agcacgtcaa 360

ctcggggtta tgcctgatct tgttctagat atgtttatca atggttacta cttaaatgtg 420

tttaaaacac agtctactga tgtcaatcga ccttatcagg acaaggacaa acgaggtggt 480

attttcgatg ctgttttcac cagaggaaat cagacaacgc tcttgacagc tcgtcatgat 540

ttaaaaaata aaggactaaa tgacatcagc accattatca agcaagaact gactgaagga 600

agagcccttg ctttatcaca tacctacgcc aatgttagca ttagccatgt gattaacttg 660

tggggagctg attttaatgc tgaaggaaac cttgaggcca tctatgtcac agactcagat 720

gctaatgcgt ctattggtat gaaaaaatat tttgtcggca ttaatgctca tggacatgtc 780

gccatttctg ccaagaaaat agaaggagaa aacattggcg ctcaagtatt aggcttattt 840

acgctttcca gtggcaagga catttggcag aaactgagcg gcggtggcca tcatcaccat 900

caccactaa 909

<210> 50
<211> 969
<212> DNA
<213> Streptococcus pyogenes

<400> 50
atggacgatt accaaaggaa tgctacggaa gcttatgcca aagaagtacc acatcagatc 60

acttctgtat ggaccaaagg tgttacacca cccgagcagt ttactcaagg tgaagatgtg 120

atccatgcgc catatcttgc tcatcaaggc tggtacgata tcaccaaggc cttcgatggg 180

aaggataatc tcttgtgtgg cgcagcaacg gcaggtaata tgctgcattg gtggtttgat 240

caaaataaaa cagagattga agcctattta agtaaacacc ctgaaaagca aaaaatcatt 300

tttcgtaacc aagagctatt tgatttgaaa gctgctatcg ataccaagga cagtcaaacc 360

aatagtcagc tttttaatta ttttagagat aaagcctttc caaatctatc agcacgtcaa 420

ctcggggtta tgcctgatct tgttctagat atgtttatca atggttacta cttaaatgtg 480

tttaaaacac agtctactga tgtcaatcga ccttatcagg acaaggacaa acgaggtggt 540

attttcgatg ctgttttcac cagaggaaac cagacaacgc tcttgacagc tcgtcatgat 600

ttaaaaaata aaggactaaa tgacatcagc accattatca agcaagaact gactgaagga 660

agagcccttg ctttatcaca tacctacgcc aatgttagca ttagccatgt gattaacttg 720

tggggagctg attttaatgc tgaaggaaac cttgaggcca tctatgtcac agactcagat 780

gctaatgcgt ctattggtat gaaaaaatat tttgtcggca ttaatgctca tggacatgtc 840

gccatttctg ccaagaaaat agaaggagaa aacattggcg ctcaagtatt aggcttattt 900

acgctttcca gtggcaagga catttggcag aaactgagcg gcggtggcca tcatcaccat 960

caccactaa 969

<210> 51
<211> 969
<212> DNA
<213> Streptococcus pyogenes

<400> 51
atggatgatt atcagcgcaa cgcgaccgaa gcgtatgcga aagaagtgcc gcatcagatt 60

accagcgtgt ggaccaaagg cgtgaccccg ctgaccccgg aacagtttac ccagggcgaa 120

gatgtgtttc atgcgccgta tgtggcgaac cagggctggt atgatattac caaagcgttt 180

gatggcaaag ataacctgct gtgcggcgcg gcgaccgcgg gcaacatgct gcattggtgg 240

tttgatcaga acaaagatca gattaaacgc tatctggaag aacatccgga aaaacagaaa 300

attaacttta acggcgaaaa catgtttgat gtgaaaaaag cgattgatac caaaaaccat 360

cagctggata gcaaactgtt taactatttt aaagaaaaag cgtttccgta tctgagcgcg 420

aaacatctgg gcgtgtttcc ggatcatgtg attgatatgt ttattaacgg ctatcgcctg 480

agcctgacca accatggccc gaccccggtg aaagaaggca gcaaagatcc gcgcggcggc 540

atttttgatg cggtgtttac ccgcggcaac cagagcaaac tgctgaccag ccgccatgat 600

tttaaaaaca aaaacctgaa cgatattagc accattatta aacaggaact gaccaaaggc 660

aaagcgctgg gcctgagcca tacctatgcg aacgtgcgca ttaaccatgt gattaacctg 720

tggggcgcgg attttaacgc ggaaggcaac ctggaagcga tttatgtgac cgatagcgat 780

agcaacgcga gcattggcat gaaaaaatat tttgtgggcg tgaacgcgca tggccatgtg 840

gcgattagcg cgaaaaaaat tgaaggcgaa aacattggcg cgcaggtgct gggcctgttt 900

accctgagca ccggccagga tagctggcag aaactgagcg gcggtggcca tcatcaccat 960

caccactaa 969

<210> 52
<211> 969
<212> DNA
<213> Streptococcus pyogenes

<400> 52
atggatgatt atcagcgcaa cgcgaccgaa gcgtatgcga aagaagtgcc gcatcagatt 60

accagcgtgt ggaccaaagg cgtgaccccg ctgaccccgg aacagtttac ccagggcgaa 120

gatgtgtttc atgcgccgta tgtggcgaac cagggctggt atgatattac caaagcgttt 180

gatggcaaag ataacctgct gtgcggcgcg gcgaccgcgg gcaacatgct gcattggtgg 240

tttgatcaga acaaagatca gattaaacgc tatctggaag aacatccgga aaaacagaaa 300

attaactttc gcggcgaaaa catgtttgat gtgaaagaag cgattcgcac caaaaaccat 360

cagctggata gcaaactgtt tgaatatttt aaagaaaaag cgtttccgta tctgagcgcg 420

aaacatctgg gcgtgtttcc ggatcatgtg attgatatgt ttattaacgg ctatcgcctg 480

agcctgacca accatggccc gaccccggtg aaaaaaggca gcaaagatcc gcgcggcggc 540

atttttgatg cggtgtttac ccgcggcaac cagagcaaac tgctgaccag ccgccatgat 600

tttaaaaaca aaaacctgaa cgatattagc accattatta aaagcgaact gaccaacggc 660

aaagcgctgg gcctgagcca tacctatgcg aacgtgcgca ttaaccatgt gattaacctg 720

tggggcgcgg attttaacgc ggaaggcaac ctggaagcga tttatgtgac cgatagcgat 780

agcaacgcga gcattggcat gaaaaaatat tttgtgggcg tgaacaaaca tggccatgtg 840

gcgattagcg cgaaaaaaat tgaaggcgaa aacattggcg cgcaggtgct gggcctgttt 900

accctgagca ccggccagga tagctggcag aaactgaacg gcggtggcca tcatcaccat 960

caccactaa 969

<210> 53
<211> 969
<212> DNA
<213> Streptococcus pyogenes

<400> 53
atggatgatt atcagcgcaa cgcgaccgaa gcgtatgcga aagaagtgcc gcatcagatt 60

accagcgtgt ggaccaaagg cgtgaccccg ctgaccccgg aacagtttac ccagggcgaa 120

gatgtgtttc atgcgccgta tgtggcgaac cagggctggt atgatattac caaaaccttt 180

aacggcaaag atgatctgct gtgcggcgcg gcgaccgcgg gcaacatgct gcattggtgg 240

tttgatcaga acaaagatca gattaaacgc tatctggaag aacatccgga aaaacagaaa 300

attaacttta acggcgaaca gatgtttgat gtgaaagaag cgattgatac caaaaaccat 360

cagctggata gcaaactgtt tgaatatttt aaagaaaaag cgtttccgta tctgagcacc 420

aaacatctgg gcgtgtttcc ggatcatgtg attgatatgt ttattaacgg ctatcgcctg 480

agcctgacca accatggccc gaccccggtg aaagaaggca gcaaagatcc gcgcggcggc 540

atttttgatg cggtgtttac ccgcggcaac cagagcaaac tgctgaccag ccgccatgat 600

tttaaagaaa aaaacctgaa agaaattagc gatctgatta aacaggaact gaccgaaggc 660

aaagcgctgg gcctgagcca tacctatgcg aacgtgcgca ttaaccatgt gattaacctg 720

tggggcgcgg attttgatgc ggaaggcaac ctgaaagcga tttatgtgac cgatagcgat 780

agcaacgcga gcattggcat gaaaaaatat tttgtgggcg tgaacgcggc gggcaaagtg 840

gcgattagcg cgaaaaaaat tgaaggcgaa aacattggcg cgcaggtgct gggcctgttt 900

accctgagca ccggccagga tagctggaac cagaccagcg gcggtggcca tcatcaccat 960

caccactaa 969

<210> 54
<211> 969
<212> DNA
<213> Streptococcus pyogenes

<400> 54
atggatgatt atcagcgcaa cgcgaccgaa gcgtatgcga aagaagtgcc gcatcagatt 60

accagcgtgt ggaccaaagg cgtgaccccg ctgaccccgg aacagtttac ccagggcgaa 120

gatgtgtttc atgcgccgta tgtggcgaac cagggctggt atgatattac caaaaccttt 180

aacggcaaag atgatctgct gtgcggcgcg gcgaccgcgg gcaacatgct gcattggtgg 240

tttgatcaga acaaagatca gattaaacgc tatctggaag aacatccgga aaaacagaaa 300

attaactttc gcggcgaaca gatgtttgat gtgaaagaag cgattcgcac caaaaaccat 360

cagctggata gcaaactgtt tgaatatttt aaagaaaaag cgtttccgta tctgagcacc 420

aaacatctgg gcgtgtttcc ggatcatgtg attgatatgt ttattaacgg ctatcgcctg 480

agcctgacca accatggccc gaccccggtg aaaaaaggca gcaaagatcc gcgcggcggc 540

atttttgatg cggtgtttac ccgcggcaac cagagcaaac tgctgaccag ccgccatgat 600

tttaaagaaa aaaacctgaa agaaattagc gatctgatta aagaagaact gaccaaaggc 660

aaagcgctgg gcctgagcca tacctatgcg aacgtgcgca ttaaccatgt gattaacctg 720

tggggcgcgg attttgatgc ggaaggcaac ctgaaagcga tttatgtgac cgatagcgat 780

agcaacgcga gcattggcat gaaaaaatat tttgtgggcg tgaacaaagc gggcaaagtg 840

gcgattagcg cgaaaaaaat tgaaggcgaa aacattggcg cgcaggtgct gggcctgttt 900

accctgagca ccggccagga tagctggaac cagaccaacg gcggtggcca tcatcaccat 960

caccactaa 969

<210> 55
<211> 963
<212> DNA
<213> Streptococcus pyogenes

<400> 55
atggatgatt atcagcgcaa cgcgaccgaa gcgtatgcga aagaagtgcc gcatcagatt 60

accagcgtgt ggaccaaagg cgtgaccccg ccggaacagt ttactcaagg tgaagatgtg 120

attcatgcgc cgtatgtggc gaaccagggc tggtatgata ttaccaaagc gtttgatggc 180

aaagataacc tgctgtgcgg cgcggcgacc gcgggcaaca tgctgcattg gtggtttgat 240

cagaacaaag atcagattaa acgctatctg gaagaacatc cggaaaaaca gaaaattaac 300

tttcgcggcg aacagatgtt tgatgtgaaa aaagcgattg ataccaaaaa ccatcagctg 360

gatagcaaac tgtttaacta ttttaaagaa aaagcgtttc cgggcctgag cgcgcgccgc 420

attggcgtgt ttccggatca tgtgattgat atgtttatta acggctatcg cctgagcctg 480

accaaccatg gcccgacccc ggtgaaagaa ggcagcaaag atccgcgcgg cggcattttt 540

gatgcggtgt ttacccgcgg caaccagagc aaactgctga ccagccgcca tgattttaaa 600

aacaaaaacc tgaacgatat tagcaccatt attaaacagg aactgaccaa aggcaaagcg 660

ctgggcctga gccataccta tgcgaacgtg agcattaacc atgtgattaa cctgtggggc 720

gcggatttta acgcggaagg caacctggaa gcgatttatg tgaccgatag cgatagcaac 780

gcgagcattg gcatgaaaaa atattttgtg ggcgtgaacg cgcatggcca tgtggcgatt 840

agcgcgaaaa aaattgaagg cgaaaacatt ggcgcgcagg tgctgggcct gtttaccctg 900

agcaccggcc aggatagctg gcagaaactg agcggcggtg gccatcatca ccatcaccac 960

taa 963