

SEQUENCE LISTING

<110> GLAXOSMITHKLINE BIOLOGICALS S.A.
 POOLMAN, JAN
 BLAIS, NORMAND
 LABBE, STEVE

<120> FUSION PROTEINS & COMBINATION VACCINES

<130> 55075317-28PCT

<150> 61/474779
 <151> 2011-04-13

<150> 61/534012
 <151> 2011-09-13

<160> 219

<170> FastSEQ for Windows Version 4.0

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 1 5 10 15
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 <213> Artificial Sequence

<220>
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<400> 2
 Met His His His His His His
 1 5

<210> 3
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<220>
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<400> 3
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<210> 4
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 <213> Haemophilus influenzae

<400> 4

pctca2012050236-seq1

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
 20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys
145      150      155      160

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<210> 5

<211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 5

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Lys Gln Asn Asp Val Lys Leu Ala Pro
 20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys
145      150      155      160

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<210> 6

<211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 6

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
 20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Arg Gly Leu Tyr Val
 65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85      90      95

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pctca2012050236-seq1

Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Ile Arg Thr Asp Phe Tyr
 100 105 110
 Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
 115 120 125
 Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
 130 135 140
 Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
 145 150 155 160

<210> 7

<211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 7

Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1 5 10 15
 Ser Ala Gln Ile Gln Lys Ala Lys Gln Asn Asp Val Lys Leu Ala Pro
 20 25 30
 Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35 40 45
 Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50 55 60
 Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65 70 75 80
 Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85 90 95
 Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
 100 105 110
 Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
 115 120 125
 Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
 130 135 140
 Gln Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys
 145 150 155 160

<210> 8

<211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 8

Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1 5 10 15
 Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
 20 25 30
 Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35 40 45
 Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50 55 60
 Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65 70 75 80
 Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85 90 95
 Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
 100 105 110
 Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
 115 120 125
 Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
 130 135 140
 Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
 145 150 155 160

<210> 9

<211> 160

pctca2012050236-seq1

<212> PRT

<213> Haemophilus influenzae

<400> 9

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
 20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
145      150      155      160

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<210> 10

<211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 10

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Met Lys Leu Ala Pro
 20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
145      150      155      160

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<210> 11

<211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 11

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Lys Gln Asn Asp Val Lys Leu Ala Pro
 20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50      55      60

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Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
      85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
      100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
      115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
      130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys
145      150      155      160

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<210> 12
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 <212> PRT
 <213> Haemophilus influenzae

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<400> 12
Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Met Lys Leu Ala Pro
      20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
      35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Val Asp Asn Gln Glu Pro Gln Ile
      50      55      60
Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val Tyr
65      70      75      80
Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile Leu
      85      90      95
Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr Asp
      100      105      110
Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys Lys
      115      120      125
His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala Gln
      130      135      140
Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
145      150      155

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<210> 13
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

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<400> 13
Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
      20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
      35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
      50      55      60
Ile Val His Phe Asp Thr Val Val Asn Leu Asp Lys Gly Leu Tyr Val
65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
      85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
      100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
      115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
      130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
145      150      155      160

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<210> 14
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

<400> 14
 Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1 5 10 15
 Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
 20 25 30
 Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35 40 45
 Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50 55 60
 Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65 70 75 80
 Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85 90 95
 Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
 100 105 110
 Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
 115 120 125
 Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
 130 135 140
 Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
 145 150 155 160

<210> 15
 <211> 194
 <212> PRT
 <213> Haemophilus influenzae

<400> 15
 Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1 5 10 15
 Ser Ala Gln Thr Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Thr Pro
 20 25 30
 Pro Thr Asp Val Gln Ser Gly Tyr Val Arg Leu Val Lys Asn Val Asn
 35 40 45
 Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50 55 60
 Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65 70 75 80
 Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85 90 95
 Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Ile Asp Phe Tyr
 100 105 110
 Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
 115 120 125
 Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
 130 135 140
 Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Asn
 145 150 155 160
 Lys Lys Ile Cys Thr Leu Ile Ser Leu Asn Phe Ile Gln Leu Leu Gly
 165 170 175
 Cys Arg Glu Tyr Ser Ile Phe Leu Gln Leu Leu Leu Phe Tyr Cys Trp
 180 185 190
 His Phe

<210> 16
 <211> 195
 <212> PRT
 <213> Haemophilus influenzae

pctca2012050236-seq1

<400> 16

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
 20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
145      150      155      160
Ile Lys Lys Ile Cys Thr Leu Ile Ser Leu Asn Phe Ile Gln Leu Leu
165      170      175
Gly Cys Arg Glu Tyr Ser Ile Phe Leu Gln Leu Leu Leu Phe Tyr Cys
180      185      190
Trp His Phe
195

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<210> 17

<211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 17

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Met Lys Leu Ala Pro
 20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
145      150      155      160

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<210> 18

<211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 18

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
 20      25      30

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pctca2012050236-seq1

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Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
    35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
    50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
    65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
    85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
    100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
    115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
    130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
    145      150      155      160

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<210> 19
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

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<400> 19
Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
  1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Lys Gln Asn Asp Val Lys Leu Ala Pro
    20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
    35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
    50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
    65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
    85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
    100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
    115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
    130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys
    145      150      155      160

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<210> 20
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

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<400> 20
Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
  1      5      10      15
Ser Ala Gln Thr Gln Lys Val Glu Gln Asn Asp Val Lys Leu Thr Ala
    20      25      30
Pro Thr Asp Val Arg Ser Gly Phe Val Arg Leu Val Lys Asn Val Asn
    35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
    50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
    65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
    85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
    100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
    115      120      125

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pctca2012050236-seq1

Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
 130 135 140
 Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Leu Val Asp Lys Lys
 145 150 155 160

<210> 21
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

<400> 21
 Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1 5 10 15
 Ser Ala Gln Ile Gln Lys Ala Lys Gln Asn Asp Val Lys Leu Ala Pro
 20 25 30
 Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35 40 45
 Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50 55 60
 Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65 70 75 80
 Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85 90 95
 Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
 100 105 110
 Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
 115 120 125
 Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
 130 135 140
 Gln Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys
 145 150 155 160

<210> 22
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

<400> 22
 Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1 5 10 15
 Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
 20 25 30
 Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35 40 45
 Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50 55 60
 Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65 70 75 80
 Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85 90 95
 Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Ile Arg Thr Asp Phe Tyr
 100 105 110
 Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
 115 120 125
 Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
 130 135 140
 Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
 145 150 155 160

<210> 23
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

<400> 23

pctca2012050236-seq1

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Lys Gln Asn Asp Val Lys Leu Ala Pro
      20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
      35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
      50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
      85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
      100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
      115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys
145      150      155      160

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<210> 24

<211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 24

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Thr Gln Lys Val Glu Gln Asn Asp Val Lys Leu Thr Pro
      20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Val Arg Leu Val Lys Asn Val Asn
      35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
      50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
      85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
      100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
      115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
145      150      155      160

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<210> 25

<211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 25

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Lys Gln Asn Asp Val Lys Leu Ala Pro
      20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
      35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
      50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
      85      90      95

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pctca2012050236-seq1

Leu	Asn	Cys	Ala	Asn	Tyr	His	Leu	Thr	Gln	Val	Arg	Thr	Asp	Phe	Tyr
			100					105					110		
Asp	Glu	Phe	Trp	Gly	Gln	Gly	Leu	Arg	Ala	Ala	Pro	Lys	Lys	Gln	Lys
		115					120					125			
Lys	His	Thr	Leu	Ser	Leu	Thr	Pro	Asp	Thr	Thr	Leu	Tyr	Asn	Ala	Ala
	130					135					140				
Gln	Ile	Ile	Cys	Ala	Asn	Tyr	Gly	Glu	Ala	Phe	Ser	Val	Asp	Lys	Lys
145					150					155					160

<210> 26

<211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 26

Met	Lys	Lys	Ile	Ile	Leu	Thr	Leu	Ser	Leu	Gly	Leu	Leu	Thr	Ala	Cys
1				5					10					15	
Ser	Ala	Gln	Thr	Gln	Lys	Val	Glu	Gln	Asn	Asp	Val	Lys	Leu	Thr	Ala
			20					25					30		
Pro	Thr	Asp	Val	Arg	Ser	Gly	Tyr	Val	Arg	Leu	Val	Lys	Asn	Ala	Asn
		35					40					45			
Tyr	Tyr	Ile	Asp	Ser	Glu	Ser	Ile	Trp	Val	Asp	Asn	Gln	Glu	Pro	Gln
	50					55					60				
Ile	Val	His	Phe	Asp	Ala	Val	Val	Asn	Leu	Asp	Lys	Gly	Leu	Tyr	Val
65					70					75					80
Tyr	Pro	Glu	Pro	Lys	Arg	Tyr	Ala	Arg	Ser	Val	Arg	Gln	Tyr	Lys	Ile
				85					90					95	
Leu	Asn	Cys	Ala	Asn	Tyr	His	Leu	Thr	Gln	Val	Arg	Thr	Asp	Phe	Tyr
			100					105					110		
Asp	Glu	Phe	Trp	Gly	Gln	Gly	Leu	Arg	Ala	Ala	Pro	Lys	Lys	Gln	Lys
		115					120					125			
Lys	His	Thr	Leu	Ser	Leu	Thr	Pro	Asp	Thr	Thr	Leu	Tyr	Asn	Ala	Ala
	130					135					140				
Gln	Ile	Ile	Cys	Ala	Asn	Tyr	Gly	Lys	Ala	Phe	Ser	Val	Asp	Lys	Lys
145					150					155					160

<210> 27

<211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 27

Met	Lys	Lys	Ile	Ile	Leu	Thr	Leu	Ser	Leu	Gly	Leu	Leu	Thr	Ala	Cys
1				5					10					15	
Ser	Ala	Gln	Ile	Gln	Lys	Ala	Glu	Gln	Asn	Asp	Val	Lys	Leu	Ala	Pro
			20					25					30		
Pro	Thr	Asp	Val	Arg	Ser	Gly	Tyr	Ile	Arg	Leu	Val	Lys	Asn	Val	Asn
		35					40					45			
Tyr	Tyr	Ile	Asp	Ser	Glu	Ser	Ile	Trp	Val	Asp	Asn	Gln	Glu	Pro	Gln
	50					55					60				
Ile	Val	His	Phe	Asp	Ala	Val	Val	Asn	Leu	Asp	Lys	Gly	Leu	Tyr	Val
65					70					75					80
Tyr	Pro	Glu	Pro	Lys	Arg	Tyr	Ala	Arg	Ser	Val	Arg	Gln	Tyr	Lys	Ile
				85					90					95	
Leu	Asn	Cys	Ala	Asn	Tyr	His	Leu	Thr	Gln	Val	Arg	Ile	Asp	Phe	Tyr
			100					105					110		
Asp	Glu	Phe	Trp	Gly	Gln	Gly	Leu	Arg	Ala	Ala	Pro	Lys	Lys	Gln	Lys
		115					120					125			
Lys	His	Thr	Leu	Ser	Leu	Thr	Pro	Asp	Thr	Thr	Leu	Tyr	Asn	Ala	Ala
	130					135					140				
Gln	Ile	Ile	Cys	Ala	Asn	Tyr	Gly	Lys	Ala	Phe	Ser	Val	Asp	Lys	Lys
145					150					155					160

<210> 28

<211> 160

pctca2012050236-seq1

<212> PRT

<213> Haemophilus influenzae

<400> 28

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
 20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
 100     105     110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
 115     120     125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
 130     135     140
Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
 145     150     155     160

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<210> 29

<211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 29

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
 20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50      55      60
Ile Val His Phe Asp Thr Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
 100     105     110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
 115     120     125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
 130     135     140
Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
 145     150     155     160

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<210> 30

<211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 30

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
 20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50      55      60

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Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
      85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
      100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
      115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
      130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
145      150      155      160

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<210> 31
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

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<400> 31
Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Lys Gln Asn Asp Val Lys Leu Ala Pro
      20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
      35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
      50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
      85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
      100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
      115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
      130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys
145      150      155      160

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<210> 32
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

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<400> 32
Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
      20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
      35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
      50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
      85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
      100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
      115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
      130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
145      150      155      160

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<210> 33
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

<400> 33
 Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1 5 10 15
 Ser Ala Gln Thr Gln Lys Val Glu Gln Asn Asp Val Lys Leu Thr Pro
 20 25 30
 Pro Thr Asp Val Arg Ser Gly Tyr Val Arg Leu Val Lys Asn Val Asn
 35 40 45
 Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50 55 60
 Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65 70 75 80
 Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85 90 95
 Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
 100 105 110
 Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
 115 120 125
 Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
 130 135 140
 Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
 145 150 155 160

<210> 34
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

<400> 34
 Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1 5 10 15
 Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
 20 25 30
 Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35 40 45
 Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50 55 60
 Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65 70 75 80
 Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85 90 95
 Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
 100 105 110
 Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
 115 120 125
 Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
 130 135 140
 Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
 145 150 155 160

<210> 35
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

<400> 35
 Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1 5 10 15
 Ser Ala Gln Ile Gln Lys Ala Lys Gln Asn Asp Val Lys Leu Ala Pro
 20 25 30

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Pro	Thr	Asp	Val	Arg	Ser	Gly	Tyr	Ile	Arg	Leu	Val	Lys	Asn	Val	Asn
		35					40					45			
Tyr	Tyr	Ile	Asp	Ser	Glu	Ser	Ile	Trp	Val	Asp	Asn	Gln	Glu	Pro	Gln
	50					55					60				
Ile	Val	His	Phe	Asp	Ala	Val	Val	Asn	Leu	Asp	Lys	Gly	Leu	Tyr	Val
65					70					75				80	
Tyr	Pro	Glu	Pro	Lys	Arg	Tyr	Ala	Arg	Ser	Val	Arg	Gln	Tyr	Lys	Ile
				85					90					95	
Leu	Asn	Cys	Ala	Asn	Tyr	His	Leu	Thr	Gln	Val	Arg	Thr	Asp	Phe	Tyr
			100					105					110		
Asp	Glu	Phe	Trp	Gly	Gln	Gly	Leu	Arg	Ala	Ala	Pro	Lys	Lys	Gln	Lys
		115					120					125			
Lys	His	Thr	Leu	Ser	Leu	Thr	Pro	Asp	Thr	Thr	Leu	Tyr	Asn	Ala	Ala
	130					135					140				
Gln	Ile	Ile	Cys	Ala	Asn	Tyr	Gly	Glu	Ala	Phe	Ser	Val	Asp	Lys	Lys
145					150					155					160

<210> 36
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

<400> 36

Met	Lys	Lys	Ile	Ile	Leu	Thr	Leu	Ser	Leu	Gly	Leu	Leu	Thr	Ala	Cys
1				5					10					15	
Ser	Ala	Gln	Ile	Gln	Lys	Ala	Lys	Gln	Asn	Asp	Val	Lys	Leu	Ala	Pro
		20						25				30			
Pro	Thr	Asp	Val	Arg	Ser	Gly	Tyr	Ile	Arg	Leu	Val	Lys	Asn	Val	Asn
		35					40					45			
Tyr	Tyr	Ile	Asp	Ser	Glu	Ser	Ile	Trp	Val	Asp	Asn	Gln	Glu	Pro	Gln
	50					55					60				
Ile	Val	His	Phe	Asp	Ala	Val	Val	Asn	Leu	Asp	Lys	Gly	Leu	Tyr	Val
65					70					75				80	
Tyr	Pro	Glu	Pro	Lys	Arg	Tyr	Ala	Arg	Ser	Val	Arg	Gln	Tyr	Lys	Ile
				85					90					95	
Leu	Asn	Cys	Ala	Asn	Tyr	His	Leu	Thr	Gln	Val	Arg	Thr	Asp	Phe	Tyr
			100					105					110		
Asp	Glu	Phe	Trp	Gly	Gln	Gly	Leu	Arg	Ala	Ala	Pro	Lys	Lys	Gln	Lys
		115					120					125			
Lys	His	Thr	Leu	Ser	Leu	Thr	Pro	Asp	Thr	Thr	Leu	Tyr	Asn	Ala	Ala
	130					135					140				
Gln	Ile	Ile	Cys	Ala	Asn	Tyr	Gly	Glu	Ala	Phe	Ser	Val	Asp	Lys	Lys
145					150					155					160

<210> 37
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

<400> 37

Met	Lys	Lys	Ile	Ile	Leu	Thr	Leu	Ser	Leu	Gly	Leu	Leu	Thr	Ala	Cys
1				5					10					15	
Ser	Ala	Gln	Thr	Gln	Lys	Ala	Glu	Gln	Asn	Asp	Val	Lys	Leu	Ala	Pro
		20						25				30			
Pro	Thr	Asp	Val	Arg	Ser	Gly	Tyr	Ile	Arg	Leu	Val	Lys	Asn	Val	Asn
		35					40					45			
Tyr	Tyr	Ile	Asp	Ser	Glu	Ser	Ile	Trp	Val	Asp	Asn	Gln	Glu	Pro	Gln
	50					55					60				
Ile	Val	His	Phe	Asp	Ala	Val	Val	Asn	Leu	Asp	Lys	Gly	Leu	Tyr	Val
65					70					75				80	
Tyr	Pro	Glu	Pro	Lys	Arg	Tyr	Ala	Arg	Ser	Val	Arg	Gln	Tyr	Lys	Ile
				85					90					95	
Leu	Asn	Cys	Ala	Asn	Tyr	His	Leu	Thr	Gln	Ile	Arg	Thr	Asp	Phe	Tyr
			100					105					110		
Asp	Glu	Phe	Trp	Gly	Gln	Gly	Leu	Arg	Ala	Ala	Pro	Lys	Lys	Gln	Lys
		115					120					125			

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Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
 130 135 140
 Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
 145 150 155 160

<210> 38
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

<400> 38
 Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1 5 10 15
 Ser Ala Gln Thr Gln Lys Val Glu Gln Asn Asp Val Lys Leu Thr Ala
 20 25 30
 Pro Ala Asp Val Arg Ser Gly Tyr Val Arg Leu Val Lys Asn Val Asn
 35 40 45
 Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50 55 60
 Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65 70 75 80
 Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85 90 95
 Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
 100 105 110
 Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
 115 120 125
 Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
 130 135 140
 Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
 145 150 155 160

<210> 39
 <211> 159
 <212> PRT
 <213> Haemophilus influenzae

<400> 39
 Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1 5 10 15
 Ser Ala Gln Ile Gln Lys Ala Lys Gln Asn Asp Val Lys Leu Ala Pro
 20 25 30
 Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35 40 45
 Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50 55 60
 Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65 70 75 80
 Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Tyr Lys Ile Leu
 85 90 95
 Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr Asp
 100 105 110
 Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys Lys
 115 120 125
 His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala Gln
 130 135 140
 Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys
 145 150 155

<210> 40
 <211> 159
 <212> PRT
 <213> Haemophilus influenzae

<400> 40

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Lys Gln Asn Asp Val Lys Leu Ala Pro
 20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Tyr Lys Ile Leu
 85      90      95
Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr Asp
100      105      110
Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys Lys
115      120      125
His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala Gln
130      135      140
Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys
145      150      155

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<210> 41

<211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 41

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
 20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
145      150      155      160

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<210> 42

<211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 42

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
 20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85      90      95

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Leu	Asn	Cys	Ala	Asn	Tyr	His	Leu	Thr	Gln	Val	Arg	Thr	Asp	Phe	Tyr
			100				105						110		
Asp	Glu	Phe	Trp	Gly	Gln	Gly	Leu	Arg	Ala	Ala	Pro	Lys	Lys	Gln	Lys
		115					120					125			
Lys	His	Thr	Leu	Ser	Leu	Thr	Pro	Asp	Thr	Thr	Leu	Tyr	Asn	Ala	Ala
	130					135					140				
Gln	Ile	Ile	Cys	Ala	Asn	Tyr	Gly	Lys	Ala	Phe	Ser	Val	Asp	Lys	Lys
145					150					155					160

<210> 43
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

<400> 43

Met	Lys	Lys	Ile	Ile	Leu	Thr	Leu	Ser	Leu	Gly	Leu	Leu	Thr	Ala	Cys
1				5					10					15	
Ser	Ala	Gln	Ile	Gln	Lys	Ala	Glu	Gln	Asn	Asp	Val	Lys	Leu	Ala	Pro
		20					25					30			
Pro	Thr	Asp	Val	Arg	Ser	Gly	Tyr	Ile	Arg	Leu	Val	Lys	Asn	Val	Asn
		35				40						45			
Tyr	Tyr	Ile	Asp	Ser	Glu	Ser	Ile	Trp	Val	Asp	Asn	Gln	Glu	Pro	Gln
	50					55					60				
Ile	Val	His	Phe	Asp	Ala	Val	Val	Asn	Leu	Asp	Lys	Gly	Leu	Tyr	Val
65					70					75					80
Tyr	Pro	Glu	Pro	Lys	Arg	Tyr	Ala	Arg	Ser	Val	Arg	Gln	Tyr	Lys	Ile
				85					90					95	
Leu	Asn	Cys	Ala	Asn	Tyr	His	Leu	Thr	Gln	Val	Arg	Thr	Asp	Phe	Tyr
			100				105						110		
Asp	Glu	Phe	Trp	Gly	Gln	Gly	Leu	Arg	Ala	Ala	Pro	Lys	Lys	Gln	Lys
		115					120					125			
Lys	His	Thr	Leu	Ser	Leu	Thr	Pro	Asp	Thr	Thr	Leu	Tyr	Asn	Ala	Ala
	130					135					140				
Gln	Ile	Ile	Cys	Ala	Asn	Tyr	Gly	Lys	Ala	Phe	Ser	Val	Asp	Lys	Lys
145					150					155					160

<210> 44
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

<400> 44

Met	Lys	Lys	Ile	Ile	Leu	Thr	Leu	Ser	Leu	Gly	Leu	Leu	Thr	Ala	Cys
1				5					10					15	
Ser	Ala	Gln	Ile	Gln	Lys	Ala	Glu	Gln	Asn	Asp	Val	Lys	Leu	Ala	Pro
		20					25					30			
Pro	Thr	Asp	Val	Arg	Ser	Gly	Tyr	Ile	Arg	Leu	Val	Lys	Asn	Val	Asn
		35				40						45			
Tyr	Tyr	Ile	Asp	Ser	Glu	Ser	Ile	Trp	Val	Asp	Asn	Gln	Glu	Pro	Gln
	50					55					60				
Ile	Val	His	Phe	Asp	Ala	Val	Val	Asn	Leu	Asp	Lys	Gly	Leu	Tyr	Val
65					70					75					80
Tyr	Pro	Glu	Pro	Lys	Arg	Tyr	Ala	Arg	Ser	Val	Arg	Gln	Tyr	Lys	Ile
				85					90					95	
Leu	Asn	Cys	Ala	Asn	Tyr	His	Leu	Thr	Gln	Val	Arg	Thr	Asp	Phe	Tyr
			100				105						110		
Asp	Glu	Phe	Trp	Gly	Gln	Gly	Leu	Arg	Ala	Ala	Pro	Lys	Lys	Gln	Lys
		115					120					125			
Lys	His	Thr	Leu	Ser	Leu	Thr	Pro	Asp	Thr	Thr	Leu	Tyr	Asn	Ala	Ala
	130					135					140				
Gln	Ile	Ile	Cys	Ala	Asn	Tyr	Gly	Lys	Ala	Phe	Ser	Val	Asp	Lys	Lys
145					150					155					160

<210> 45
 <211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 45

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
      20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
      35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
      50      55      60
Ile Val His Phe Asp Thr Val Val Asn Leu Asp Lys Gly Leu Tyr Val
65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
      85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
      100      105      110
Asp Glu Phe Trp Gly Gln Ser Leu Arg Ala Ala Pro Lys Lys Gln Lys
      115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
      130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
145      150      155      160

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<210> 46

<211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 46

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Thr Gln Lys Val Glu Gln Asn Asp Val Lys Leu Thr Pro
      20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Val Arg Leu Val Lys Asn Val Asn
      35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
      50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
      85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
      100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
      115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Val Tyr Asn Ala Ala
      130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
145      150      155      160

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<210> 47

<211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 47

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Thr Gln Lys Val Glu Gln Asn Asp Val Lys Leu Thr Pro
      20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Val Arg Leu Val Lys Asn Val Asn
      35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
      50      55      60

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Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
      85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
      100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
      115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Val Tyr Asn Ala Ala
      130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
145      150      155      160

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<210> 48
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

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<400> 48
Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Lys Gln Asn Asp Val Lys Leu Ala Pro
      20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
      35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
      50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
      85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
      100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
      115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
      130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys
145      150      155      160

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<210> 49
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

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<400> 49
Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
      20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
      35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
      50      55      60
Ile Val His Phe Asp Thr Val Val Asn Leu Asp Lys Gly Leu Tyr Val
65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
      85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
      100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
      115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
      130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
145      150      155      160

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<210> 50
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

<400> 50
 Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1 5 10 15
 Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
 20 25 30
 Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35 40 45
 Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50 55 60
 Ile Val His Phe Asp Thr Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65 70 75 80
 Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85 90 95
 Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
 100 105 110
 Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
 115 120 125
 Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
 130 135 140
 Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
 145 150 155 160

<210> 51
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

<400> 51
 Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1 5 10 15
 Ser Ala Gln Thr Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Thr Pro
 20 25 30
 Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35 40 45
 Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50 55 60
 Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65 70 75 80
 Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85 90 95
 Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
 100 105 110
 Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
 115 120 125
 Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
 130 135 140
 Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
 145 150 155 160

<210> 52
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

<400> 52
 Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1 5 10 15
 Ser Ala Gln Ile Gln Lys Ala Lys Gln Asn Asp Val Lys Leu Ala Pro
 20 25 30

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Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
   35         40         45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
   50         55         60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
   65         70         75         80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
   85         90         95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
   100        105        110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
   115        120        125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
   130        135        140
Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
   145        150        155        160

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<210> 53
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

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<400> 53
Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
  1         5         10        15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
   20        25        30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
   35        40        45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
   50        55        60
Ile Val His Phe Asp Thr Val Val Asn Leu Asp Lys Gly Leu Tyr Val
   65        70        75         80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
   85        90        95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
   100       105       110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
   115       120       125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
   130       135       140
Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
   145       150       155       160

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<210> 54
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

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<400> 54
Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
  1         5         10        15
Ser Ala Gln Thr Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
   20        25        30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
   35        40        45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
   50        55        60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
   65        70        75         80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
   85        90        95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Ile Arg Thr Asp Phe Tyr
   100       105       110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
   115       120       125

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Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
 130 135 140
 Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
 145 150 155 160

<210> 55
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

<400> 55
 Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1 5 10 15
 Ser Ala Gln Ile Gln Lys Ala Lys Gln Asn Asp Val Lys Leu Ala Pro
 20 25 30
 Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35 40 45
 Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50 55 60
 Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65 70 75 80
 Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85 90 95
 Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
 100 105 110
 Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
 115 120 125
 Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
 130 135 140
 Gln Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys
 145 150 155 160

<210> 56
 <211> 160
 <212> PRT
 <213> Haemophilus influenzae

<400> 56
 Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1 5 10 15
 Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
 20 25 30
 Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35 40 45
 Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 50 55 60
 Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
 65 70 75 80
 Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 85 90 95
 Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
 100 105 110
 Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
 115 120 125
 Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
 130 135 140
 Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
 145 150 155 160

<210> 57
 <211> 159
 <212> PRT
 <213> Haemophilus influenzae

<400> 57

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```

Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1      5      10      15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Met Lys Leu Ala Pro
 20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Val Asp Asn Gln Glu Pro Gln Ile
 50      55      60
Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val Tyr
 65      70      75      80
Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile Leu
 85      90      95
Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr Asp
100      105      110
Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys Lys
115      120      125
His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala Gln
130      135      140
Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
145      150      155

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<210> 58
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

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<400> 58
Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50      55      60
Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65      70      75      80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85      90      95
Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
100      105      110
Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
115      120      125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130      135      140
Gly Ser Val Thr Gln
145

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<210> 59
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

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<400> 59
Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50      55      60
Ser Thr Asn Glu Thr Thr Lys Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65      70      75      80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85      90      95

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Asn Gly Ala Ile Thr Val Ala Gly Asn Gly Thr Leu Asp Gly Met Ser
 100 105 110
 Tyr Thr Leu Thr Ala Glu Gly Asp Ser Ala Lys Gly Val Thr Trp Lys
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 60
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 60
 Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85 90 95
 Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 61
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 61
 Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Lys Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Gly Lys Pro Ser Cys Ser Gly Gly Ser Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Ile Thr Gln
 85 90 95
 Ser Gly Gly Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Ala Gly Asn Ala Ala Ala Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 62
 <211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 62

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Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50      55      60
Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65      70      75      80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85      90      95
Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
100      105      110
Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
115      120      125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130      135      140
Gly Ser Val Thr Gln
145

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<210> 63

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 63

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Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ser Asp Val Glu Leu Cys Val Tyr
 50      55      60
Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Ser Asn Gly Ile Ala
 65      70      75      80
Ala Asp Ile Thr Thr Val Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85      90      95
Asn Gly Ala Ile Thr Val Ala Gly Asn Gly Thr Leu Asp Gly Met Ser
100      105      110
Tyr Thr Leu Thr Ala Glu Gly Asp Ser Ala Lys Gly Val Thr Trp Thr
115      120      125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130      135      140
Gly Ser Val Thr Gln
145

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<210> 64

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 64

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Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50      55      60

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Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
65 70 75 80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
85 90 95
Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
100 105 110
Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
115 120 125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130 135 140
Gly Ser Val Thr Gln
145

<210> 65
<211> 149
<212> PRT
<213> Haemophilus influenzae

<400> 65
Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
1 5 10 15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
20 25 30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
35 40 45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
50 55 60
Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
65 70 75 80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
85 90 95
Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
100 105 110
Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
115 120 125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130 135 140
Gly Ser Val Thr Gln
145

<210> 66
<211> 149
<212> PRT
<213> Haemophilus influenzae

<400> 66
Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
1 5 10 15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
20 25 30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
35 40 45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
50 55 60
Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
65 70 75 80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
85 90 95
Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
100 105 110
Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
115 120 125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130 135 140
Gly Ser Val Thr Gln
145

<210> 67
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 67
 Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Lys Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Asn Glu Ile Thr Asn Cys Met Gly Gly Lys Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85 90 95
 Ser Gly Gly Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Ile Thr Gln
 145

<210> 68
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 68
 Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ser Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85 90 95
 Ser Gly Gly Ile Thr Val Lys Gly Asn Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Lys Gly Asn Ala Thr Ala Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Arg Ser Val Thr Lys
 145

<210> 69
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 69
 Met Lys Leu Thr Thr Leu Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30

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Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Asn Glu Thr Thr Ser Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Lys Thr Ala Lys Gly Tyr Val Ala Ser Val Ile Thr Gln
 85 90 95
 Ser Gly Gly Ile Thr Val Lys Gly Asn Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Lys Gly Asn Ala Ala Ala Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Lys
 145

<210> 70

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 70

Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Gly Lys Pro Ser Cys Ser Gly Gly Ser Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85 90 95
 Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Ser Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 71

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 71

Met Lys Leu Thr Thr Leu Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Asn Glu Thr Thr Ser Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Lys Thr Ala Lys Gly Tyr Val Ala Ser Val Ile Thr Gln
 85 90 95
 Ser Gly Gly Ile Thr Val Lys Gly Asn Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Lys Gly Asn Ala Ala Ala Gly Val Thr Trp Thr
 115 120 125

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Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Lys
 145

<210> 72
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 72
 Met Lys Leu Thr Thr Leu Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Ser Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85 90 95
 Ser Gly Gly Ile Thr Val Lys Gly Asn Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 73
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 73
 Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ser Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ser Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Ser Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85 90 95
 Ser Gly Gly Ile Thr Val Lys Gly Asn Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Lys Gly Asn Ala Thr Ala Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Arg Ser Val Thr Lys
 145

<210> 74
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 74

pctca2012050236-seq1

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Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50      55      60
Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65      70      75      80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85      90      95
Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
100      105      110
Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
115      120      125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130      135      140
Gly Ser Val Thr Gln
145

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<210> 75
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

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<400> 75
Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50      55      60
Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65      70      75      80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85      90      95
Ser Gly Gly Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
100      105      110
Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
115      120      125
Thr Thr Cys Lys Gly Thr Glu Ala Ser Leu Phe Pro Ala Asn Phe Cys
130      135      140
Gly Ser Val Thr Gln
145

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<210> 76
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

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<400> 76
Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ser Val Ser Glu Leu
 35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50      55      60
Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65      70      75      80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85      90      95

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pctca2012050236-seq1
 Ser Gly Gly Ile Thr Val Lys Gly Asn Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Lys Gly Asn Ala Thr Ala Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Arg Ser Val Thr Lys
 145

<210> 77
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 77
 Met Lys Leu Thr Thr Leu Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Ser Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85 90 95
 Ser Gly Gly Ile Thr Val Lys Gly Asn Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 78
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 78
 Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Ser Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85 90 95
 Ser Gly Gly Ile Thr Val Lys Gly Asn Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Lys Gly Asn Ala Thr Ala Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Arg Ser Val Thr Lys
 145

<210> 79
 <211> 149

pctca2012050236-seq1

<212> PRT

<213> Haemophilus influenzae

<400> 79

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Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50      55      60
Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65      70      75      80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85      90      95
Ser Gly Gly Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
100      105      110
Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
115      120      125
Thr Thr Cys Lys Gly Thr Glu Ala Ser Leu Phe Pro Ala Asn Phe Cys
130      135      140
Gly Ser Val Thr Gln
145

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<210> 80

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 80

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Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50      55      60
Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65      70      75      80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85      90      95
Ser Gly Gly Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
100      105      110
Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
115      120      125
Thr Thr Cys Lys Gly Thr Glu Ala Ser Leu Phe Pro Ala Asn Phe Cys
130      135      140
Gly Ser Val Thr Gln
145

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<210> 81

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 81

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Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ser Asp Val Glu Leu Cys Val Tyr
 50      55      60

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Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Ser Asn Gly Ile Ala
65 70 75 80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
85 90 95
Asn Gly Ala Ile Thr Val Ala Gly Asn Gly Thr Leu Asp Gly Met Ser
100 105 110
Tyr Thr Leu Thr Ala Glu Gly Asp Ser Ala Lys Gly Val Thr Trp Lys
115 120 125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130 135 140
Gly Ser Val Thr Lys
145

<210> 82
<211> 149
<212> PRT
<213> Haemophilus influenzae

<400> 82
Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
1 5 10 15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
20 25 30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
35 40 45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
50 55 60
Ser Thr Asn Glu Ala Thr Lys Cys Thr Gly Gly Lys Asn Gly Ile Ala
65 70 75 80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
85 90 95
Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
100 105 110
Tyr Ile Leu Gln Ala Ser Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
115 120 125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130 135 140
Gly Ser Val Thr Gln
145

<210> 83
<211> 149
<212> PRT
<213> Haemophilus influenzae

<400> 83
Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
1 5 10 15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
20 25 30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
35 40 45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
50 55 60
Ser Thr Asn Glu Ala Thr Lys Cys Thr Gly Gly Lys Asn Gly Ile Ala
65 70 75 80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
85 90 95
Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
100 105 110
Tyr Ile Leu Gln Ala Ser Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
115 120 125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130 135 140
Gly Ser Val Thr Gln
145

<210> 84
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 84
 Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85 90 95
 Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 85
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 85
 Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Ile Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ser Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Ser Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85 90 95
 Ser Gly Gly Ile Thr Val Lys Gly Asn Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Lys Gly Asn Ala Thr Ala Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Arg Ser Val Thr Lys
 145

<210> 86
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 86
 Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30

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Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85 90 95
 Ser Gly Gly Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Glu Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 87

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 87

Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85 90 95
 Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 88

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 88

Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ser Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Ser Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Val Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85 90 95
 Asn Gly Ala Ile Thr Val Ala Gly Asn Gly Thr Leu Asp Gly Met Ser
 100 105 110
 Tyr Thr Leu Thr Ala Glu Gly Asp Ser Ala Lys Gly Val Thr Trp Thr
 115 120 125

pctca2012050236-seq1

Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 89
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 89
 Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85 90 95
 Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 90
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 90
 Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85 90 95
 Ser Gly Gly Ile Thr Val Lys Gly Asn Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 91
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 91

pctca2012050236-seq1

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Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
50      55      60
Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Ser Asn Gly Ile Ala
65      70      75      80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
85      90      95
Asn Gly Ala Ile Thr Val Ala Gly Asn Gly Thr Leu Asp Arg Met Ser
100      105      110
Tyr Thr Leu Thr Ala Glu Gly Asp Ser Ala Lys Gly Val Thr Trp Thr
115      120      125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130      135      140
Gly Ser Val Thr Gln
145

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<210> 92
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

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<400> 92
Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
50      55      60
Ser Thr Gly Lys Pro Ser Cys Ser Gly Gly Ser Asn Gly Ile Ala
65      70      75      80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
85      90      95
Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
100      105      110
Tyr Ile Leu Gln Ala Ser Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
115      120      125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130      135      140
Gly Ser Val Thr Gln
145

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<210> 93
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

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<400> 93
Met Lys Leu Thr Thr Gln Thr Thr Leu Lys Lys Gly Phe Thr Leu Ile
1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ser Asp Val Glu Leu Cys Val Tyr
50      55      60
Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
65      70      75      80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Ile Thr Gln
85      90      95

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pctca2012050236-seq1
 Ser Gly Gly Ile Thr Val Lys Gly Asn Gly Thr Leu Thr Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Ile Thr Gln
 145

<210> 94
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 94
 Met Lys Leu Thr Thr Leu Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Asn Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Lys Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85 90 95
 Ser Gly Gly Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 95
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 95
 Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Gly Lys Pro Ser Ser Cys Ser Gly Gly Ser Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85 90 95
 Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Ser Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 96
 <211> 149

pctca2012050236-seq1

<212> PRT

<213> Haemophilus influenzae

<400> 96

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Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50      55      60
Ser Thr Asn Glu Ala Thr Lys Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65      70      75      80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85      90      95
Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
100      105      110
Tyr Ile Leu Gln Ala Ser Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
115      120      125
Thr Thr Cys Lys Gly Thr Asp Thr Ser Leu Phe Pro Ala Asn Phe Cys
130      135      140
Gly Ser Val Thr Gln
145

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<210> 97

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 97

```

Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50      55      60
Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65      70      75      80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85      90      95
Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
100      105      110
Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
115      120      125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130      135      140
Gly Ser Val Thr Gln
145

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<210> 98

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 98

```

Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50      55      60

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Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
65 70 75 80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
85 90 95
Ser Gly Gly Ile Thr Val Lys Gly Asn Gly Thr Leu Ala Asn Met Glu
100 105 110
Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
115 120 125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130 135 140
Gly Ser Val Thr Gln
145

<210> 99

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 99

Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
1 5 10 15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
20 25 30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
35 40 45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
50 55 60
Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Ser Asn Gly Ile Ala
65 70 75 80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
85 90 95
Ser Gly Gly Ile Thr Val Lys Gly Asn Gly Thr Leu Ala Asn Met Glu
100 105 110
Tyr Ile Leu Gln Ala Lys Gly Asn Ala Thr Ala Gly Val Thr Trp Thr
115 120 125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130 135 140
Arg Ser Val Thr Lys
145

<210> 100

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 100

Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
1 5 10 15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
20 25 30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
35 40 45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
50 55 60
Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Ser Asn Gly Ile Ala
65 70 75 80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
85 90 95
Ser Gly Gly Ile Thr Val Lys Gly Asn Gly Thr Leu Ala Asn Met Glu
100 105 110
Tyr Ile Leu Gln Ala Lys Gly Asn Ala Thr Ala Gly Val Thr Trp Thr
115 120 125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130 135 140
Arg Ser Val Thr Lys
145

pctca2012050236-seq1

<210> 101
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 101
 Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85 90 95
 Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 102
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 102
 Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Ser Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85 90 95
 Ser Gly Gly Ile Thr Val Lys Gly Asn Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Lys Gly Asn Ala Thr Ala Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Arg Ser Val Thr Lys
 145

<210> 103
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 103
 Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30

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Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Asn Glu Ala Thr Lys Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85 90 95
 Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Ser Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 104

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 104

Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85 90 95
 Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 105

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 105

Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85 90 95
 Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125

pctca2012050236-seq1
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 106
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<220>
 <221> VARIANT
 <222> (1)...(149)
 <223> Xaa = glutamine or leucine

<400> 106
 Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85 90 95
 Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Xaa Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 107
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 107
 Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85 90 95
 Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 108

pctca2012050236-seq1

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 108

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Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50      55      60
Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65      70      75      80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
 85      90      95
Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
100      105      110
Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
115      120      125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130      135      140
Gly Ser Val Thr Gln
145

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<210> 109

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 109

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Met Lys Leu Thr Thr Leu Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50      55      60
Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Asn Asn Gly Ile Ala
 65      70      75      80
Ala Asp Ile Lys Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85      90      95
Ser Gly Gly Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
100      105      110
Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
115      120      125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130      135      140
Gly Ser Val Thr Gln
145

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<210> 110

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 110

```

Met Lys Leu Thr Thr Leu Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr

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```

      50      55      60
ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Asn Asn Gly Ile Ala
65 65 70 75 80
Ala Asp Ile Lys Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
      85      90      95
ser Gly Gly Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
100 105 110
Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
115 120 125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130 135 140
Gly Ser Val Thr Gln
145

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<210> 111
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

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<400> 111
Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
1 5 10 15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
20 25 30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
35 40 45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
50 55 60
ser Thr Asn Glu Thr Thr Ser Cys Thr Gly Gly Lys Asn Gly Ile Ala
65 70 75 80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
85 90 95
Asn Gly Ala Ile Thr Val Ala Gly Asn Gly Thr Leu Asp Gly Met Ser
100 105 110
Tyr Thr Leu Thr Ala Glu Gly Asp Ser Ala Lys Gly Val Thr Trp Lys
115 120 125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130 135 140
Gly Ser Val Thr Gln
145

```

<210> 112
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

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<400> 112
Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
1 5 10 15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
20 25 30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
35 40 45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
50 55 60
ser Thr Asn Glu Thr Thr Ser Cys Thr Gly Gly Lys Asn Gly Ile Ala
65 70 75 80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser
85 90 95
Asn Gly Ala Ile Thr Val Ala Gly Asn Gly Thr Leu Asp Gly Met Ser
100 105 110
Tyr Thr Leu Thr Ala Glu Gly Asp Ser Ala Lys Gly Val Thr Trp Lys
115 120 125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130 135 140
Gly Ser Val Thr Gln

```

145

<210> 113
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 113
 Met Lys Leu Thr Thr Leu Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Asn Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Lys Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85 90 95
 Ser Gly Gly Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 114
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 114
 Met Lys Leu Thr Thr Leu Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50 55 60
 Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Asn Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Lys Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85 90 95
 Ser Gly Gly Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser Val Thr Gln
 145

<210> 115
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 115
 Met Lys Leu Thr Thr Leu Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala

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      20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
      35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
      50      55      60
Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Asn Asn Gly Ile Ala
      65      70      75      80
Ala Asp Ile Lys Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
      85      90      95
Ser Gly Gly Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
      100      105      110
Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
      115      120      125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
      130      135      140
Gly Ser Val Thr Gln
      145

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<210> 116

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 116

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Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
  1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
      20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
      35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
      50      55      60
Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala
      65      70      75      80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
      85      90      95
Ser Gly Gly Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
      100      105      110
Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
      115      120      125
Thr Thr Cys Lys Gly Thr Glu Ala Ser Leu Phe Pro Ala Asn Phe Cys
      130      135      140
Gly Ser Val Thr Gln
      145

```

<210> 117

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 117

```

Met Lys Leu Thr Thr Leu Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
  1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
      20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
      35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
      50      55      60
Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Asn Asn Gly Ile Ala
      65      70      75      80
Ala Asp Ile Lys Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
      85      90      95
Ser Gly Gly Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
      100      105      110
Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr

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Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 115 120 125
 130 135 140
 Gly Ser val Thr Gln
 145

<210> 118
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 118
 Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys val Tyr
 50 55 60
 Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Ser Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr val Ala Ser val Lys Thr Gln
 85 90 95
 Ser Gly Gly Ile Thr val Lys Gly Asn Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Lys Gly Asn Ala Thr Ala Gly val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Arg Ser val Thr Lys
 145

<210> 119
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

<400> 119
 Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1 5 10 15
 Glu Leu Met Ile val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20 25 30
 Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35 40 45
 Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp val Glu Leu Cys val Tyr
 50 55 60
 Ser Thr Asn Glu Ala Thr Lys Cys Thr Gly Gly Lys Asn Gly Ile Ala
 65 70 75 80
 Ala Asp Ile Thr Thr Ala Lys Gly Tyr val Lys Ser val Thr Thr Ser
 85 90 95
 Asn Gly Ala Ile Thr val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu
 100 105 110
 Tyr Ile Leu Gln Ala Ser Gly Asn Ala Ala Thr Gly val Thr Trp Thr
 115 120 125
 Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
 130 135 140
 Gly Ser val Thr Gln
 145

<210> 120
 <211> 149
 <212> PRT
 <213> Haemophilus influenzae

pctca2012050236-seq1

<400> 120

```

Met Lys Leu Thr Thr Leu Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ala Val Ser Glu Leu
 35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr
 50      55      60
Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Ser Asn Gly Ile Ala
 65      70      75      80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85      90      95
Ser Gly Gly Ile Thr Val Lys Gly Asn Gly Thr Leu Ala Asn Met Glu
100      105      110
Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr
115      120      125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130      135      140
Gly Ser Val Thr Gln
145

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<210> 121

<211> 149

<212> PRT

<213> Haemophilus influenzae

<400> 121

```

Met Lys Leu Thr Thr Gln Gln Thr Leu Lys Lys Gly Phe Thr Leu Ile
 1      5      10      15
Glu Leu Met Ile Val Ile Ala Ile Ile Ala Ile Leu Ala Thr Ile Ala
 20      25      30
Ile Pro Ser Tyr Gln Asn Tyr Thr Lys Lys Ala Ser Val Ser Glu Leu
 35      40      45
Leu Gln Ala Ser Ala Pro Tyr Lys Ser Asp Val Glu Leu Cys Val Tyr
 50      55      60
Ser Thr Gly Lys Pro Ser Thr Cys Ser Gly Gly Ser Asn Gly Ile Ala
 65      70      75      80
Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Ala Ser Val Lys Thr Gln
 85      90      95
Ser Gly Gly Ile Thr Val Lys Gly Asn Gly Thr Leu Ala Asn Met Glu
100      105      110
Tyr Ile Leu Gln Ala Lys Gly Asn Ala Thr Ala Gly Val Thr Trp Thr
115      120      125
Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys
130      135      140
Arg Ser Val Thr Lys
145

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<210> 122

<211> 144

<212> PRT

<213> Haemophilus influenzae

<400> 122

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Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
 1      5      10      15
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
 20      25      30
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
 35      40      45
Ile Val His Phe Asp Ala Val Asn Leu Asp Lys Gly Leu Tyr Val
 50      55      60
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
 65      70      75      80
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr

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				85					90				95				
Asp	Glu	Phe	Trp	Gly	Gln	Gly	Leu	Arg	Ala	Ala	Pro	Lys	Lys	Gln	Lys		
			100					105					110				
Lys	His	Thr	Leu	Ser	Leu	Thr	Pro	Asp	Thr	Thr	Leu	Tyr	Asn	Ala	Ala		
		115					120					125					
Gln	Ile	Ile	Cys	Ala	Asn	Tyr	Gly	Glu	Ala	Phe	Ser	Val	Asp	Lys	Lys		
	130					135					140						

<210> 123
 <211> 143
 <212> PRT
 <213> Haemophilus influenzae

<400> 123																	
Ala	Gln	Ile	Gln	Lys	Ala	Glu	Gln	Asn	Asp	Val	Lys	Leu	Ala	Pro	Pro		
1				5					10					15			
Thr	Asp	Val	Arg	Ser	Gly	Tyr	Ile	Arg	Leu	Val	Lys	Asn	Val	Asn	Tyr		
			20					25					30				
Tyr	Ile	Asp	Ser	Glu	Ser	Ile	Trp	Val	Asp	Asn	Gln	Glu	Pro	Gln	Ile		
		35					40					45					
Val	His	Phe	Asp	Ala	Val	Val	Asn	Leu	Asp	Lys	Gly	Leu	Tyr	Val	Tyr		
	50					55					60						
Pro	Glu	Pro	Lys	Arg	Tyr	Ala	Arg	Ser	Val	Arg	Gln	Tyr	Lys	Ile	Leu		
65					70					75					80		
Asn	Cys	Ala	Asn	Tyr	His	Leu	Thr	Gln	Val	Arg	Thr	Asp	Phe	Tyr	Asp		
			85					90					95				
Glu	Phe	Trp	Gly	Gln	Gly	Leu	Arg	Ala	Ala	Pro	Lys	Lys	Gln	Lys	Lys		
			100					105					110				
His	Thr	Leu	Ser	Leu	Thr	Pro	Asp	Thr	Thr	Leu	Tyr	Asn	Ala	Ala	Gln		
		115					120					125					
Ile	Ile	Cys	Ala	Asn	Tyr	Gly	Glu	Ala	Phe	Ser	Val	Asp	Lys	Lys			
	130					135					140						

<210> 124
 <211> 142
 <212> PRT
 <213> Haemophilus influenzae

<400> 124																	
Gln	Ile	Gln	Lys	Ala	Glu	Gln	Asn	Asp	Val	Lys	Leu	Ala	Pro	Pro	Thr		
1				5					10					15			
Asp	Val	Arg	Ser	Gly	Tyr	Ile	Arg	Leu	Val	Lys	Asn	Val	Asn	Tyr	Tyr		
			20					25					30				
Ile	Asp	Ser	Glu	Ser	Ile	Trp	Val	Asp	Asn	Gln	Glu	Pro	Gln	Ile	Val		
		35					40					45					
His	Phe	Asp	Ala	Val	Val	Asn	Leu	Asp	Lys	Gly	Leu	Tyr	Val	Tyr	Pro		
	50					55					60						
Glu	Pro	Lys	Arg	Tyr	Ala	Arg	Ser	Val	Arg	Gln	Tyr	Lys	Ile	Leu	Asn		
65					70					75					80		
Cys	Ala	Asn	Tyr	His	Leu	Thr	Gln	Val	Arg	Thr	Asp	Phe	Tyr	Asp	Glu		
			85					90					95				
Phe	Trp	Gly	Gln	Gly	Leu	Arg	Ala	Ala	Pro	Lys	Lys	Gln	Lys	Lys	His		
			100					105					110				
Thr	Leu	Ser	Leu	Thr	Pro	Asp	Thr	Thr	Leu	Tyr	Asn	Ala	Ala	Gln	Ile		
		115					120					125					
Ile	Cys	Ala	Asn	Tyr	Gly	Glu	Ala	Phe	Ser	Val	Asp	Lys	Lys				
	130					135					140						

<210> 125
 <211> 141
 <212> PRT
 <213> Haemophilus influenzae

<400> 125
 Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro Pro Thr Asp

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```

1      5      10      15
Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn Tyr Tyr Ile
20
Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln Ile Val His
35
Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val Tyr Pro Glu
50
Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile Leu Asn Cys
65
Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr Asp Glu Phe
85
Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys Lys His Thr
100
Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala Gln Ile Ile
115
Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys
130      135      140

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<210> 126
 <211> 139
 <212> PRT
 <213> Haemophilus influenzae

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<400> 126
Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro Pro Thr Asp Val Arg
1      5      10      15
Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn Tyr Tyr Ile Asp Ser
20
Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln Ile Val His Phe Asp
35
Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val Tyr Pro Glu Pro Lys
50
Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile Leu Asn Cys Ala Asn
65
Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr Asp Glu Phe Trp Gly
85
Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys Lys His Thr Leu Ser
100
Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala Gln Ile Ile Cys Ala
115
Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys
130      135

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<210> 127
 <211> 110
 <212> PRT
 <213> Haemophilus influenzae

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<400> 127
Thr Lys Lys Ala Ala Val Ser Glu Leu Leu Gln Ala Ser Ala Pro Tyr
1      5      10      15
Lys Ala Asp Val Glu Leu Cys Val Tyr Ser Thr Asn Glu Thr Thr Asn
20
Cys Thr Gly Gly Lys Asn Gly Ile Ala Ala Asp Ile Thr Ala Lys
35
Gly Tyr Val Lys Ser Val Thr Ser Asn Gly Ala Ile Thr Val Lys
50
Gly Asp Gly Thr Leu Ala Asn Met Glu Tyr Ile Leu Gln Ala Thr Gly
65
Asn Ala Ala Thr Gly Val Thr Trp Thr Thr Cys Lys Gly Thr Asp
85
Ala Ser Leu Phe Pro Ala Asn Phe Cys Gly Ser Val Thr Gln
100      105      110

```

<210> 128

pctca2012050236-seq1

<211> 25
 <212> PRT
 <213> Haemophilus influenzae

<400> 128
 Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile Leu Asn Cys
 1 5 10 15
 Ala Asn Tyr His Leu Thr Gln Val Arg
 20 25

<210> 129
 <211> 66
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> pelB signal peptide

<400> 129
 atgaaatacc tgctgccgac cgctgctgct ggtctgctgc tcctcgctgc ccagccggcg 60
 atggcc 66

<210> 130
 <211> 22
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> pelB signal peptide

<400> 130
 Met Lys Tyr Leu Leu Pro Thr Ala Ala Ala Gly Leu Leu Leu Ala
 1 5 10 15
 Ala Gln Pro Ala Met Ala
 20

<210> 131
 <211> 57
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> FlgI signal peptide

<400> 131
 atgattaaat ttctctctgc attaattctt ctactgggtca cgacggcggc tcaggct 57

<210> 132
 <211> 19
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> FlgI signal peptide

<400> 132
 Met Ile Lys Phe Leu Ser Ala Leu Ile Leu Leu Val Thr Thr Ala
 1 5 10 15
 Ala Gln Ala

<210> 133
 <211> 69
 <212> DNA
 <213> Artificial Sequence

pctca2012050236-seq1

<220>

<223> NadA signal peptide

<400> 133

atgaaacact ttccatccaa agtactgacc acagccatcc ttgccacttt ctgtagcggc 60
gcactggca 69

<210> 134

<211> 23

<212> PRT

<213> Artificial Sequence

<220>

<223> NadA signal peptide

<400> 134

Met Lys His Phe Pro Ser Lys Val Leu Thr Thr Ala Ile Leu Ala Thr
1 5 10 15
Phe Cys Ser Gly Ala Leu Ala
20

<210> 135

<211> 852

<212> DNA

<213> Artificial Sequence

<220>

<223> LVL312

<400> 135

atgattaaat ttctctctgc attaattctt ctactgggtca cgacggcggc tcaggctgag 60
actaaaaaag cagcgggtatc tgaattactg caagcgtcag cgccttataa ggctgatgtg 120
gaattatgtg tatatagcac aaatgaaaca acaactgta cgggtggaaa aaatgggtatt 180
gcagcagata taaccacagc aaaaggctat gtaaaatcag tgacaacaag caacgggtgca 240
ataacagtaa aaggggatgg cacattggca aatatggaat atattttgca agctacagggt 300
aatgctgcaa cagggtgtaac ttggacaaca acttgcaaag gaacggatgc ctctttatit 360
ccagcaaat tttgcggaag tgtcacacaa ggcggcgcg agattcagaa ggctgaacaa 420
aatgatgtga agctggcacc gccgactgat gtacgaagcg gatataatcg tttggtaaaag 480
aatgtgaatt attacatcga tagtgaatcg atctgggtgg ataaccaaga gccacaaatt 540
gtacattttg atgcagtggg gaatttagat aagggattgt atgtttatcc tgagcctaaa 600
cgttatgcac gttctgttcg tcagtataag atcttgaatt gtgcaaatta tcattttaact 660
caagtacgaa ctgatttcta tgatgaattt tggggacagg gtttgcgggc agcacctaaa 720
aagcaaaaga aacatacggt aagtttaaca cctgatacaa cgctttataa tgctgctcag 780
attattttgt cgaactatgg tgaagcattt tcagttgata aaaaaggcgg ccaccaccac 840
caccaccact aa 852

<210> 136

<211> 283

<212> PRT

<213> Artificial Sequence

<220>

<223> LVL312

<400> 136

Met Ile Lys Phe Leu Ser Ala Leu Ile Leu Leu Leu Val Thr Thr Ala
1 5 10 15
Ala Gln Ala Glu Thr Lys Lys Ala Ala Val Ser Glu Leu Leu Gln Ala
20 25 30
Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr Ser Thr Asn
35 40 45
Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala Ala Asp Ile
50 55 60
Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser Asn Gly Ala
65 70 75 80
Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu Tyr Ile Leu

Gln	Ala	Thr	Gly 100	Asn	Ala	Ala	Thr	Gly 105	Val	Thr	Trp	Thr	Thr	Thr	Cys
Lys	Gly	Thr 115	Asp	Ala	Ser	Leu	Phe 120	Pro	Ala	Asn	Phe	Cys 125	Gly	Ser	Val
Thr	Gln 130	Gly	Gly	Ala	Gln	Ile 135	Gln	Lys	Ala	Glu	Gln 140	Asn	Asp	Val	Lys
Leu 145	Ala	Pro	Pro	Thr	Asp 150	Val	Arg	Ser	Gly	Tyr 155	Ile	Arg	Leu	Val	Lys 160
Asn	Val	Asn	Tyr	Tyr 165	Ile	Asp	Ser	Glu	Ser 170	Ile	Trp	Val	Asp	Asn 175	Gln
Glu	Pro	Gln	Ile 180	Val	His	Phe	Asp	Ala 185	Val	Val	Asn	Leu	Asp 190	Lys	Gly
Leu	Tyr	Val 195	Tyr	Pro	Glu	Pro	Lys 200	Arg	Tyr	Ala	Arg	Ser 205	Val	Arg	Gln
Tyr	Lys 210	Ile	Leu	Asn	Cys	Ala 215	Asn	Tyr	His	Leu	Thr 220	Gln	Val	Arg	Thr
Asp 225	Phe	Tyr	Asp	Glu	Phe 230	Trp	Gly	Gln	Gly	Leu 235	Arg	Ala	Ala	Pro	Lys 240
Lys	Gln	Lys	Lys	His 245	Thr	Leu	Ser	Leu	Thr 250	Pro	Asp	Thr	Thr	Leu 255	Tyr
Asn	Ala	Ala	Gln 260	Ile	Ile	Cys	Ala	Asn 265	Tyr	Gly	Glu	Ala	Phe 270	Ser	Val
Asp	Lys	Lys 275	Gly	Gly	His	His	His 280	His	His	His					

<210>	137
<211>	855
<212>	DNA
<213>	Artificial Sequence

<220>
<223> LVL291

<400>	137						
atgaaatacc	tgctgccgac	cgctgctgct	ggctctgctgc	tcctcgctgc	ccagccggcg	60	
atggcccaga	ttcagaaggc	tgaacaaaat	gatgtgaagc	tggcaccgcc	gactgatgta	120	
cgaagcggat	atatacgttt	ggtaaagaat	gtgaattatt	acatcgatag	tgaatcgatc	180	
tgggttgata	accaagagcc	acaaattgta	cattttgatg	cagtggtgaa	tttagataag	240	
ggattgtatg	tttatcctga	gcctaaacgt	tatgcacggt	ctgttcgtca	gtataagatc	300	
ttgaattgtg	caaattatca	tttaactcaa	gtacgaactg	atttctatga	tgaattttgg	360	
ggacaggggt	tgcgggcagc	acctaanaag	caaaagaaac	atacgttaag	tttaaacact	420	
gatacaacgc	tttataatgc	tgctcagatt	atttgtgcga	actatgggtga	agcatttttc	480	
gttgataaaa	aaggcggcac	taaaaaagca	gcggtatctg	aattactgcga	agcgtcacgc	540	
ccctataaag	ctgatgtgga	attatgtgta	tatagcacia	atgaaacaac	aaactgtacg	600	
ggtggaaaaa	atgggtattgc	agcagatata	accacagcaa	aaggctatgt	aaaatcagtg	660	
acaacaagca	acggtgcaat	aacagtaaaa	ggggatggca	cattggcaaa	tatggaatat	720	
atttttgcaag	ctacaggtaa	tgctgcaaca	ggtgtaactt	ggacaacaac	ttgcaaagga	780	
accgatgcct	ctttatttcc	agcaaatttt	tgcggaagtg	tcacacaagg	cggccaccac	840	
caccaccacc	actaa					855	

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<210> 138
<211> 284
<212> PRT
<213> Artificial Sequence
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<220>
<223> LVL291

<400> 138
Met Lys Tyr Leu Leu Pro Thr Ala Ala Ala Gly Leu Leu Leu Leu Ala
1 5 10 15
Ala Gln Pro Ala Met Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val
20 25 30
Lys Leu Ala Pro Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val
35 40 45
Lys Asn Val Asn Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn

	50					55					60				
Gln 65	Glu	Pro	Gln	Ile	Val 70	His	Phe	Asp	Ala	Val 75	Val	Asn	Leu	Asp	Lys 80
Gly	Leu	Tyr	Val	Tyr 85	Pro	Glu	Pro	Lys	Arg 90	Tyr	Ala	Arg	Ser	Val 95	Arg
Gln	Tyr	Lys	Ile 100	Leu	Asn	Cys	Ala	Asn 105	Tyr	His	Leu	Thr	Gln 110	Val	Arg
Thr	Asp	Phe 115	Tyr	Asp	Glu	Phe	Trp 120	Gly	Gln	Gly	Leu	Arg 125	Ala	Ala	Pro
Lys	Lys 130	Gln	Lys	Lys	His	Thr 135	Leu	Ser	Leu	Thr	Pro 140	Asp	Thr	Thr	Leu
Tyr 145	Asn	Ala	Ala	Gln	Ile 150	Ile	Cys	Ala	Asn	Tyr 155	Gly	Glu	Ala	Phe	Ser 160
Val	Asp	Lys	Lys	Gly 165	Gly	Thr	Lys	Lys	Ala 170	Ala	Val	Ser	Glu	Leu 175	Leu
Gln	Ala	Ser	Ala 180	Pro	Tyr	Lys	Ala	Asp 185	Val	Glu	Leu	Cys	Val 190	Tyr	Ser
Thr	Asn	Glu 195	Thr	Thr	Asn	Cys	Thr 200	Gly	Gly	Lys	Asn	Gly 205	Ile	Ala	Ala
Asp	Ile 210	Thr	Thr	Ala	Lys	Gly 215	Tyr	Val	Lys	Ser	Val 220	Thr	Thr	Ser	Asn
Gly 225	Ala	Ile	Thr	Val	Lys 230	Gly	Asp	Gly	Thr	Leu 235	Ala	Asn	Met	Glu	Tyr 240
Ile	Leu	Gln	Ala	Thr 245	Gly	Asn	Ala	Ala	Thr 250	Gly	Val	Thr	Trp	Thr 255	Thr
Thr	Cys	Lys	Gly 260	Thr	Asp	Ala	Ser	Leu 265	Phe	Pro	Ala	Asn	Phe 270	Cys	Gly
Ser	Val	Thr 275	Gln	Gly	Gly	His	His 280	His	His	His	His				

<220>
<223> LVL268

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<210> 140
<211> 284
<212> PRT
<213> Artificial sequence
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<400> 140
Met Lys Tyr Leu Leu Pro Thr Ala Ala Ala Gly Leu Leu Leu Leu Ala
1 5 10 15
Ala Gln Pro Ala Met Ala Asp Ile Gln Lys Ala Glu Gln Asn Asp Val

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<400> 142

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Met Lys His Phe Pro Ser Lys Val Leu Thr Thr Ala Ile Leu Ala Thr
 1      5      10      15
Phe Cys Ser Gly Ala Leu Ala Ala Thr Asn Asp Asp Asp Lys Ala Glu
 20      25      30
Gln Asn Asp Val Lys Leu Ala Pro Pro Thr Asp Val Arg Ser Gly Tyr
 35      40      45
Ile Arg Leu Val Lys Asn Val Asn Tyr Tyr Ile Asp Ser Glu Ser Ile
 50      55      60
Trp Val Asp Asn Gln Glu Pro Gln Ile Val His Phe Asp Ala Val Val
 65      70      75      80
Asn Leu Asp Lys Gly Leu Tyr Val Tyr Pro Glu Pro Lys Arg Tyr Ala
 85      90      95
Arg Ser Val Arg Gln Tyr Lys Ile Leu Asn Cys Ala Asn Tyr His Leu
100      105      110
Thr Gln Val Arg Thr Asp Phe Tyr Asp Glu Phe Trp Gly Gln Gly Leu
115      120      125
Arg Ala Ala Pro Lys Lys Gln Lys Lys His Thr Leu Ser Leu Thr Pro
130      135      140
Asp Thr Thr Leu Tyr Asn Ala Ala Gln Ile Ile Cys Ala Asn Tyr Gly
145      150      155      160
Glu Ala Phe Ser Val Asp Lys Lys Gly Gly Thr Lys Lys Ala Ala Val
165      170      175
Ser Glu Leu Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu
180      185      190
Cys Val Tyr Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn
195      200      205
Gly Ile Ala Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val
210      215      220
Thr Thr Ser Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala
225      230      235
Asn Met Glu Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val
240      245      250      255
Thr Trp Thr Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala
260      265      270
Asn Phe Cys Gly Ser Val Thr Gln Gly Gly His His His His His
275      280      285

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<210> 143

<211> 792

<212> DNA

<213> Artificial Sequence

<220>

<223> LVL270

<400> 143

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atgcaccacc accaccacca cagcgcgcag attcagaagg ctgaacaaaa tgatgtgaag 60
ctggcaccgc cgactgatgt acgaagcggg tatatacgtt tggtaaagaa tgtgaattat 120
tacatcgata gtgaatcgat ctgggtggat aaccaagagc cacaatttgt acattttgat 180
gcagtgggtga atttagataa gggattgtat gtttatcctg agcctaaacg ttatgcacgt 240
tctgttcgtc agtataagat ctgaatttgt gcaaattatc atttaactca agtacgaact 300
gatttctatg atgaattttg gggacagggg ttgcggggcag cacctaaaaa gcaaaaagaaa 360
catacgttaa gttaacacc tgatacaacg ctttataatg ctgctcagat tatttgtgcg 420
aactatgggt aagcattttc agttgataaa aaaggcggca ctaaaaaagc agcggtatct 480
gaattactgc aagcgtcagc gccttataag gctgatgtgg aattatgtgt atatagcaca 540
aatgaaacaa caaactgtac ggggtggaaa aatggtattg cagcagatat aaccacagca 600
aaaggctatg taaaatcagt gacaacaagc aacgggtgcaa taacagtaaa aggggatggc 660
acattggcaa atatggaata tttttgcaa gctacaggta atgctgcaac aggtgtaact 720
tggaacaaca cttgcaaagg aacggatgcc tctttatttc cagcaaattt ttgcggaagt 780
gtcacacaat aa                                     792

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<210> 144

<211> 263

<212> PRT

<213> Artificial Sequence

pctca2012050236-seq1

<220>

<223> LVL270

<400> 144

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Met His His His His His Ser Ala Gln Ile Gln Lys Ala Glu Gln
 1      5      10      15
Asn Asp Val Lys Leu Ala Pro Pro Thr Asp Val Arg Ser Gly Tyr Ile
 20      25      30
Arg Leu Val Lys Asn Val Asn Tyr Tyr Ile Asp Ser Glu Ser Ile Trp
 35      40      45
Val Asp Asn Gln Glu Pro Gln Ile Val His Phe Asp Ala Val Val Asn
 50      55      60
Leu Asp Lys Gly Leu Tyr Val Tyr Pro Glu Pro Lys Arg Tyr Ala Arg
 65      70      75      80
Ser Val Arg Gln Tyr Lys Ile Leu Asn Cys Ala Asn Tyr His Leu Thr
 85      90      95
Gln Val Arg Thr Asp Phe Tyr Asp Glu Phe Trp Gly Gln Gly Leu Arg
100      105      110
Ala Ala Pro Lys Lys Gln Lys Lys His Thr Leu Ser Leu Thr Pro Asp
115      120      125
Thr Thr Leu Tyr Asn Ala Ala Gln Ile Ile Cys Ala Asn Tyr Gly Glu
130      135      140
Ala Phe Ser Val Asp Lys Lys Gly Gly Thr Lys Lys Ala Ala Val Ser
145      150      155      160
Glu Leu Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys
165      170      175
Val Tyr Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly
180      185      190
Ile Ala Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr
195      200      205
Thr Ser Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn
210      215      220
Met Glu Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr
225      230      235      240
Trp Thr Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn
245      250      255
Phe Cys Gly Ser Val Thr Gln
260

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<210> 145

<211> 852

<212> DNA

<213> Artificial Sequence

<220>

<223> LVL315

<400> 145

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atgaaatacc tgctgccgac cgctgctgct ggtctgctgc tcctcgctgc ccagccggcg 60
atggccatgg ataaggctga acaaaatgat gtgaagctgg caccgccgac tgatgtacga 120
agcggatata tacgttttgt aaagaatgtg aattattaca tcgatagtga atcgatctgg 180
gtggataacc aagagccaca aattgtacat tttgatgcag tgggtgaattt agataagggg 240
ttgtatgttt atcctgagcc taaacgttat gcacgttctg ttcgtcagta taagatcttg 300
aattgtgcaa attatcattt aactcaagta cgaactgatt tctatgatga attttggggg 360
cagggtttgc gggcagcacc taaaaagcaa aagaaacata cgtaaagttt aacacctgat 420
acaacgcttt ataatgctgc tcagattatt tgtgcgaact atggtgaagc attttcagtt 480
gataaaaaag gcggcactaa aaaagcagcg gtatctgaat tactgcaagc gtcagcgctt 540
tataaggctg atgtggaatt atgtgtatat agcacaaatg aaacaacaaa ctgtacgggt 600
ggaaaaaatg gtattgcagc agatataacc acagcaaaag gctatgtaaa atcagtgaca 660
acaagcaacg gtgcaataac agtaaaaggg gatggcacat tggcaaatat ggaatatatt 720
ttgcaagcta caggtaatgc tgcaacaggt gtaacttgga caacaacttg caaaggaacg 780
gatgcctctt tatttccagc aaatttttgc ggaagtgtca cacaaggcgg ccaccaccac 840
caccaccact aa
852

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<210> 146

<211> 283

<212> PRT

<213> Artificial Sequence

<220>

<223> LVL315

<400> 146

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Met Lys Tyr Leu Leu Pro Thr Ala Ala Ala Gly Leu Leu Leu Leu Ala
 1      5      10      15
Ala Gln Pro Ala Met Ala Met Asp Lys Ala Glu Gln Asn Asp Val Lys
 20      25      30
Leu Ala Pro Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys
 35      40      45
Asn Val Asn Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln
 50      55      60
Glu Pro Gln Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly
 65      70      75      80
Leu Tyr Val Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln
 85      90      95
Tyr Lys Ile Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr
100      105      110
Asp Phe Tyr Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys
115      120      125
Lys Gln Lys Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr
130      135      140
Asn Ala Ala Gln Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val
145      150      155      160
Asp Lys Lys Gly Gly Thr Lys Lys Ala Ala Val Ser Glu Leu Leu Gln
165      170      175
Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr Ser Thr
180      185      190
Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala Ala Asp
195      200      205
Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser Asn Gly
210      215      220
Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu Tyr Ile
225      230      235      240
Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr Thr Thr
245      250      255
Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys Gly Ser
260      265      270
Val Thr Gln Gly Gly His His His His His His
275      280

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<210> 147

<211> 831

<212> DNA

<213> Artificial Sequence

<220>

<223> LVL317

<400> 147

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atgaaatacc tgctgccgac cgctgctgct ggtctgctgc tcctcgctgc ccagccggcg 60
atggcccaga ttcagaaggc tgaacaaaat gatgtgaagc tggcaccgcc gactgatgta 120
cgaagcggat atatacgttt ggtaaagaat gtgaattatt acatcgatag tgaatcgatc 180
tgggtggata accaagagcc acaaattgta ctttttgatg cagtgggtgaa tttagataag 240
ggattgtatg tttatcctga gcctaaacgt tatgcacgtt ctgttcgtca gtataagatc 300
ttgaattgtg caaattatca tttaactcaa gtacgaactg atttctatga tgaattttgg 360
ggacagggtt tgcgggcagc acctaaaaag caaaagaaac atacgttaag tttaacacct 420
gatacaacgc tttataatgc tgctcagatt atttgtgcga actatggtga agcattttca 480
gttgataaaa aaggcggcac taaaaaagca gcggtatctg aattactgca agcgtcagcg 540
ccttataagg ctgatgtgga attatgtgta tatagcacia atgaaacaac aaactgtacg 600
ggtggaaaaa atggtattgc agcagatata accacagcaa aaggctatgt aaaatcagtg 660
acaacaagca acggtgcaat aacagtaaaa ggggatggca cattggcaaa tatggaatat 720
attttgcaag ctacaggtaa tgctgcaaca ggtgtaactt ggacaacaac ttgcaaagga 780
acggatgcct ctttatttcc agcaaatatt tgcggaagtg tcacacaata a 831

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<210> 148
 <211> 276
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> LVL317

<400> 148
 Met Lys Tyr Leu Leu Pro Thr Ala Ala Ala Gly Leu Leu Leu Leu Ala
 1 5 10 15
 Ala Gln Pro Ala Met Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val
 20 25 30
 Lys Leu Ala Pro Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val
 35 40 45
 Lys Asn Val Asn Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn
 50 55 60
 Gln Glu Pro Gln Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys
 65 70 75 80
 Gly Leu Tyr Val Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg
 85 90 95
 Gln Tyr Lys Ile Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg
 100 105 110
 Thr Asp Phe Tyr Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro
 115 120 125
 Lys Lys Gln Lys Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu
 130 135 140
 Tyr Asn Ala Ala Gln Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser
 145 150 155 160
 Val Asp Lys Lys Gly Gly Thr Lys Lys Ala Val Ser Glu Leu Leu
 165 170 175
 Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr Ser
 180 185 190
 Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala Ala
 195 200 205
 Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser Asn
 210 215 220
 Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu Tyr
 225 230 235 240
 Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr Thr
 245 250 255
 Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys Gly
 260 265 270
 Ser Val Thr Gln
 275

<210> 149
 <211> 828
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> LVL318

<400> 149
 atgaaatacc tgctgccgac cgctgctgct ggtctgctgc tcctcgctgc ccagccggcg 60
 atggccatgg ataaggctga acaaaatgat gtgaagctgg caccgccgac tgatgtacga 120
 agcggatata tacgttttgg aaagaatgtg aattattaca tcgatagtga atcgatctgg 180
 gtggataacc aagagccaca aattgtacat tttgatgcag tgggtgaattt agataaggga 240
 ttgtatgttt atcctgagcc taaacgttat gcacgttctg ttcgtcagta taagatcttg 300
 aattgtgcaa attatcattt aactcaagta cgaactgatt tctatgatga attttgggga 360
 cagggtttgc gggcagcacc taaaaagcaa aagaaacata cgtaaagttt aacacctgat 420
 acaacgcttt ataatgctgc tcagattatt tgtgcgaact atgggtgaagc attttcagtt 480
 gataaaaaag gcggcactaa aaaagcagcg gtatctgaat tactgcaagc gtcagcgcct 540
 tataaggctg atgtggaatt atgtgtatat agcacaatg aaacaacaaa ctgtacgggt 600
 ggaaaaaatg gtattgcagc agatataacc acagcaaaag gctatgtaaa atcagtgcga 660
 acaagcaacg gtgcaataac agtaaaaggg gatggcacat tggcaaatat ggaatatatt 720

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 ttgcaagcta caggtaatgc tgcaacaggt gtaacttgga caacaacttg caaaggaacg 780
 gatgcctctt tatttccagc aaatttttgc ggaagtgtca cacaataa 828

<210> 150
 <211> 275
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> LVL318

<400> 150
 Met Lys Tyr Leu Leu Pro Thr Ala Ala Ala Gly Leu Leu Leu Leu Ala
 1 5 10 15
 Ala Gln Pro Ala Met Ala Met Asp Lys Ala Glu Gln Asn Asp Val Lys
 20 25 30
 Leu Ala Pro Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys
 35 40 45
 Asn Val Asn Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln
 50 55 60
 Glu Pro Gln Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly
 65 70 75 80
 Leu Tyr Val Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln
 85 90 95
 Tyr Lys Ile Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr
 100 105 110
 Asp Phe Tyr Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys
 115 120 125
 Lys Gln Lys Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr
 130 135 140
 Asn Ala Ala Gln Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val
 145 150 155 160
 Asp Lys Lys Gly Gly Thr Lys Lys Ala Ala Val Ser Glu Leu Leu Gln
 165 170 175
 Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr Ser Thr
 180 185 190
 Asn Glu Thr Thr Asn Cys Thr Gly Lys Asn Gly Ile Ala Ala Asp
 195 200 205
 Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser Asn Gly
 210 215 220
 Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu Tyr Ile
 225 230 235 240
 Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr Thr Thr
 245 250 255
 Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys Gly Ser
 260 265 270
 Val Thr Gln
 275

<210> 151
 <211> 483
 <212> DNA
 <213> Haemophilus influenzae

<400> 151
 atgaaaaaaa ttattttaac attatcactt gggttactta ccgcttggtc tgctcaaadc 60
 caaaaggctg aacaaaatga tgtgaagctg gcaccgccga ctgatgtacg aagcggatat 120
 atacgttttg taaagaatgt gaattattac atcgatagtg aatcgatctg ggtggataac 180
 caagagccac aaattgtaca ttttgatgct gtggtgaatt tagatagggg attgtatggt 240
 tatcctgagc ctaaaagtta tgcacgttct gttcgtcagt ataagatttt gaattgtgca 300
 aattatcatt taactcaaata acgaactgat ttctatgatg aattttgggg acagggtttg 360
 cgggcagcac ctaaaaagca aaagaaacat acgttaagtt taacacctga tacaacgctt 420
 tataatgctg ctcagattat ttgtgcaaat tatggtaaag cattttcagt tgataaaaaa 480
 taa 483

<210> 152
 <211> 160

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<212> PRT

<213> Haemophilus influenzae

<400> 152

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1           5           10           15
Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
           20           25           30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
           35           40           45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
           50           55           60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Arg Gly Leu Tyr Val
65           70           75           80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
           85           90           95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Ile Arg Thr Asp Phe Tyr
           100          105          110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
           115          120          125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
           130          135          140
Gln Ile Ile Cys Ala Asn Tyr Gly Lys Ala Phe Ser Val Asp Lys Lys
145           150          155          160

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<210> 153

<211> 480

<212> DNA

<213> Haemophilus influenzae

<400> 153

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atgaaaaaaa ttattttaac attatcactt gggttactta ctgcctgttc tgctcaaatac 60
caaaaggcta aacaaaatga tgtgaagctg gcaccgccga ctgatgtacg aagcggatat 120
atacgtttgg taaagaatgt gaattattac atcgatagtg aatcgatctg ggtggataac 180
caagagccac aaattgtaca ttttgatgca gtggtgaatt tagataaggg attgtatgtt 240
tatcctgagc ctaaactgta tgcacgttct gticgtcagt ataagatctt gaattgtgca 300
aattatcatt taactcaagt acgaactgat ttctatgatg aattttgggg acaggggtttg 360
cgggcagcac ctaaaaagca aaagaaacat acgttaagtt taacacctga tacaacgctt 420
tataatgctg ctcagattat ttgtgcgaac tatggtgaag cattttcagt tgataaaaaa 480

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<210> 154

<211> 160

<212> PRT

<213> Haemophilus influenzae

<400> 154

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Met Lys Lys Ile Ile Leu Thr Leu Ser Leu Gly Leu Leu Thr Ala Cys
 1           5           10           15
Ser Ala Gln Ile Gln Lys Ala Lys Gln Asn Asp Val Lys Leu Ala Pro
           20           25           30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
           35           40           45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
           50           55           60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
65           70           75           80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
           85           90           95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
           100          105          110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
           115          120          125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
           130          135          140
Gln Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys
145           150          155          160

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<210> 155
 <211> 91
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer

<400> 155
 cacacacata tgattaaatt tctctctgca ttaattcttc tactgggtcac gacggcggct 60
 caggctgaga ctaaaaaagc agcggatatct g 91

<210> 156
 <211> 66
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer

<400> 156
 tgtgtgaagc ttttagtggt ggtggtggtg gtggccgcct tgtgtgacac ttccgcaaaa 60
 atttgc 66

<210> 157
 <211> 58
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer

<400> 157
 tttgcggaag tgtcacacaa ggcggcgcgc agattcagaa ggctgaacaa aatgatgt 58

<210> 158
 <211> 58
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer

<400> 158
 acatcathtt gttcagcctt ctgaatctgc gcgccgcctt gtgtgacact tccgcaaa 58

<210> 159
 <211> 59
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer

<400> 159
 tgtgtgaagc ttttagtggt ggtggtggtg gtggccgcct tttttatcaa ctgaaaatg 59

<210> 160
 <211> 65
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer

<400> 160

pctca2012050236-seq1

cacacacata tgcaccacca ccaccaccac agcgcgagaga ttcagaaggc tgaacaaaat 60
gatgt 65

<210> 161
<211> 46
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 161
cattttcagt tgataaaaaa ggcggcacta aaaaagcagc ggtatc 46

<210> 162
<211> 46
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 162
gataccgctg ctttttttagt gccgcctttt ttatcaactg aaaatg 46

<210> 163
<211> 35
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 163
tgtgtgaagc ttttattgtg tgacacttcc gcaaa 35

<210> 164
<211> 104
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 164
cacacacata tgaaatacct gctgccgacc gctgctgctg gtctgctgct cctcgctgcc 60
cagccggcga tggccagat tcagaaggct gaacaaaatg atgt 104

<210> 165
<211> 49
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 165
gcattttcag ttgataaaaa aggcggcact aaaaaagcag cggtatctg 49

<210> 166
<211> 49
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 166

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cagataccgc tgctttttta gtgccgcctt ttttatcaac tgaaaatgc 49

<210> 167
 <211> 104
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer

<400> 167
 cacacacata tgaaatacct gctgccgacc gctgctgctg gtctgctgct cctcgctgcc 60
 cagccggcga tggccgatat tcagaaggct gaacaaaatg atgt 104

<210> 168
 <211> 115
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer

<400> 168
 cacacacata tgaaacactt tccatccaaa gtactgacca cagccatcct tgccactttc 60
 tgtagcggcg cactggcagc caciaacgac gacgataagg ctgaacaaaa tgatg 115

<210> 169
 <211> 35
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer

<400> 169
 gccggcgatg gccatggata aggctgaaca aaatg 35

<210> 170
 <211> 35
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer

<400> 170
 cattttgttc agccttatcc atggccatcg ccggc 35

<210> 171
 <211> 34
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer

<400> 171
 ggaagtgtca cacaataagg cggccaccac cacc 34

<210> 172
 <211> 34
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer

<400> 172

ggtggtggtg gccgccttat tgtgtgacac ttcc 34

<210> 173
 <211> 54
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer

<400> 173
 gaattccata tgcacccatca ccataccat actaaaaaag cagcggatc tgaa 54

<210> 174
 <211> 32
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer

<400> 174
 gcgccgctcg agtcattgtg tgacacttcc gc 32

<210> 175
 <211> 43
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer

<400> 175
 gccagccgg cgatggccca gatccagaag gctgaacaaa atg 43

<210> 176
 <211> 43
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> primer

<400> 176
 cattttgttc agccttctgg atctgggcca tcgccggctg ggc 43

<210> 177
 <211> 254
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Fusion protein

<400> 177
 Gln Ile Gln Lys Ala Glu Gln Asn Asp Val Lys Leu Ala Pro Pro Thr
 1 5 10 15
 Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn Tyr Tyr
 20 25 30
 Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln Ile Val
 35 40 45
 His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val Tyr Pro
 50 55 60
 Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile Leu Asn
 65 70 75 80
 Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr Asp Glu
 85 90 95
 Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys Lys His

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100	105	110
Thr Leu Ser	Thr Leu Tyr Asn Ala	Ala Gln Ile
115	120	125
Ile Cys Ala	Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys	Lys Gly Gly
130	135	140
Thr Lys Lys	Ala Ala Val Ser Glu Leu Leu Gln Ala Ser Ala Pro Tyr	160
145	150	155
Lys Ala Asp	Val Glu Leu Cys Val Tyr Ser Thr Asn Glu Thr Thr Asn	175
165	170	175
Cys Thr Gly	Gly Lys Asn Gly Ile Ala Ala Asp Ile Thr Thr Ala Lys	190
180	185	190
Gly Tyr Val	Lys Ser Val Thr Thr Ser Asn Gly Ala Ile Thr Val Lys	205
195	200	205
Gly Asp Gly	Thr Leu Ala Asn Met Glu Tyr Ile Leu Gln Ala Thr Gly	220
210	215	220
Asn Ala Ala	Thr Gly Val Thr Trp Thr Thr Thr Cys Lys Gly Thr Asp	240
225	230	235
Ala Ser Leu	Phe Pro Ala Asn Phe Cys Gly Ser Val Thr Gln	250
245	250	

<210> 178
 <211> 6
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Synthetic construct

<400> 178
 Ala Thr Asn Asp Asp Asp
 1 5

<210> 179
 <211> 138
 <212> PRT
 <213> Haemophilus influenzae

<400> 179
 Ala Glu Gln Asn Asp Val Lys Leu Ala Pro Pro Thr Asp Val Arg Ser
 1 5 10 15
 Gly Tyr Ile Arg Leu Val Lys Asn Val Asn Tyr Tyr Ile Asp Ser Glu
 20 25 30
 Ser Ile Trp Val Asp Asn Gln Glu Pro Gln Ile Val His Phe Asp Ala
 35 40 45
 Val Val Asn Leu Asp Lys Gly Leu Tyr Val Tyr Pro Glu Pro Lys Arg
 50 55 60
 Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile Leu Asn Cys Ala Asn Tyr
 65 70 75 80
 His Leu Thr Gln Val Arg Thr Asp Phe Tyr Asp Glu Phe Trp Gly Gln
 85 90 95
 Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys Lys His Thr Leu Ser Leu
 100 105 110
 Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala Gln Ile Ile Cys Ala Asn
 115 120 125
 Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys
 130 135

<210> 180
 <211> 137
 <212> PRT
 <213> Haemophilus influenzae

<400> 180
 Glu Gln Asn Asp Val Lys Leu Ala Pro Pro Thr Asp Val Arg Ser Gly
 1 5 10 15

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Tyr Ile Arg Leu Val Lys Asn Val Asn Tyr Tyr Ile Asp Ser Glu Ser
      20      25      30
Ile Trp Val Asp Asn Gln Glu Pro Gln Ile Val His Phe Asp Ala Val
      35      40      45
Val Asn Leu Asp Lys Gly Leu Tyr Val Tyr Pro Glu Pro Lys Arg Tyr
      50      55      60
Ala Arg Ser Val Arg Gln Tyr Lys Ile Leu Asn Cys Ala Asn Tyr His
      65      70      75      80
Leu Thr Gln Val Arg Thr Asp Phe Tyr Asp Glu Phe Trp Gly Gln Gly
      85      90      95
Leu Arg Ala Ala Pro Lys Lys Gln Lys Lys His Thr Leu Ser Leu Thr
      100      105      110
Pro Asp Thr Thr Leu Tyr Asn Ala Ala Gln Ile Ile Cys Ala Asn Tyr
      115      120      125
Gly Glu Ala Phe Ser Val Asp Lys Lys
      130      135

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<210> 181
 <211> 849
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> LVL702

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<400> 181
atgaaatacc tgctgccgac cgctgctgct ggtctgctgc tcctcgctgc ccagccggcg 60
atggccattc agaaggctga acaaaatgat gtgaagctgg caccgccgac tgatgtacga 120
agcggatata tacgttttgt aaagaatgtg aattattaca tcgatagtga atcgatctgg 180
gtggataacc aagagccaca aattgtacat ttgatgcag tgggtgaattt agataaggga 240
ttgtatgttt atcctgagcc taaacgttat gcacgttctg ttcgtcagta taagatcttg 300
aattgtgcaa attatcattt aactcaagta cgaactgatt tctatgatga attttgggga 360
cagggtttgc gggcagcacc taaaaagcaa aagaaacata cgtaaagttt aacacctgat 420
acaacgcttt ataatgctgc tcagattatt tgtgcgaact atggtgaagc attttcagtt 480
gataaaaaag gcggcactaa aaaagcagcg gtatctgaat tactgcaagc gtcagcgctt 540
tataaggctg atgtggaatt atgtgtatat agcacaaatg aaacaacaaa ctgtacgggt 600
ggaaaaaatg gtattgcagc agatataacc acagcaaaag gctatgtaaa atcagtgaca 660
acaagcaacg gtgcaataac agtaaaaggg gatggcacat tggcaaatat ggaatatatt 720
ttgcaagcta caggtaatgc tgcaacaggt gtaacttggg caacaacttg caaaggaacg 780
gatgcctctt tatttcagc aaatttttgc ggaagtgtca cacaaggcgg ccaccaccac 840
caccaccac

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<210> 182
 <211> 283
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> LVL702

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<400> 182
Met Lys Tyr Leu Leu Pro Thr Ala Ala Ala Gly Leu Leu Leu Leu Ala
  1      5      10      15
Ala Gln Pro Ala Met Ala Ile Gln Lys Ala Glu Gln Asn Asp Val Lys
      20      25      30
Leu Ala Pro Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys
      35      40      45
Asn Val Asn Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln
      50      55      60
Glu Pro Gln Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly
      65      70      75      80
Leu Tyr Val Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln
      85      90      95
Tyr Lys Ile Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr
      100      105      110
Asp Phe Tyr Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys
      115      120      125

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Lys	Gln	Lys	Lys	His	Thr	Leu	Ser	Leu	Thr	Pro	Asp	Thr	Thr	Leu	Tyr
130						135					140				
Asn	Ala	Ala	Gln	Ile	Ile	Cys	Ala	Asn	Tyr	Gly	Glu	Ala	Phe	Ser	Val
145				150						155					160
Asp	Lys	Lys	Gly	Gly	Thr	Lys	Lys	Ala	Ala	Val	Ser	Glu	Leu	Leu	Gln
			165						170					175	
Ala	Ser	Ala	Pro	Tyr	Lys	Ala	Asp	Val	Glu	Leu	Cys	Val	Tyr	Ser	Thr
			180					185					190		
Asn	Glu	Thr	Thr	Asn	Cys	Thr	Gly	Gly	Lys	Asn	Gly	Ile	Ala	Ala	Asp
		195					200					205			
Ile	Thr	Thr	Ala	Lys	Gly	Tyr	Val	Lys	Ser	Val	Thr	Thr	Ser	Asn	Gly
	210				215						220				
Ala	Ile	Thr	Val	Lys	Gly	Asp	Gly	Thr	Leu	Ala	Asn	Met	Glu	Tyr	Ile
225					230					235					240
Leu	Gln	Ala	Thr	Gly	Asn	Ala	Ala	Thr	Gly	Val	Thr	Trp	Thr	Thr	Thr
			245						250					255	
Cys	Lys	Gly	Thr	Asp	Ala	Ser	Leu	Phe	Pro	Ala	Asn	Phe	Cys	Gly	Ser
			260					265					270		
Val	Thr	Gln	Gly	Gly	His	His	His	His	His	His					
	275						280								

<210> 183
 <211> 858
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> LVL736

<400> 183

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atggccagcg	cccagattca	gaaggctgaa	caaatgatg	tgaagctggc	accgccgact	120
gatgtacgaa	gcggatatat	acgtttggta	aagaatgtga	attattacat	cgatagtga	180
tcgatctggg	tgataacca	agagccacaa	attgtacatt	ttgatgcagt	ggatgaattta	240
gataagggat	tgtatgttta	tcctgagcct	aaacgttatg	cacgttctgt	tcgtcagtat	300
aagatcttga	attgtgcaaa	ttatcattta	actcaagtac	gaactgattt	ctatgatgaa	360
ttttggggac	agggtttgcg	ggcagcacct	aaaaagcaaa	agaaacatac	gttaagttta	420
acacctgata	caacgcttta	taatgctgct	cagattatgt	gtgcgaacta	tggtgaagca	480
ttttcagttg	ataaaaaagg	cggcactaaa	aaagcagcgg	tatctgaatt	actgcaagcg	540
tcagcgcctt	ataaggctga	tgtggaatta	tgtgtatata	gcacaaatga	aacaacaaac	600
tgtacgggtg	gaaaaaatgg	tattgcagca	gatataacca	cagcaaaagg	ctatgtaaaa	660
tcagtgcaca	caagcaacgg	tgcaataaca	gtaaaagggg	atggcacatt	ggcaaatatg	720
gaatatattt	tgcaagctac	aggtaatgct	gcaacaggtg	taacttggac	aacaacttgc	780
aaaggaacgg	atgcctcttt	atttccagca	aatttttgcg	gaagtgtcac	acaaggcgcg	840
caccaccacc	accaccac					858

<210> 184
 <211> 286
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> LVL736

<400> 184

Met	Lys	Tyr	Leu	Leu	Pro	Thr	Ala	Ala	Ala	Gly	Leu	Leu	Leu	Leu	Ala
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Ala	Gln	Pro	Ala	Met	Ala	Ser	Ala	Gln	Ile	Gln	Lys	Ala	Glu	Gln	Asn
		20					25					30			
Asp	Val	Lys	Leu	Ala	Pro	Pro	Thr	Asp	Val	Arg	Ser	Gly	Tyr	Ile	Arg
		35					40				45				
Leu	Val	Lys	Asn	Val	Asn	Tyr	Tyr	Ile	Asp	Ser	Glu	Ser	Ile	Trp	Val
	50				55					60					
Asp	Asn	Gln	Glu	Pro	Gln	Ile	Val	His	Phe	Asp	Ala	Val	Val	Asn	Leu
65					70					75				80	
Asp	Lys	Gly	Leu	Tyr	Val	Tyr	Pro	Glu	Pro	Lys	Arg	Tyr	Ala	Arg	Ser
			85						90					95	

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Val	Arg	Gln	Tyr	Lys	Ile	Leu	Asn	Cys	Ala	Asn	Tyr	His	Leu	Thr	Gln
			100					105					110		
Val	Arg	Thr	Asp	Phe	Tyr	Asp	Glu	Phe	Trp	Gly	Gln	Gly	Leu	Arg	Ala
		115					120					125			
Ala	Pro	Lys	Lys	Gln	Lys	Lys	His	Thr	Leu	Ser	Leu	Thr	Pro	Asp	Thr
		130				135					140				
Thr	Leu	Tyr	Asn	Ala	Ala	Gln	Ile	Ile	Cys	Ala	Asn	Tyr	Gly	Glu	Ala
				150						155					160
Phe	Ser	Val	Asp	Lys	Lys	Gly	Gly	Thr	Lys	Lys	Ala	Ala	Val	Ser	Glu
				165					170					175	
Leu	Leu	Gln	Ala	Ser	Ala	Pro	Tyr	Lys	Ala	Asp	Val	Glu	Leu	Cys	Val
			180					185					190		
Tyr	Ser	Thr	Asn	Glu	Thr	Thr	Asn	Cys	Thr	Gly	Gly	Lys	Asn	Gly	Ile
		195					200					205			
Ala	Ala	Asp	Ile	Thr	Thr	Ala	Lys	Gly	Tyr	Val	Lys	Ser	Val	Thr	Thr
		210				215					220				
Ser	Asn	Gly	Ala	Ile	Thr	Val	Lys	Gly	Asp	Gly	Thr	Leu	Ala	Asn	Met
		225			230				235						240
Glu	Tyr	Ile	Leu	Gln	Ala	Thr	Gly	Asn	Ala	Ala	Thr	Gly	Val	Thr	Trp
				245					250					255	
Thr	Thr	Thr	Cys	Lys	Gly	Thr	Asp	Ala	Ser	Leu	Phe	Pro	Ala	Asn	Phe
			260					265					270		
Cys	Gly	Ser	Val	Thr	Gln	Gly	Gly	His	His	His	His	His	His		
		275				280						285			

<210> 185
 <211> 855
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> LVL737

<400> 185
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 gtacgaagcg gatataacg tttggtaaag aatgtgaatt attacatcga tagtgaatcg 180
 atctgggtgg ataaccaaga gccacaaatt gtacattttg atgcagtggg gaatttagat 240
 aagggattgt atgtttatcc tgagcctaaa cgttatgcac gttctgttcg tcagtataag 300
 atcttgaatt gtgcaaatta tcatttaact caagtacgaa ctgatttcta tgatgaattt 360
 tggggacagg gtttgcgggc agcacctaaa aagcaaaaga aacatacggt aagttaaaca 420
 cctgatacaa cgctttataa tgctgctcag attattttgt cgaactatgg tgaagcattt 480
 tcagtgtgata aaaaaggcgg cactaaaaaa gcagcgggtat ctgaattact gcaagcgtca 540
 gcgccttata aggctgatgt ggaattatgt gtatatagca caaatgaaac aacaaactgt 600
 acgggtggaa aaaatggtat tgcagcagat ataaccacag caaaaggcta tgtaaaatca 660
 gtgacaacaa gcaacggtgc aataacagta aaaggggatg gcacattggc aaatatggaa 720
 tatattttgc aagctacagg taatgctgca acaggtgtaa cttggacaac aacttgcaaa 780
 ggaacggatg cctctttatt tccagcaaat ttttgcgga gtgtcacaca aggcggccac 840
 caccaccacc accac 855

<210> 186
 <211> 285
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> LVL737

<400> 186
 Met Lys Tyr Leu Leu Pro Thr Ala Ala Ala Gly Leu Leu Leu Leu Ala
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 Ala Gln Pro Ala Met Ala Ala Gln Ile Gln Lys Ala Glu Gln Asn Asp
 20 25 30
 Val Lys Leu Ala Pro Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu
 35 40 45
 Val Lys Asn Val Asn Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp
 50 55 60

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Asn	Gln	Glu	Pro	Gln	Ile	Val	His	Phe	Asp	Ala	Val	Val	Asn	Leu	Asp
65					70				75					80	
Lys	Gly	Leu	Tyr	Val	Tyr	Pro	Glu	Pro	Lys	Arg	Tyr	Ala	Arg	Ser	Val
				85					90					95	
Arg	Gln	Tyr	Lys	Ile	Leu	Asn	Cys	Ala	Asn	Tyr	His	Leu	Thr	Gln	Val
			100					105					110		
Arg	Thr	Asp	Phe	Tyr	Asp	Glu	Phe	Trp	Gly	Gln	Gly	Leu	Arg	Ala	Ala
		115					120					125			
Pro	Lys	Lys	Gln	Lys	Lys	His	Thr	Leu	Ser	Leu	Thr	Pro	Asp	Thr	Thr
	130					135					140				
Leu	Tyr	Asn	Ala	Ala	Gln	Ile	Ile	Cys	Ala	Asn	Tyr	Gly	Glu	Ala	Phe
145					150					155					160
Ser	Val	Asp	Lys	Lys	Gly	Gly	Thr	Lys	Lys	Ala	Ala	Val	Ser	Glu	Leu
			165						170					175	
Leu	Gln	Ala	Ser	Ala	Pro	Tyr	Lys	Ala	Asp	Val	Glu	Leu	Cys	Val	Tyr
			180					185					190		
Ser	Thr	Asn	Glu	Thr	Thr	Asn	Cys	Thr	Gly	Gly	Lys	Asn	Gly	Ile	Ala
		195					200					205			
Ala	Asp	Ile	Thr	Thr	Ala	Lys	Gly	Tyr	Val	Lys	Ser	Val	Thr	Thr	Ser
	210					215					220				
Asn	Gly	Ala	Ile	Thr	Val	Lys	Gly	Asp	Gly	Thr	Leu	Ala	Asn	Met	Glu
225					230					235					240
Tyr	Ile	Leu	Gln	Ala	Thr	Gly	Asn	Ala	Ala	Thr	Gly	Val	Thr	Trp	Thr
			245					250						255	
Thr	Thr	Cys	Lys	Gly	Thr	Asp	Ala	Ser	Leu	Phe	Pro	Ala	Asn	Phe	Cys
		260						265					270		
Gly	Ser	Val	Thr	Gln	Gly	Gly	His	His	His	His	His	His			
		275					280					285			

<210> 187
 <211> 843
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> LVL738

<400> 187
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 tatatacggt tggtaaagaa tgtgaattat tacatcgata gtgaatcgat ctgggtggat 180
 aaccaagagc cacaaattgt acattttgat gcagtgggtga atttagataa gggattgtat 240
 gtttatcctg agcctaaacg ttatgcacgt tctgttcgtc agtataagat ctggaattgt 300
 gcaaattatc atttaactca agtacgaact gatttctatg atgaattttg gggacagggt 360
 ttgcgggcag cacctaaaaa gcaaaagaaa catacgttaa gttaacacc tgatacaacg 420
 ctttataatg ctgctcagat tatttgtgcg aactatggtg aagcattttc agttgataaa 480
 aaaggcggca ctaaaaaagc agcggatatct gaattactgc aagcgtcagc gccttataag 540
 gctgatgtgg aattatgtgt atatagcaca aatgaaacaa caaactgtac ggggtgaaaa 600
 aatgggtattg cagcagatat aaccacagca aaaggctatg taaaatcagt gacaacaagc 660
 aacgggtgcaa taacagtaaa aggggatggc acatitggcaa atatggaata tattttgcaa 720
 gctacaggtg atgtctgaac aggtgtaact tggacaacaa cttgcaaagg aacggatgcc 780
 tctttatttc cagcaaattt ttgcggaagt gtcacacaag gcggccacca ccaccaccac 840
 cac 843

<210> 188
 <211> 281
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> LVL738

<400> 188
 Met Lys Tyr Leu Leu Pro Thr Ala Ala Ala Gly Leu Leu Leu Leu Ala
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 Ala Gln Pro Ala Met Ala Lys Ala Glu Gln Asn Asp Val Lys Leu Ala
 20 25 30

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Pro	Pro	Thr	Asp	Val	Arg	Ser	Gly	Tyr	Ile	Arg	Leu	Val	Lys	Asn	Val
		35					40					45			
Asn	Tyr	Tyr	Ile	Asp	Ser	Glu	Ser	Ile	Trp	Val	Asp	Asn	Gln	Glu	Pro
	50					55					60				
Gln	Ile	Val	His	Phe	Asp	Ala	Val	Val	Asn	Leu	Asp	Lys	Gly	Leu	Tyr
65					70					75					80
Val	Tyr	Pro	Glu	Pro	Lys	Arg	Tyr	Ala	Arg	Ser	Val	Arg	Gln	Tyr	Lys
				85					90					95	
Ile	Leu	Asn	Cys	Ala	Asn	Tyr	His	Leu	Thr	Gln	Val	Arg	Thr	Asp	Phe
			100					105					110		
Tyr	Asp	Glu	Phe	Trp	Gly	Gln	Gly	Leu	Arg	Ala	Ala	Pro	Lys	Lys	Gln
		115					120					125			
Lys	Lys	His	Thr	Leu	Ser	Leu	Thr	Pro	Asp	Thr	Thr	Leu	Tyr	Asn	Ala
	130					135					140				
Ala	Gln	Ile	Ile	Cys	Ala	Asn	Tyr	Gly	Glu	Ala	Phe	Ser	Val	Asp	Lys
145					150					155					160
Lys	Gly	Gly	Thr	Lys	Lys	Ala	Ala	Val	Ser	Glu	Leu	Leu	Gln	Ala	Ser
				165					170					175	
Ala	Pro	Tyr	Lys	Ala	Asp	Val	Glu	Leu	Cys	Val	Tyr	Ser	Thr	Asn	Glu
			180					185					190		
Thr	Thr	Asn	Cys	Thr	Gly	Gly	Lys	Asn	Gly	Ile	Ala	Ala	Asp	Ile	Thr
		195					200					205			
Thr	Ala	Lys	Gly	Tyr	Val	Lys	Ser	Val	Thr	Thr	Ser	Asn	Gly	Ala	Ile
	210					215					220				
Thr	Val	Lys	Gly	Asp	Gly	Thr	Leu	Ala	Asn	Met	Glu	Tyr	Ile	Leu	Gln
225					230					235					240
Ala	Thr	Gly	Asn	Ala	Ala	Thr	Gly	Val	Thr	Trp	Thr	Thr	Thr	Cys	Lys
			245						250					255	
Gly	Thr	Asp	Ala	Ser	Leu	Phe	Pro	Ala	Asn	Phe	Cys	Gly	Ser	Val	Thr
			260					265					270		
Gln	Gly	Gly	His	His	His	His	His	His							
		275					280								

<210> 189
 <211> 840
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> LVL739

<400> 189

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atagcttttg	taaagaatgt	gaattattac	atcgatagtg	aatcgatctg	ggtggataac	180
caagagccac	aaattgtaca	ttttgatgca	gtggtgaatt	tagataaggg	attgtatggt	240
tatcctgagc	ctaaacgtta	tgcacgttct	gttcgtcagt	ataagatctt	gaattgtgca	300
aattatcatt	taactcaagt	acgaactgat	ttctatgatg	aattttgggg	acaggggttg	360
cgggcagcac	ctaaaaagca	aaagaaacat	acgttaagtt	taacacctga	tacaacgctt	420
tataatgctg	ctcagattat	ttgtgcgaac	tatggtgaag	cattttcagt	tgataaaaaa	480
ggcggcacta	aaaaagcagc	ggtatctgaa	ttactgcaag	cgtcagcgcc	ttataaggct	540
gatgtggaat	tatgtgtata	tagcacaat	gaaacaacaa	actgtacggg	tggaaaaaat	600
ggtattgcag	cagatataac	cacagcaaaa	ggctatgtaa	aatcagtgac	aacaagcaac	660
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acaggtaatg	ctgcaacagg	tgtactttgg	acaacaactt	gcaaaggaac	ggatgcctct	780
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<210> 190
 <211> 280
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> LVL739

<400> 190

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Met	Lys	Tyr	Leu	Leu	Pro	Thr	Ala	Ala	Ala	Gly	Leu	Leu	Leu	Ala
1				5				10					15	
Ala	Gln	Pro	Ala	Met	Ala	Ala	Glu	Gln	Asn	Asp	Val	Lys	Leu	Ala
			20					25				30		Pro
Pro	Thr	Asp	Val	Arg	Ser	Gly	Tyr	Ile	Arg	Leu	Val	Lys	Asn	Val
		35					40					45		Asn
Tyr	Tyr	Ile	Asp	Ser	Glu	Ser	Ile	Trp	Val	Asp	Asn	Gln	Glu	Pro
	50					55					60			Gln
Ile	Val	His	Phe	Asp	Ala	Val	Val	Asn	Leu	Asp	Lys	Gly	Leu	Tyr
65					70					75				80
Tyr	Pro	Glu	Pro	Lys	Arg	Tyr	Ala	Arg	Ser	Val	Arg	Gln	Tyr	Lys
				85					90					95
Leu	Asn	Cys	Ala	Asn	Tyr	His	Leu	Thr	Gln	Val	Arg	Thr	Asp	Phe
			100					105					110	Tyr
Asp	Glu	Phe	Trp	Gly	Gln	Gly	Leu	Arg	Ala	Ala	Pro	Lys	Lys	Gln
		115					120					125		Lys
Lys	His	Thr	Leu	Ser	Leu	Thr	Pro	Asp	Thr	Thr	Leu	Tyr	Asn	Ala
	130					135					140			Ala
Gln	Ile	Ile	Cys	Ala	Asn	Tyr	Gly	Glu	Ala	Phe	Ser	Val	Asp	Lys
145					150					155				160
Gly	Gly	Thr	Lys	Lys	Ala	Ala	Val	Ser	Glu	Leu	Leu	Gln	Ala	Ser
			165						170					175
Pro	Tyr	Lys	Ala	Asp	Val	Glu	Leu	Cys	Val	Tyr	Ser	Thr	Asn	Glu
			180					185					190	Thr
Thr	Asn	Cys	Thr	Gly	Gly	Lys	Asn	Gly	Ile	Ala	Ala	Asp	Ile	Thr
		195					200					205		Thr
Ala	Lys	Gly	Tyr	Val	Lys	Ser	Val	Thr	Thr	Ser	Asn	Gly	Ala	Ile
	210					215					220			Thr
Val	Lys	Gly	Asp	Gly	Thr	Leu	Ala	Asn	Met	Glu	Tyr	Ile	Leu	Gln
225					230					235				240
Thr	Gly	Asn	Ala	Ala	Thr	Gly	Val	Thr	Trp	Thr	Thr	Thr	Cys	Lys
			245						250					255
Thr	Asp	Ala	Ser	Leu	Phe	Pro	Ala	Asn	Phe	Cys	Gly	Ser	Val	Thr
			260					265					270	Gln
Gly	Gly	His	His	His	His	His	His							
		275					280							

<210> 191
 <211> 837
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> LVL740

<400> 191

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cgtttggtaa	agaatgtgaa	ttattacatc	gatatggaat	cgatctgggt	ggataaccaa	180
gagccacaaa	ttgtacattt	tgatgcagtg	gtgaatttag	ataagggatt	gtatgtttat	240
cctgagccta	aacgttatgc	acgttctgtt	cgtcagtata	agatcttgaa	ttgtgcaa	300
tatcatttaa	ctcaagtacg	aactgatttc	tatgatgaat	tttggggaca	gggtttgcgg	360
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attgcagcag	atataaccac	agcaaaaagg	tatgtaaaat	cagtgacaac	aagcaacggg	660
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tttccagcaa	atttttgcgg	aagtgtcaca	caaggcggcc	accaccacca	ccaccac	837

<210> 192
 <211> 279
 <212> PRT
 <213> Artificial Sequence

<220>

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<223> LVL740

<400> 192

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Met Lys Tyr Leu Leu Pro Thr Ala Ala Ala Gly Leu Leu Leu Leu Ala
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 20      25      30
Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn Tyr
 35      40      45
Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln Ile
 50      55      60
Val His Phe Asp Ala Val Asn Leu Asp Lys Gly Leu Tyr Val Tyr
 65      70      75      80
Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile Leu
 85      90      95
Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr Asp
100      105      110
Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys Lys
115      120      125
His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala Gln
130      135      140
Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys Gly
145      150      155      160
Gly Thr Lys Lys Ala Val Ser Glu Leu Leu Gln Ala Ser Ala Pro
165      170      175
Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr Ser Thr Asn Glu Thr Thr
180      185      190
Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala Ala Asp Ile Thr Thr Ala
195      200      205
Lys Gly Tyr Val Lys Ser Val Thr Thr Ser Asn Gly Ala Ile Thr Val
210      215      220
Lys Gly Asp Gly Thr Leu Ala Asn Met Glu Tyr Ile Leu Gln Ala Thr
225      230      235      240
Gly Asn Ala Ala Thr Gly Val Thr Trp Thr Thr Cys Lys Gly Thr
245      250      255
Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys Gly Ser Val Thr Gln Gly
260      265      270
Gly His His His His His
275

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<210> 193

<211> 825

<212> DNA

<213> Artificial Sequence

<220>

<223> LVL735

<400> 193

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gtggataacc aagagccaca aattgtacat tttgatgcag tgggtgaattt agataagggg 240
ttgtatgttt atcctgagcc taaacgttat gcacgttctg ttcgtcagta taagatcttg 300
aattgtgcaa attatcattt aactcaagta cgaactgatt tctatgatga attttgggga 360
cagggtttgc gggcagcacc taaaaagcaa aagaaacata cgtaaagttt aacacctgat 420
acaacgcttt ataatgctgc tcagattatt tgtgcgaact atggtgaagc attttcagtt 480
gataaaaaag gcggcactaa aaaagcagcg gtatctgaat tactgcaagc gtcagcgcct 540
tataaggctg atgtggaatt atgtgtatat agcacaatg aaacaacaaa ctgtacgggt 600
ggaaaaaatg gtattgcagc agatataacc acagcaaaag gctatgtaaa atcagtgaca 660
acaagcaacg gtgcaataac agtaaaaggg gatggcacat tggcaaatat ggaatatatt 720
ttgcaagcta caggtaatgc tgcaacaggt gtaacttggg caacaacttg caaaggaacg 780
gatgcctctt tatttccagc aaatttttgc ggaagtgtca caca 825

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<210> 194

<211> 275

<212> PRT

<213> Artificial Sequence

<220>

<223> LVL735

<400> 194

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Met Lys Tyr Leu Leu Pro Thr Ala Ala Ala Gly Leu Leu Leu Leu Ala
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Ala Gln Pro Ala Met Ala Ile Gln Lys Ala Glu Gln Asn Asp Val Lys
 20      25      30
Leu Ala Pro Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys
 35      40      45
Asn Val Asn Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln
 50      55      60
Glu Pro Gln Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly
 65      70      75      80
Leu Tyr Val Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln
 85      90      95
Tyr Lys Ile Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr
100      105      110
Asp Phe Tyr Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys
115      120      125
Lys Gln Lys Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr
130      135      140
Asn Ala Ala Gln Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val
145      150      155      160
Asp Lys Lys Gly Gly Thr Lys Lys Ala Ala Val Ser Glu Leu Leu Gln
165      170      175
Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr Ser Thr
180      185      190
Asn Glu Thr Thr Asn Cys Thr Gly Lys Asn Gly Ile Ala Ala Asp
195      200      205
Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser Asn Gly
210      215      220
Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu Tyr Ile
225      230      235      240
Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr Thr
245      250      255
Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys Gly Ser
260      265      270
Val Thr Gln
275

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<210> 195

<211> 834

<212> DNA

<213> Artificial Sequence

<220>

<223> LVL778

<400> 195

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atgaaatacc tgctgccgac cgctgctgct ggtctgctgc tcctcgctgc ccagccggcg 60
atggccagcg ccagattca gaaggctgaa caaatgatg tgaagctggc accgccgact 120
gatgtacgaa gcgatatat acgtttggta aagaatgtga attattacat cgatagtga 180
tcgatctggg tggataacca agagccacaa attgtacatt ttgatgcagt ggtgaattta 240
gataagggat tgtatgttta tcctgagcct aaacgttatg cacgttctgt tcgtcagtat 300
aagatcttga attgtgcaaa ttatcattta actcaagtac gaactgattt ctatgatgaa 360
ttttggggac agggtttgcg ggcagcacct aaaaagcaaa agaaacatac gttaagttaa 420
acacctgata caacgcttta taatgctgct cagattattt gtgcgaacta tggatgaagca 480
ttttcagttg ataaaaaagg cggcactaaa aaagcagcgg tatctgaatt actgcaagcg 540
tcagcgcctt ataaggctga tgtggaatta tgtgtatata gcacaaatga aacaacaaac 600
tgtacgggtg gaaaaaatgg tattgcagca gatataacca cagcaaaagg ctatgtaaaa 660
tcagtgacaa caagcaacgg tgcaataaca gtaaaagggg atggcacatt ggcaaatatg 720
gaatatattt tgcaagctac aggtaatgct gcaacagggt taacttggac aacaacttgc 780
aaaggaacgg atgcctcttt atttccagca aatttttgcg gaagtgtcac acaa 834

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<210> 196
 <211> 278
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> LVL778

<400> 196
 Met Lys Tyr Leu Leu Pro Thr Ala Ala Ala Gly Leu Leu Leu Leu Ala
 1 5 10 15
 Ala Gln Pro Ala Met Ala Ser Ala Gln Ile Gln Lys Ala Glu Gln Asn
 20 25 30
 Asp Val Lys Leu Ala Pro Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg
 35 40 45
 Leu Val Lys Asn Val Asn Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val
 50 55 60
 Asp Asn Gln Glu Pro Gln Ile Val His Phe Asp Ala Val Val Asn Leu
 65 70 75 80
 Asp Lys Gly Leu Tyr Val Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser
 85 90 95
 Val Arg Gln Tyr Lys Ile Leu Asn Cys Ala Asn Tyr His Leu Thr Gln
 100 105 110
 Val Arg Thr Asp Phe Tyr Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala
 115 120 125
 Ala Pro Lys Lys Gln Lys Lys His Thr Leu Ser Leu Thr Pro Asp Thr
 130 135 140
 Thr Leu Tyr Asn Ala Ala Gln Ile Ile Cys Ala Asn Tyr Gly Glu Ala
 145 150 155 160
 Phe Ser Val Asp Lys Lys Gly Gly Thr Lys Lys Ala Ala Val Ser Glu
 165 170 175
 Leu Leu Gln Ala Ser Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val
 180 185 190
 Tyr Ser Thr Asn Glu Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile
 195 200 205
 Ala Ala Asp Ile Thr Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr
 210 215 220
 Ser Asn Gly Ala Ile Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met
 225 230 235 240
 Glu Tyr Ile Leu Gln Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp
 245 250 255
 Thr Thr Thr Cys Lys Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe
 260 265 270
 Cys Gly Ser Val Thr Gln
 275

<210> 197
 <211> 831
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> LVL779

<400> 197
 atgaaatacc tgctgccgac cgctgctgct ggtctgctgc tcctcgctgc ccagccggcg 60
 atggccgccc agattcagaa ggctgaacaa aatgatgtga agctggcacc gccgactgat 120
 gtacgaagcg gatataacg tttggtaaag aatgtgaatt attacatcga tagtgaatcg 180
 atctgggtgg ataaccaaga gccacaaatt gtacattttg atgcagtggg gaatttagat 240
 aagggtattg atgtttatcc tgagcctaaa cgttatgcac gttctgttcg tcagtataag 300
 atcttgaatt gtgcaaatca tcatttaact caagtacgaa ctgatttcta tgatgaattt 360
 tggggacagg gtttgcgggc agcacctaaa aagcaaaaga aacatacggt aagttaaca 420
 cctgatacaa cgctttataa tgctgctcag attatttgtg cgaactatgg tgaagcattt 480
 tcagttgata aaaaaggcgg cactaaaaaa gcagcgggat ctgaattact gcaagcgtca 540
 gcgccttata aggctgatgt ggaattatgt gtatatagca caaatgaaac aacaaactgt 600
 acgggtggaa aaaatgggtat tgcagcagat ataaccacag caaaaggcta tgtaaaatca 660
 gtgacaacaa gcaacggtgc aataacagta aaaggggatg gcacattggc aaatatggaa 720

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tatattttgc aagctacagg taatgctgca acaggtgtaa cttggacaac aacttgcaaa 780
 ggaacggatg cctctttatt tccagcaaat ttttgcggaa gtgtcacaca a 831

<210> 198

<211> 277

<212> PRT

<213> Artificial Sequence

<220>

<223> LVL779

<400> 198

Met	Lys	Tyr	Leu	Leu	Pro	Thr	Ala	Ala	Ala	Gly	Leu	Leu	Leu	Leu	Ala
1			5						10					15	
Ala	Gln	Pro	Ala	Met	Ala	Ala	Gln	Ile	Gln	Lys	Ala	Glu	Gln	Asn	Asp
			20					25					30		
Val	Lys	Leu	Ala	Pro	Pro	Thr	Asp	Val	Arg	Ser	Gly	Tyr	Ile	Arg	Leu
		35					40					45			
Val	Lys	Asn	Val	Asn	Tyr	Tyr	Ile	Asp	Ser	Glu	Ser	Ile	Trp	Val	Asp
	50					55					60				
Asn	Gln	Glu	Pro	Gln	Ile	Val	His	Phe	Asp	Ala	Val	Val	Asn	Leu	Asp
65					70				75					80	
Lys	Gly	Leu	Tyr	Val	Tyr	Pro	Glu	Pro	Lys	Arg	Tyr	Ala	Arg	Ser	Val
			85					90						95	
Arg	Gln	Tyr	Lys	Ile	Leu	Asn	Cys	Ala	Asn	Tyr	His	Leu	Thr	Gln	Val
			100					105					110		
Arg	Thr	Asp	Phe	Tyr	Asp	Glu	Phe	Trp	Gly	Gln	Gly	Leu	Arg	Ala	Ala
		115					120					125			
Pro	Lys	Lys	Gln	Lys	Lys	His	Thr	Leu	Ser	Leu	Thr	Pro	Asp	Thr	Thr
	130					135					140				
Leu	Tyr	Asn	Ala	Ala	Gln	Ile	Ile	Cys	Ala	Asn	Tyr	Gly	Glu	Ala	Phe
					150				155					160	
Ser	Val	Asp	Lys	Lys	Gly	Gly	Thr	Lys	Lys	Ala	Ala	Val	Ser	Glu	Leu
			165					170						175	
Leu	Gln	Ala	Ser	Ala	Pro	Tyr	Lys	Ala	Asp	Val	Glu	Leu	Cys	Val	Tyr
			180					185					190		
Ser	Thr	Asn	Glu	Thr	Thr	Asn	Cys	Thr	Gly	Gly	Lys	Asn	Gly	Ile	Ala
		195					200					205			
Ala	Asp	Ile	Thr	Thr	Ala	Lys	Gly	Tyr	Val	Lys	Ser	Val	Thr	Thr	Ser
	210					215					220				
Asn	Gly	Ala	Ile	Thr	Val	Lys	Gly	Asp	Gly	Thr	Leu	Ala	Asn	Met	Glu
225					230				235					240	
Tyr	Ile	Leu	Gln	Ala	Thr	Gly	Asn	Ala	Ala	Thr	Gly	Val	Thr	Trp	Thr
			245					250						255	
Thr	Thr	Cys	Lys	Gly	Thr	Asp	Ala	Ser	Leu	Phe	Pro	Ala	Asn	Phe	Cys
		260						265					270		
Gly	Ser	Val	Thr	Gln											
		275													

<210> 199

<211> 819

<212> DNA

<213> Artificial Sequence

<220>

<223> LVL780

<400> 199

atgaaatacc	tgctgccgac	cgctgctgct	ggctctgctgc	tcctcgctgc	ccagccggcg	60
atggccaagg	ctgaacaaaa	tgatgtgaag	ctggcaccgc	cgactgatgt	acgaagcgga	120
tatatacggt	tggtaaagaa	tgtgaattat	tacatcgata	gtgaatcgat	ctgggtggat	180
aaccaagagc	cacaaattgt	acattttgat	gcagtgggtga	atttagataa	gggattgtat	240
gtttatcctg	agcctaaacg	ttatgcacgt	tctgttcgtc	agtataagat	cttgaattgt	300
gcaaattatc	atttaactca	agtacgaact	gatttctatg	atgaattttg	gggacagggt	360
ttgcgggcag	cacctaataa	gcaaaagaaa	catacggtta	gtttaacacc	tgatacaacg	420
ctttataatg	ctgctcagat	tatttgtgcg	aactatgggtg	aagcattttc	agttgataaa	480
aaaggcggca	ctaaaaaagc	agcgggtatct	gaattactgc	aagcgtcagc	gccttataag	540

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gctgatgtgg aattatgtgt atatagcaca aatgaaacaa caaactgtac ggggtggaaaa 600
aatgggtattg cagcagatat aaccacagca aaaggctatg taaaatcagt gacaacaagc 660
aacgggtgcaa taacagtaaa aggggatggc acattggcaa atatggaata tattttgcaa 720
gctacaggta atgctgcaac aggtgtaact tggacaacaa cttgcaaagg aacggatgcc 780
tctttatitc cagcaaattt ttgcggaagt gtcacacaa 819

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<210> 200

<211> 273

<212> PRT

<213> Artificial Sequence

<220>

<223> LVL780

<400> 200

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Met Lys Tyr Leu Leu Pro Thr Ala Ala Ala Gly Leu Leu Leu Leu Ala
1      5      10      15
Ala Gln Pro Ala Met Ala Lys Ala Glu Gln Asn Asp Val Lys Leu Ala
20      25      30
Pro Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val
35      40      45
Asn Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro
50      55      60
Gln Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr
65      70      75      80
Val Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys
85      90      95
Ile Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe
100     105     110
Tyr Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln
115     120     125
Lys Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala
130     135     140
Ala Gln Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys
145     150     155     160
Lys Gly Gly Thr Lys Lys Ala Ala Val Ser Glu Leu Leu Gln Ala Ser
165     170     175
Ala Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr Ser Thr Asn Glu
180     185     190
Thr Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala Ala Asp Ile Thr
195     200     205
Thr Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser Asn Gly Ala Ile
210     215     220
Thr Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu Tyr Ile Leu Gln
225     230     235     240
Ala Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr Thr Thr Cys Lys
245     250     255
Gly Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys Gly Ser Val Thr
260     265     270
Gln

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<210> 201

<211> 816

<212> DNA

<213> Artificial Sequence

<220>

<223> LVL781

<400> 201

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atgaaatacc tgctgccgac cgctgctgct ggtctgctgc tcctcgctgc ccagccggcg 60
atggccgctg aacaaaatga tgtgaagctg gcaccgccga ctgatgtacg aagcggatat 120
atacgttttg taaagaatgt gaattattac atcgatagtg aatcgatctg ggtggataac 180
caagagccac aaattgtaca ttttgatgca gtgggtgaatt tagataaggg attgtatggt 240
tatcctgagc ctaaactgta tgcacgttct gttcgtcagt ataagatctt gaattgtgca 300
aattatcatt taactcaagt acgaactgat ttctatgatg aattttgggg acagggtttg 360

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cgggcagcac ctaaaaagca aaagaaacat acgttaagtt taacacctga tacaacgctt 420
tataatgctg ctcagattat ttgtgcgaac tatggtgaag ctttttcagt tgataaaaaa 480
ggcggcacta aaaaagcagc ggtatctgaa ttactgcaag cgtcagcgcc ttataaggct 540
gatgtggaat tatgtgtata tagcacaacaa gaaacaacaa actgtacggg tggaaaaaat 600
ggtattgcag cagatataac cacagcaaaa ggctatgtaa aatcagtgcg aacaagcaac 660
ggtgcaataa cagtaaaagg ggatggcaca ttggcaaata tgggaatatat tttgcaagct 720
acaggtaatg ctgcaacagg tgtaacttgg acaacaactt gcaaaggaac ggatgcctct 780
ttatttccag caaatTTTTT cggaagtgtc acacaa 816

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<210> 202

<211> 272

<212> PRT

<213> Artificial Sequence

<220>

<223> LVL781

<400> 202

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Met Lys Tyr Leu Leu Pro Thr Ala Ala Ala Gly Leu Leu Leu Leu Ala
1      5      10      15
Ala Gln Pro Ala Met Ala Ala Glu Gln Asn Asp Val Lys Leu Ala Pro
20      25      30
Pro Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn
35      40      45
Tyr Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln
50      55      60
Ile Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val
65      70      75      80
Tyr Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile
85      90      95
Leu Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr
100      105      110
Asp Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys
115      120      125
Lys His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala
130      135      140
Gln Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys
145      150      155      160
Gly Gly Thr Lys Lys Ala Ala Val Ser Glu Leu Leu Gln Ala Ser Ala
165      170      175
Pro Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr Ser Thr Asn Glu Thr
180      185      190
Thr Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala Ala Asp Ile Thr Thr
195      200      205
Ala Lys Gly Tyr Val Lys Ser Val Thr Thr Ser Asn Gly Ala Ile Thr
210      215      220
Val Lys Gly Asp Gly Thr Leu Ala Asn Met Glu Tyr Ile Leu Gln Ala
225      230      235      240
Thr Gly Asn Ala Ala Thr Gly Val Thr Trp Thr Thr Thr Cys Lys Gly
245      250      255
Thr Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys Gly Ser Val Thr Gln
260      265      270

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<210> 203

<211> 813

<212> DNA

<213> Artificial Sequence

<220>

<223> LVL782

<400> 203

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atggccgaac aaaatgatgt gaagctggca ccgccgactg atgtacgaag cggatatata 120
cgtttggtaa agaatgtgaa ttattacatc gatagtgaat cgatctgggt ggataacca 180
gagccacaaa ttgtacattt tgatgcagtg gtgaatttag ataagggtatt gtatgtttat 240
cctgagccta aacgttatgc acgttctgtt cgtcagtata agatcttgaa ttgtgcaaat 300

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pctca2012050236-seq1

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tattcatttaa ctcaagtacg aactgatttc tatgatgaat tttggggaca gggtttgcgg 360
gcagcaccta aaaagcaaaa gaaacatacg ttaagttaa cacctgatac aacgctttat 420
aatgctgctc agattatttg tgcgaactat ggtgaagcat tttcagttga taaaaaaggc 480
ggcactaaaa aagcagcggt atctgaatta ctgcaagcgt cagcgcctta taaggctgat 540
gtggaattat gtgtatatag cacaatgaa acaaaaact gtacgggtgg aaaaaatggt 600
attgcagcag atataaccac agcaaaaggc tatgtaaaat cagtgacaac aagcaacggt 660
gcaataacag taaaagggga tggcacattg gcaaatatgg aatatatttt gcaagctaca 720
ggtaatgctg caacaggtgt aacttggaca acaacttgca aaggaacgga tgcctcttta 780
tttccagcaa atttttgcgg aagtgtcaca caa 813

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<210> 204

<211> 271

<212> PRT

<213> Artificial Sequence

<220>

<223> LVL782

<400> 204

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Met Lys Tyr Leu Leu Pro Thr Ala Ala Ala Gly Leu Leu Leu Leu Ala
 1      5      10      15
Ala Gln Pro Ala Met Ala Glu Gln Asn Asp Val Lys Leu Ala Pro Pro
 20      25      30
Thr Asp Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn Tyr
 35      40      45
Tyr Ile Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln Ile
 50      55      60
Val His Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val Tyr
 65      70      75      80
Pro Glu Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile Leu
 85      90      95
Asn Cys Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr Asp
100      105      110
Glu Phe Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys Lys
115      120      125
His Thr Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala Gln
130      135      140
Ile Ile Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys Gly
145      150      155      160
Gly Thr Lys Lys Ala Ala Val Ser Glu Leu Leu Gln Ala Ser Ala Pro
165      170      175
Tyr Lys Ala Asp Val Glu Leu Cys Val Tyr Ser Thr Asn Glu Thr Thr
180      185      190
Asn Cys Thr Gly Gly Lys Asn Gly Ile Ala Ala Asp Ile Thr Thr Ala
195      200      205
Lys Gly Tyr Val Lys Ser Val Thr Thr Ser Asn Gly Ala Ile Thr Val
210      215      220
Lys Gly Asp Gly Thr Leu Ala Asn Met Glu Tyr Ile Leu Gln Ala Thr
225      230      235      240
Gly Asn Ala Ala Thr Gly Val Thr Trp Thr Thr Thr Cys Lys Gly Thr
245      250      255
Asp Ala Ser Leu Phe Pro Ala Asn Phe Cys Gly Ser Val Thr Gln
260      265      270

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<210> 205

<211> 95

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<400> 205

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gatatacata tgaaatacct gctgccgacc gctgctgctg gtctgctgct cctcgctgcc 60
cagccggcga tggccattca gaaggctgaa caaaa 95

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<210> 206

pctca2012050236-seq1

<211> 39
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 206
ggccgcaagc ttttagtggt ggtggtggtg gtggccgcc 39

<210> 207
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 207
ggccgcaagc ttttattgtg tgacacttcc 30

<210> 208
<211> 42
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 208
gctgcccagc cggcgatggc caaggctgaa caaatgatg tg 42

<210> 209
<211> 42
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 209
cacatcattt tggtcagcct tggccatcgc cggctgggca gc 42

<210> 210
<211> 43
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 210
gctgcccagc cggcgatggc cgctgaacaa aatgatgtga agc 43

<210> 211
<211> 43
<212> DNA
<213> Artificial Sequence

<220>
<223> primer

<400> 211
gcttcacatc attttgttca gcggccatcg ccggctgggc agc 43

<210> 212
<211> 43
<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<400> 212

gctgcccagc cggcgatggc cgaacaaaat gatgtgaagc tgg

43

<210> 213

<211> 43

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<400> 213

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43

<210> 214

<211> 43

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<400> 214

gctgcccagc cggcgatggc cgcccagatt cagaaggctg aac

43

<210> 215

<211> 43

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<400> 215

gttcagcctt ctgaatctgg gcggccatcg ccggctgggc agc

43

<210> 216

<211> 46

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<400> 216

gctgcccagc cggcgatggc cagcgcccag attcagaagg ctgaac

46

<210> 217

<211> 46

<212> DNA

<213> Artificial Sequence

<220>

<223> primer

<400> 217

gttcagcctt ctgaatctgg gcgctggcca tcgccggctg ggcagc

46

<210> 218

<211> 30

<212> DNA

<213> Artificial Sequence

pctca2012050236-seq1

<220>
 <223> primer

<400> 218
 cacacacata tgaaatacct gctgccgacc

30

<210> 219
 <211> 253
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> FUSION PROTEIN

<400> 219
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 1 5 10 15
 Val Arg Ser Gly Tyr Ile Arg Leu Val Lys Asn Val Asn Tyr Tyr Ile
 20 25 30
 Asp Ser Glu Ser Ile Trp Val Asp Asn Gln Glu Pro Gln Ile Val His
 35 40 45
 Phe Asp Ala Val Val Asn Leu Asp Lys Gly Leu Tyr Val Tyr Pro Glu
 50 55 60
 Pro Lys Arg Tyr Ala Arg Ser Val Arg Gln Tyr Lys Ile Leu Asn Cys
 65 70 75 80
 Ala Asn Tyr His Leu Thr Gln Val Arg Thr Asp Phe Tyr Asp Glu Phe
 85 90 95
 Trp Gly Gln Gly Leu Arg Ala Ala Pro Lys Lys Gln Lys Lys His Thr
 100 105 110
 Leu Ser Leu Thr Pro Asp Thr Thr Leu Tyr Asn Ala Ala Gln Ile Ile
 115 120 125
 Cys Ala Asn Tyr Gly Glu Ala Phe Ser Val Asp Lys Lys Gly Gly Thr
 130 135 140
 Lys Lys Ala Ala Val Ser Glu Leu Leu Gln Ala Ser Ala Pro Tyr Lys
 145 150 155 160
 Ala Asp Val Glu Leu Cys Val Tyr Ser Thr Asn Glu Thr Thr Asn Cys
 165 170 175
 Thr Gly Gly Lys Asn Gly Ile Ala Ala Asp Ile Thr Thr Ala Lys Gly
 180 185 190
 Tyr Val Lys Ser Val Thr Thr Ser Asn Gly Ala Ile Thr Val Lys Gly
 195 200 205
 Asp Gly Thr Leu Ala Asn Met Glu Tyr Ile Leu Gln Ala Thr Gly Asn
 210 215 220
 Ala Ala Thr Gly Val Thr Trp Thr Thr Thr Cys Lys Gly Thr Asp Ala
 225 230 235 240
 Ser Leu Phe Pro Ala Asn Phe Cys Gly Ser Val Thr Gln
 245 250