SEQUENCE LISTING

<110> American Type Culture Collection (ATCC)

<120> Virus-Like Particles Comprising Zika Antigen

<130> 32262/52049A

<150> US 62/524,440
<151> 2017-06-23

<160> 106

<170> PatentIn version 3.5

<210> 1
<211> 188
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> Woodchuck hepatitis core antigen (WHcAg)

<400> 1

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1 5 10 15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
20 25 30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
35 40 45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
50 55 60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Thr Ser Glu Gln
65 70 75 80

Val Arg Thr Ile Ile Val Asn His Val Asn Asp Thr Trp Gly Leu Lys
85 90 95

```
Val Arg Gln Ser Leu Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln
            100                 105                 110

His Thr Val Gln Glu Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr
        115                 120                 125

Pro Ala Pro Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro
    130                 135                 140

Glu His Thr Val Ile Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser
145                 150                 155                 160

Pro Arg Arg Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro
                165                 170                 175

Arg Arg Arg Arg Ser Gln Ser Pro Ser Ala Asn Cys
            180                 185
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<210> 2
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<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> Envelope domain 3 full length

<400> 2

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His Leu Lys Cys Arg Leu Lys Met Asp Lys Leu Arg Leu Lys Gly Val
1               5                   10                  15

Ser Tyr Ser Leu Cys Thr Ala Ala Phe Thr Phe Thr Lys Ile Pro Ala
            20                  25                  30

Glu Thr Leu His Gly Thr Val Thr Val Glu Val Gln Tyr Ala Gly Thr
        35                  40                  45

Asp Gly Pro Cys Lys Val Pro Ala Gln Met Ala Val Asp Met Gln Thr
    50                  55                  60
```

```
Leu Thr Pro Val Gly Arg Leu Ile Thr Ala Asn Pro Val Ile Thr Glu
65                  70                  75                  80


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


Asp Ser Tyr Ile Val Ile Gly Val Gly Glu Lys Lys Ile Thr His His
            100                 105                 110


Trp His Arg Ser Gly Ser Thr Ile Gly Lys Ala Phe Glu Ala Thr Val
        115                 120                 125


Arg Gly Ala Lys Arg Met Ala Val
    130                 135
```

<210> 3
<211> 80
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> Envelope domain 3 G (EDIII) G loop-truncated

<400> 3

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Ala Phe Thr Phe Thr Lys Ile Pro Ala Glu Thr Leu His Gly Thr Val
1               5                   10                  15


Thr Val Glu Leu Gln Tyr Ala Gly Thr Asp Gly Pro Cys Lys Val Pro
            20                  25                  30


Ala Gln Met Ala Val Asp Met Gln Thr Leu Thr Pro Val Gly Arg Leu
        35                  40                  45


Ile Thr Ala Asn Pro Val Ile Thr Glu Ser Thr Glu Asn Ser Lys Met
    50                  55                  60


Met Leu Glu Leu Asp Pro Pro Phe Gly Asp Ser Tyr Ile Val Ile Gly
65                  70                  75                  80
```

<210> 4
<211> 23
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> Envelope domain 3, A-B loop

<400> 4

Ala Phe Thr Phe Thr Lys Ile Pro Ala Glu Thr Leu His Gly Thr Val
1 5 10 15

Thr Val Glu Leu Gln Tyr Ala
20

<210> 5
<211> 29
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> Envelope domain 3, CXCDDX loop

<400> 5

Pro Cys Lys Val Pro Ala Gln Met Ala Val Asp Met Gln Thr Leu Thr
1 5 10 15

Pro Val Gly Arg Leu Ile Thr Ala Asn Pro Val Ile Thr
20 25

<210> 6
<211> 24
<212> PRT
<213> Artificial Sequence

<220>

<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> Envelope domain 3, DX-E loop

<400> 6

Arg Leu Ile Thr Ala Asn Pro Val Ile Thr Glu Ser Thr Glu Asn Ser
1 5 10 15

Lys Met Met Leu Glu Leu Asp Pro
20

<210> 7
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
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<220>
<221> MISC_FEATURE
<223> Envelope domain 3, F-G loop

<400> 7

Gly Asp Ser Tyr Ile Val Ile Gly Val Gly Glu Lys Lys Ile Thr His
1 5 10 15

His Trp His Arg
20

<210> 8
<211> 13
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
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<223> Envelope fusion loop

<400> 8

Asp Arg Gly Trp Gly Asn Gly Cys Gly Leu Phe Gly Lys
1 5 10

<210> 9
<211> 92
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> Envelope domain 2 (ED2) sequence A-E

<400> 9

Thr Thr Thr Val Ser Asn Met Ala Glu Val Arg Ser Tyr Cys Tyr Glu
1 5 10 15

Ala Ser Ile Ser Asp Met Ala Ser Asp Ser Arg Cys Pro Thr Gln Gly
20 25 30

Glu Ala Tyr Leu Asp Lys Gln Ser Asp Thr Gln Tyr Val Cys Lys Arg
35 40 45

Thr Leu Val Asp Arg Gly Trp Gly Asn Gly Cys Gly Leu Phe Gly Lys
50 55 60

Gly Ser Leu Val Thr Cys Ala Lys Phe Ala Cys Ser Lys Lys Met Thr
65 70 75 80

Gly Lys Ser Ile Gln Pro Glu Asn Leu Glu Tyr Arg
85 90

<210> 10
<211> 61
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>

<221> MISC_FEATURE
<223> Envelope domain 2 sequence B-D

<400> 10

Glu Ala Ser Ile Ser Asp Met Ala Ser Asp Ser Arg Cys Pro Thr Gln
1 5 10 15

Gly Glu Ala Tyr Leu Asp Lys Gln Ser Asp Thr Gln Tyr Val Cys Lys
20 25 30

Arg Thr Leu Val Asp Arg Gly Trp Gly Asn Gly Cys Gly Leu Phe Gly
35 40 45

Lys Gly Ser Leu Val Thr Cys Ala Lys Phe Ala Cys Ser
50 55 60

<210> 11
<211> 82
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> Envelope domain 1 glycan loop

<400> 11

Met Thr Gly Lys Ser Ile Gln Pro Glu Asn Leu Glu Tyr Arg Ile Met
1 5 10 15

Leu Ser Val His Gly Ser Gln His Ser Gly Met Ile Val Asn Asp Thr
20 25 30

Gly His Glu Thr Asp Glu Asn Arg Ala Lys Val Glu Ile Thr Pro Asn
35 40 45

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

Asp Cys Glu Pro Arg Thr Gly Leu Asp Phe Ser Asp Leu Tyr Tyr Leu
65 70 75 80

Thr Met

<210> 12
<211> 327
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 1) PLUS SEQ ID NO: 2

<400> 12

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1 5 10 15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
20 25 30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
35 40 45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
50 55 60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Gly Gly
65 70 75 80

Thr His Leu Lys Cys Arg Leu Lys Met Asp Lys Leu Arg Leu Lys Gly
85 90 95

Val Ser Tyr Ser Leu Cys Thr Ala Ala Phe Thr Phe Thr Lys Ile Pro
100 105 110

Ala Glu Thr Leu His Gly Thr Val Thr Val Glu Val Gln Tyr Ala Gly
115 120 125

Thr Asp Gly Pro Cys Lys Val Pro Ala Gln Met Ala Val Asp Met Gln

```
    130                 135                 140

Thr Leu Thr Pro Val Gly Arg Leu Ile Thr Ala Asn Pro Val Ile Thr
145                 150                 155                 160

Glu Ser Thr Glu Asn Ser Lys Met Met Leu Glu Leu Asp Pro Pro Phe
                165                 170                 175

Gly Asp Ser Tyr Ile Val Ile Gly Val Gly Glu Lys Lys Ile Thr His
            180                 185                 190

His Trp His Arg Ser Gly Ser Thr Ile Gly Lys Ala Phe Glu Ala Thr
        195                 200                 205

Val Arg Gly Ala Lys Arg Met Ala Val Gly Gly Gly Gly Thr Ile Ile
    210                 215                 220

Val Asn His Val Asn Asp Thr Trp Gly Leu Lys Val Arg Gln Ser Leu
225                 230                 235                 240

Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln His Thr Val Gln Glu
                245                 250                 255

Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Ala Pro Tyr Arg
            260                 265                 270

Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu His Thr Val Ile
        275                 280                 285

Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser Pro Arg Arg Arg Thr
    290                 295                 300

Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser
305                 310                 315                 320

Gln Ser Pro Ser Ala Asn Cys
                325
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<210> 13
<211> 262
<212> PRT

<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 1) PLUS SEQ ID NO: 3

<400> 13

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1 5 10 15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
20 25 30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
35 40 45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
50 55 60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Ala Phe Thr Phe
65 70 75 80

Thr Lys Ile Pro Ala Glu Thr Leu His Gly Thr Val Thr Val Glu Leu
85 90 95

Gln Tyr Ala Gly Thr Asp Gly Pro Cys Lys Val Pro Ala Gln Met Ala
100 105 110

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

Pro Val Ile Thr Glu Ser Thr Glu Asn Ser Lys Met Met Leu Glu Leu
130 135 140

Asp Pro Pro Phe Gly Asp Ser Tyr Ile Val Ile Gly Thr Ile Ile Val
145 150 155 160

Asn His Val Asn Asp Thr Trp Gly Leu Lys Val Arg Gln Ser Leu Trp
165 170 175

```
Phe His Leu Ser Cys Leu Thr Phe Gly Gln His Thr Val Gln Glu Phe
            180                 185                 190

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

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

Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser Pro Arg Arg Arg Thr Pro
225                 230                 235                 240

Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser Gln
                245                 250                 255

Ser Pro Ser Ala Asn Cys
            260
```

<210> 14
<211> 205
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 1) PLUS SEQ ID NO: 4

<400> 14

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Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1               5                   10                  15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
            20                  25                  30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
        35                  40                  45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
```

50 55 60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Ala Phe Thr Phe
65 70 75 80

Thr Lys Ile Pro Ala Glu Thr Leu His Gly Thr Val Thr Val Glu Leu
85 90 95

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

Lys Val Arg Gln Ser Leu Trp Phe His Leu Ser Cys Leu Thr Phe Gly
115 120 125

Gln His Thr Val Gln Glu Phe Leu Val Ser Phe Gly Val Trp Ile Arg
130 135 140

Thr Pro Ala Pro Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu
145 150 155 160

Pro Glu His Thr Val Ile Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg
165 170 175

Ser Pro Arg Arg Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser
180 185 190

Pro Arg Arg Arg Arg Ser Gln Ser Pro Ser Ala Asn Cys
195 200 205

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

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 1) PLUS SEQ ID NO: 5

<400> 15

```
Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1               5                  10                  15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
            20                  25                  30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
        35                  40                  45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
    50                  55                  60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Pro Cys Lys Val
65                  70                  75                  80

Pro Ala Gln Met Ala Val Asp Met Gln Thr Leu Thr Pro Val Gly Arg
                85                  90                  95

Leu Ile Thr Ala Asn Pro Val Ile Thr Thr Ile Ile Val Asn His Val
            100                 105                 110

Asn Asp Thr Trp Gly Leu Lys Val Arg Gln Ser Leu Trp Phe His Leu
        115                 120                 125

Ser Cys Leu Thr Phe Gly Gln His Thr Val Gln Glu Phe Leu Val Ser
    130                 135                 140

Phe Gly Val Trp Ile Arg Thr Pro Ala Pro Tyr Arg Pro Pro Asn Ala
145                 150                 155                 160

Pro Ile Leu Ser Thr Leu Pro Glu His Thr Val Ile Arg Arg Arg Gly
                165                 170                 175

Gly Ala Arg Ala Ser Arg Ser Pro Arg Arg Arg Thr Pro Ser Pro Arg
            180                 185                 190

Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Ser
        195                 200                 205

Ala Asn Cys
    210
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<210> 16
<211> 206
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 1) PLUS SEQ ID NO: 6

<400> 16

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1 5 10 15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
20 25 30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
35 40 45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
50 55 60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Arg Leu Ile Thr
65 70 75 80

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

Glu Leu Asp Pro Thr Ile Ile Val Asn His Val Asn Asp Thr Trp Gly
100 105 110

Leu Lys Val Arg Gln Ser Leu Trp Phe His Leu Ser Cys Leu Thr Phe
115 120 125

Gly Gln His Thr Val Gln Glu Phe Leu Val Ser Phe Gly Val Trp Ile
130 135 140

Arg Thr Pro Ala Pro Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr

145 150 155 160

Leu Pro Glu His Thr Val Ile Arg Arg Arg Gly Gly Ala Arg Ala Ser
165 170 175

Arg Ser Pro Arg Arg Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln
180 185 190

Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Ser Ala Asn Cys
195 200 205

<210> 17
<211> 202
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 1) PLUS SEQ ID NO: 7

<400> 17

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1 5 10 15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
20 25 30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
35 40 45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
50 55 60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Asp Ser Tyr
65 70 75 80

Ile Val Ile Gly Val Gly Glu Lys Lys Ile Thr His His Trp His Arg
85 90 95

```
Thr Ile Ile Val Asn His Val Asn Asp Thr Trp Gly Leu Lys Val Arg
            100                 105                 110

Gln Ser Leu Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln His Thr
        115                 120                 125

Val Gln Glu Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Ala
    130                 135                 140

Pro Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu His
145                 150                 155                 160

Thr Val Ile Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser Pro Arg
                165                 170                 175

Arg Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg
            180                 185                 190

Arg Arg Ser Gln Ser Pro Ser Ala Asn Cys
        195                 200
```

<210> 18
<211> 200
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 1) PLUS SEQ ID NO: 8

<400> 18

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Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1               5                   10                  15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
            20                  25                  30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
        35                  40                  45
```

```
Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
    50                  55                  60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Thr Asp
65                  70                  75                  80

Arg Gly Trp Gly Asn Gly Cys Gly Leu Phe Gly Lys Gly Gly Thr Ile
                85                  90                  95

Ile Val Asn His Val Asn Asp Thr Trp Gly Leu Lys Val Arg Gln Ser
            100                 105                 110

Leu Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln His Thr Val Gln
        115                 120                 125

Glu Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Ala Pro Tyr
    130                 135                 140

Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu His Thr Val
145                 150                 155                 160

Ile Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser Pro Arg Arg Arg
                165                 170                 175

Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg
            180                 185                 190

Ser Gln Ser Pro Ser Ala Asn Cys
        195                 200


<210>  19
<211>  278
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Synthetic Polypeptide


<220>
<221>  MISC_FEATURE
<223>  WHcAg (SEQ ID NO: 1) PLUS SEQ ID NO: 9
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<400> 19

```
Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1               5                  10                  15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
            20                  25                  30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
        35                  40                  45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
    50                  55                  60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Thr Thr
65                  70                  75                  80

Thr Val Ser Asn Met Ala Glu Val Arg Ser Tyr Cys Tyr Glu Ala Ser
                85                  90                  95

Ile Ser Asp Met Ala Ser Asp Ser Arg Cys Pro Thr Gln Gly Glu Ala
            100                 105                 110

Tyr Leu Asp Lys Gln Ser Asp Thr Gln Tyr Val Cys Lys Arg Thr Leu
        115                 120                 125

Val Asp Arg Gly Trp Gly Asn Gly Cys Gly Leu Phe Gly Lys Gly Ser
    130                 135                 140

Leu Val Thr Cys Ala Lys Phe Ala Cys Ser Lys Lys Met Thr Gly Lys
145                 150                 155                 160

Ser Ile Gln Pro Glu Asn Leu Glu Tyr Arg Gly Gly Thr Ile Ile Val
                165                 170                 175

Asn His Val Asn Asp Thr Trp Gly Leu Lys Val Arg Gln Ser Leu Trp
            180                 185                 190

Phe His Leu Ser Cys Leu Thr Phe Gly Gln His Thr Val Gln Glu Phe
        195                 200                 205
```

```
Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Ala Pro Tyr Arg Pro
    210                 215                 220

Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu His Thr Val Ile Arg
225                 230                 235                 240

Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser Pro Arg Arg Arg Thr Pro
                245                 250                 255

Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser Gln
            260                 265                 270

Ser Pro Ser Ala Asn Cys
        275
```

<210> 20
<211> 247
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 1) PLUS SEQ ID NO: 10

<400> 20

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Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1               5                   10                  15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
            20                  25                  30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
        35                  40                  45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
    50                  55                  60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Glu Ala
65                  70                  75                  80
```

```
Ser Ile Ser Asp Met Ala Ser Asp Ser Arg Cys Pro Thr Gln Gly Glu
                85                  90                  95

Ala Tyr Leu Asp Lys Gln Ser Asp Thr Gln Tyr Val Cys Lys Arg Thr
            100                 105                 110

Leu Val Asp Arg Gly Trp Gly Asn Gly Cys Gly Leu Phe Gly Lys Gly
        115                 120                 125

Ser Leu Val Thr Cys Ala Lys Phe Ala Cys Ser Gly Gly Thr Ile Ile
    130                 135                 140

Val Asn His Val Asn Asp Thr Trp Gly Leu Lys Val Arg Gln Ser Leu
145                 150                 155                 160

Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln His Thr Val Gln Glu
                165                 170                 175

Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Ala Pro Tyr Arg
            180                 185                 190

Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu His Thr Val Ile
        195                 200                 205

Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser Pro Arg Arg Arg Thr
    210                 215                 220

Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser
225                 230                 235                 240

Gln Ser Pro Ser Ala Asn Cys
                245
```

<210> 21
<211> 268
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 1) PLUS SEQ ID NO: 11

<400> 21

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Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1               5                  10                  15


Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
            20                  25                  30


Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
        35                  40                  45


Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
    50                  55                  60


Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Met Thr
65                  70                  75                  80


Gly Lys Ser Ile Gln Pro Glu Asn Leu Glu Tyr Arg Ile Met Leu Ser
                85                  90                  95


Val His Gly Ser Gln His Ser Gly Met Ile Val Asn Asp Thr Gly His
            100                 105                 110


Glu Thr Asp Glu Asn Arg Ala Lys Val Glu Ile Thr Pro Asn Ser Pro
        115                 120                 125


Arg Ala Glu Ala Thr Leu Gly Gly Phe Gly Ser Leu Gly Leu Asp Cys
    130                 135                 140


Glu Pro Arg Thr Gly Leu Asp Phe Ser Asp Leu Tyr Tyr Leu Thr Met
145                 150                 155                 160


Gly Gly Thr Ile Ile Val Asn His Val Asn Asp Thr Trp Gly Leu Lys
                165                 170                 175


Val Arg Gln Ser Leu Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln
            180                 185                 190
```

```
His Thr Val Gln Glu Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr
        195                 200                 205

Pro Ala Pro Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro
    210                 215                 220

Glu His Thr Val Ile Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser
225                 230                 235                 240

Pro Arg Arg Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro
                245                 250                 255

Arg Arg Arg Arg Ser Gln Ser Pro Ser Ala Asn Cys
            260                 265
```

<210> 22
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> NS1 Beta 1-2

<400> 22

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Asp Val Gly Cys Ser Val Asp Phe Ser Lys Lys Glu Thr Arg Cys Gly
1               5                   10                  15

Thr
```

<210> 23
<211> 33
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE

<223> NS1 Beta 3-4

<400> 23

Asp Arg Tyr Lys Tyr His Pro Asp Ser Pro Arg Arg Leu Ala Ala Ala
1 5 10 15

Val Lys Gln Ala Trp Glu Asp Gly Ile Cys Gly Ile Ser Ser Val Ser
20 25 30

Arg

<210> 24
<211> 31
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> NS1 Alpha 2-Beta 5

<400> 24

Met Glu Asn Ile Met Trp Arg Ser Val Glu Gly Glu Leu Asn Ala Ile
1 5 10 15

Leu Glu Glu Asn Gly Val Gln Leu Thr Val Val Val Gly Ser Val
20 25 30

<210> 25
<211> 89
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> NS1 Beta 4-5-6

<400> 25

```
Cys Gly Ile Ser Ser Val Ser Arg Met Glu Asn Ile Met Trp Arg Ser
1               5                   10                  15

Val Glu Gly Glu Leu Asn Ala Ile Leu Glu Glu Asn Gly Val Gln Leu
            20                  25                  30

Thr Val Val Val Gly Ser Val Lys Asn Pro Met Trp Arg Gly Pro Gln
        35                  40                  45

Arg Leu Pro Val Pro Val Asn Glu Leu Pro His Gly Trp Lys Ala Trp
    50                  55                  60

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

Val Asp Gly Asp Thr Leu Lys Glu Cys
                85
```

<210> 26
<211> 44
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> NS1 Intertwined Loop-Beta 6

<400> 26

```
Lys Asn Pro Met Trp Arg Gly Pro Gln Arg Leu Pro Val Pro Val Asn
1               5                   10                  15

Glu Leu Pro His Gly Trp Lys Ala Trp Gly Lys Ser Tyr Phe Val Arg
            20                  25                  30

Ala Ala Lys Thr Asn Asn Ser Phe Val Val Asp Gly
        35                  40
```

<210> 27
<211> 41
<212> PRT

<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> NS1 Beta 7-8-9

<400> 27

Asp Thr Leu Lys Glu Cys Pro Leu Lys His Arg Ala Trp Asn Ser Phe
1 5 10 15

Leu Val Glu Asp His Gly Phe Gly Val Phe His Thr Ser Val Trp Leu
20 25 30

Lys Val Arg Glu Asp Tyr Ser Leu Glu
35 40

<210> 28
<211> 45
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> NS1 Beta 10-11-12-13

<400> 28

Cys Asp Pro Ala Val Ile Gly Thr Ala Val Lys Gly Lys Glu Ala Val
1 5 10 15

His Ser Asp Leu Gly Tyr Trp Ile Glu Ser Glu Lys Asn Asp Thr Trp
20 25 30

Arg Leu Lys Arg Ala His Leu Ile Glu Met Lys Thr Cys
35 40 45

<210> 29
<211> 20
<212> PRT

<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> NS1 Beta 12-13

<400> 29

Gly Tyr Trp Ile Glu Ser Glu Lys Asn Asp Thr Trp Arg Leu Lys Arg
1 5 10 15

Ala His Leu Ile
20

<210> 30
<211> 63
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> NS1 Spaghetti Loop-Beta 14

<400> 30

Arg Ala His Leu Ile Glu Met Lys Thr Cys Glu Trp Pro Lys Ser His
1 5 10 15

Thr Leu Trp Thr Asp Gly Ile Glu Glu Ser Asp Leu Ile Ile Pro Lys
20 25 30

Ser Leu Ala Gly Pro Leu Ser His His Asn Thr Arg Glu Gly Tyr Arg
35 40 45

Thr Gln Met Lys Gly Pro Trp His Ser Glu Glu Leu Glu Ile Arg
50 55 60

<210> 31
<211> 54
<212> PRT

<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> NS1 Beta 14-15-16-17

<400> 31

Leu Glu Ile Arg Phe Glu Glu Cys Pro Gly Thr Lys Val His Val Glu
1 5 10 15

Glu Thr Cys Gly Thr Arg Gly Pro Ser Leu Arg Ser Thr Thr Ala Ser
20 25 30

Gly Arg Val Ile Glu Glu Trp Cys Cys Arg Glu Cys Thr Met Pro Pro
35 40 45

Leu Ser Phe Arg Ala Lys
50

<210> 32
<211> 50
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> NS1 Beta 15-16-17-18

<400> 32

Cys Pro Gly Thr Lys Val His Val Glu Glu Thr Cys Gly Thr Arg Gly
1 5 10 15

Pro Ser Leu Arg Ser Thr Thr Ala Ser Gly Arg Val Ile Glu Glu Trp
20 25 30

Cys Cys Arg Glu Cys Thr Met Pro Pro Leu Ser Phe Arg Ala Lys Asp
35 40 45

Gly Cys
50

<210> 33
<211> 89
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> NS1 Beta 14-15-16-17-18-19-C terminus

<400> 33

Met Lys Gly Pro Trp His Ser Glu Glu Leu Glu Ile Arg Phe Glu Glu
1 5 10 15

Cys Pro Gly Thr Lys Val His Val Glu Glu Thr Cys Gly Thr Arg Gly
20 25 30

Pro Ser Leu Arg Ser Thr Thr Ala Ser Gly Arg Val Ile Glu Glu Trp
35 40 45

Cys Cys Arg Glu Cys Thr Met Pro Pro Leu Ser Phe Arg Ala Lys Asp
50 55 60

Gly Cys Trp Tyr Gly Met Glu Ile Arg Pro Arg Lys Glu Pro Glu Ser
65 70 75 80

Asn Leu Val Arg Ser Met Val Thr Ala
85

<210> 34
<211> 208
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>

<221> MISC_FEATURE
<223> WHcAg (SEQ. ID NO: 1) PLUS SEQ. ID NO:22

<400> 34

```
Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1               5                  10                  15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
            20                  25                  30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
        35                  40                  45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
    50                  55                  60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Gly Gly
65                  70                  75                  80

Thr Asp Val Gly Cys Ser Val Asp Phe Ser Lys Lys Glu Thr Arg Cys
                85                  90                  95

Gly Thr Gly Gly Gly Gly Thr Ile Ile Val Asn His Val Asn Asp Thr
            100                 105                 110

Trp Gly Leu Lys Val Arg Gln Ser Leu Trp Phe His Leu Ser Cys Leu
        115                 120                 125

Thr Phe Gly Gln His Thr Val Gln Glu Phe Leu Val Ser Phe Gly Val
    130                 135                 140

Trp Ile Arg Thr Pro Ala Pro Tyr Arg Pro Pro Asn Ala Pro Ile Leu
145                 150                 155                 160

Ser Thr Leu Pro Glu His Thr Val Ile Arg Arg Arg Gly Gly Ala Arg
                165                 170                 175

Ala Ser Arg Ser Pro Arg Arg Arg Thr Pro Ser Pro Arg Arg Arg Arg
            180                 185                 190

Ser Gln Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Ser Ala Asn Cys
```

195 200 205

<210> 35
<211> 224
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ. ID NO: 1) PLUS SEQ. ID NO:23

<400> 35

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1 5 10 15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
20 25 30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
35 40 45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
50 55 60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Gly Gly
65 70 75 80

Thr Asp Arg Tyr Lys Tyr His Pro Asp Ser Pro Arg Arg Leu Ala Ala
85 90 95

Ala Val Lys Gln Ala Trp Glu Asp Gly Ile Cys Gly Ile Ser Ser Val
100 105 110

Ser Arg Gly Gly Gly Gly Thr Ile Ile Val Asn His Val Asn Asp Thr
115 120 125

Trp Gly Leu Lys Val Arg Gln Ser Leu Trp Phe His Leu Ser Cys Leu
130 135 140

```
Thr Phe Gly Gln His Thr Val Gln Glu Phe Leu Val Ser Phe Gly Val
145                 150                 155                 160


Trp Ile Arg Thr Pro Ala Pro Tyr Arg Pro Pro Asn Ala Pro Ile Leu
                165                 170                 175


Ser Thr Leu Pro Glu His Thr Val Ile Arg Arg Arg Gly Gly Ala Arg
            180                 185                 190


Ala Ser Arg Ser Pro Arg Arg Arg Thr Pro Ser Pro Arg Arg Arg Arg
        195                 200                 205


Ser Gln Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Ser Ala Asn Cys
    210                 215                 220


<210>  36
<211>  222
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Synthetic Polypeptide


<220>
<221>  MISC_FEATURE
<223>  WHcAg (SEQ. ID NO: 1) PLUS SEQ. ID NO:24

<400>  36

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1               5                   10                  15


Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
            20                  25                  30


Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
        35                  40                  45


Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
    50                  55                  60


Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Gly Gly
65                  70                  75                  80
```

```
Thr Met Glu Asn Ile Met Trp Arg Ser Val Glu Gly Glu Leu Asn Ala
                85                  90                  95

Ile Leu Glu Glu Asn Gly Val Gln Leu Thr Val Val Val Gly Ser Val
            100                 105                 110

Gly Gly Gly Gly Thr Ile Ile Val Asn His Val Asn Asp Thr Trp Gly
        115                 120                 125

Leu Lys Val Arg Gln Ser Leu Trp Phe His Leu Ser Cys Leu Thr Phe
    130                 135                 140

Gly Gln His Thr Val Gln Glu Phe Leu Val Ser Phe Gly Val Trp Ile
145                 150                 155                 160

Arg Thr Pro Ala Pro Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr
                165                 170                 175

Leu Pro Glu His Thr Val Ile Arg Arg Arg Gly Gly Ala Arg Ala Ser
            180                 185                 190

Arg Ser Pro Arg Arg Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln
        195                 200                 205

Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Ser Ala Asn Cys
    210                 215                 220
```

<210> 37
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ. ID NO: 1) PLUS SEQ. ID NO:25

<400> 37

```
Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1               5                   10                  15
```

```
Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
            20                  25                  30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
        35                  40                  45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
    50                  55                  60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Gly Gly
65                  70                  75                  80

Thr Cys Gly Ile Ser Ser Val Ser Arg Met Glu Asn Ile Met Trp Arg
                85                  90                  95

Ser Val Glu Gly Glu Leu Asn Ala Ile Leu Glu Glu Asn Gly Val Gln
            100                 105                 110

Leu Thr Val Val Val Gly Ser Val Lys Asn Pro Met Trp Arg Gly Pro
        115                 120                 125

Gln Arg Leu Pro Val Pro Val Asn Glu Leu Pro His Gly Trp Lys Ala
    130                 135                 140

Trp Gly Lys Ser Tyr Phe Val Arg Ala Ala Lys Thr Asn Asn Ser Phe
145                 150                 155                 160

Val Val Asp Gly Asp Thr Leu Lys Glu Cys Gly Gly Gly Gly Thr Ile
                165                 170                 175

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

Leu Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln His Thr Val Gln
        195                 200                 205

Glu Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Ala Pro Tyr
    210                 215                 220
```

```
Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu His Thr Val
225                 230                 235                 240


Ile Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser Pro Arg Arg Arg
                245                 250                 255


Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg
            260                 265                 270


Ser Gln Ser Pro Ser Ala Asn Cys
        275                 280


<210>  38
<211>  235
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Synthetic Polypeptide


<220>
<221>  MISC_FEATURE
<223>  WHcAg (SEQ. ID NO: 1) PLUS SEQ. ID NO:26

<400>  38

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1               5                   10                  15


Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
            20                  25                  30


Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
        35                  40                  45


Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
    50                  55                  60


Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Gly Gly
65                  70                  75                  80


Thr Lys Asn Pro Met Trp Arg Gly Pro Gln Arg Leu Pro Val Pro Val
                85                  90                  95
```

```
Asn Glu Leu Pro His Gly Trp Lys Ala Trp Gly Lys Ser Tyr Phe Val
            100                 105                 110

Arg Ala Ala Lys Thr Asn Asn Ser Phe Val Val Asp Gly Gly Gly Gly
        115                 120                 125

Gly Thr Ile Ile Val Asn His Val Asn Asp Thr Trp Gly Leu Lys Val
    130                 135                 140

Arg Gln Ser Leu Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln His
145                 150                 155                 160

Thr Val Gln Glu Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro
                165                 170                 175

Ala Pro Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu
            180                 185                 190

His Thr Val Ile Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser Pro
        195                 200                 205

Arg Arg Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg
    210                 215                 220

Arg Arg Arg Ser Gln Ser Pro Ser Ala Asn Cys
225                 230                 235
```

<210> 39
<211> 232
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ. ID NO: 1) PLUS SEQ. ID NO:27

<400> 39

```
Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1               5                   10                  15
```

```
Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
            20                  25                  30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
        35                  40                  45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
    50                  55                  60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Gly Gly
65                  70                  75                  80

Thr Asp Thr Leu Lys Glu Cys Pro Leu Lys His Arg Ala Trp Asn Ser
                85                  90                  95

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

Leu Lys Val Arg Glu Asp Tyr Ser Leu Glu Gly Gly Gly Gly Thr Ile
        115                 120                 125

Ile Val Asn His Val Asn Asp Thr Trp Gly Leu Lys Val Arg Gln Ser
    130                 135                 140

Leu Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln His Thr Val Gln
145                 150                 155                 160

Glu Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Ala Pro Tyr
                165                 170                 175

Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu His Thr Val
            180                 185                 190

Ile Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser Pro Arg Arg Arg
        195                 200                 205

Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg
    210                 215                 220
```

Ser Gln Ser Pro Ser Ala Asn Cys
225 230

<210> 40
<211> 236
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ. ID NO: 1) PLUS SEQ. ID NO:28

<400> 40

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1 5 10 15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
20 25 30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
35 40 45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
50 55 60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Gly Gly
65 70 75 80

Thr Cys Asp Pro Ala Val Ile Gly Thr Ala Val Lys Gly Lys Glu Ala
85 90 95

Val His Ser Asp Leu Gly Tyr Trp Ile Glu Ser Glu Lys Asn Asp Thr
100 105 110

Trp Arg Leu Lys Arg Ala His Leu Ile Glu Met Lys Thr Cys Gly Gly
115 120 125

Gly Gly Thr Ile Ile Val Asn His Val Asn Asp Thr Trp Gly Leu Lys
130 135 140

```
Val Arg Gln Ser Leu Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln
145                 150                 155                 160


His Thr Val Gln Glu Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr
                165                 170                 175


Pro Ala Pro Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro
            180                 185                 190


Glu His Thr Val Ile Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser
        195                 200                 205


Pro Arg Arg Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro
    210                 215                 220


Arg Arg Arg Arg Ser Gln Ser Pro Ser Ala Asn Cys
225                 230                 235


<210>  41
<211>  211
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Synthetic Polypeptide


<220>
<221>  MISC_FEATURE
<223>  WHcAg (SEQ. ID NO: 1) PLUS SEQ. ID NO:29

<400>  41

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1               5                   10                  15


Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
            20                  25                  30


Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
        35                  40                  45


Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
    50                  55                  60
```

```
Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Gly Gly
65                  70                  75                  80

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

Arg Ala His Leu Ile Gly Gly Gly Gly Thr Ile Ile Val Asn His Val
            100                 105                 110

Asn Asp Thr Trp Gly Leu Lys Val Arg Gln Ser Leu Trp Phe His Leu
        115                 120                 125

Ser Cys Leu Thr Phe Gly Gln His Thr Val Gln Glu Phe Leu Val Ser
    130                 135                 140

Phe Gly Val Trp Ile Arg Thr Pro Ala Pro Tyr Arg Pro Pro Asn Ala
145                 150                 155                 160

Pro Ile Leu Ser Thr Leu Pro Glu His Thr Val Ile Arg Arg Arg Gly
                165                 170                 175

Gly Ala Arg Ala Ser Arg Ser Pro Arg Arg Arg Thr Pro Ser Pro Arg
            180                 185                 190

Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Ser
        195                 200                 205

Ala Asn Cys
    210
```

<210> 42
<211> 254
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ. ID NO: 1) PLUS SEQ. ID NO:30

<400> 42

```
Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1               5                  10                  15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
            20                  25                  30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
        35                  40                  45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
    50                  55                  60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Gly Gly
65                  70                  75                  80

Thr Arg Ala His Leu Ile Glu Met Lys Thr Cys Glu Trp Pro Lys Ser
                85                  90                  95

His Thr Leu Trp Thr Asp Gly Ile Glu Glu Ser Asp Leu Ile Ile Pro
            100                 105                 110

Lys Ser Leu Ala Gly Pro Leu Ser His His Asn Thr Arg Glu Gly Tyr
        115                 120                 125

Arg Thr Gln Met Lys Gly Pro Trp His Ser Glu Glu Leu Glu Ile Arg
    130                 135                 140

Gly Gly Gly Gly Thr Ile Ile Val Asn His Val Asn Asp Thr Trp Gly
145                 150                 155                 160

Leu Lys Val Arg Gln Ser Leu Trp Phe His Leu Ser Cys Leu Thr Phe
                165                 170                 175

Gly Gln His Thr Val Gln Glu Phe Leu Val Ser Phe Gly Val Trp Ile
            180                 185                 190

Arg Thr Pro Ala Pro Tyr Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr
        195                 200                 205
```

```
Leu Pro Glu His Thr Val Ile Arg Arg Arg Gly Gly Ala Arg Ala Ser
    210                 215                 220

Arg Ser Pro Arg Arg Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln
225                 230                 235                 240

Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Ser Ala Asn Cys
                245                 250
```

<210> 43
<211> 245
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ. ID NO: 1) PLUS SEQ. ID NO:31

<400> 43

```
Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1               5                   10                  15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
            20                  25                  30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
        35                  40                  45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
    50                  55                  60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Gly Gly
65                  70                  75                  80

Thr Leu Glu Ile Arg Phe Glu Glu Cys Pro Gly Thr Lys Val His Val
                85                  90                  95

Glu Glu Thr Cys Gly Thr Arg Gly Pro Ser Leu Arg Ser Thr Thr Ala
            100                 105                 110
```

```
Ser Gly Arg Val Ile Glu Glu Trp Cys Cys Arg Glu Cys Thr Met Pro
        115                 120                 125

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

His Val Asn Asp Thr Trp Gly Leu Lys Val Arg Gln Ser Leu Trp Phe
145                 150                 155                 160

His Leu Ser Cys Leu Thr Phe Gly Gln His Thr Val Gln Glu Phe Leu
                165                 170                 175

Val Ser Phe Gly Val Trp Ile Arg Thr Pro Ala Pro Tyr Arg Pro Pro
            180                 185                 190

Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu His Thr Val Ile Arg Arg
        195                 200                 205

Arg Gly Gly Ala Arg Ala Ser Arg Ser Pro Arg Arg Arg Thr Pro Ser
    210                 215                 220

Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser Gln Ser
225                 230                 235                 240

Pro Ser Ala Asn Cys
                245
```

<210> 44
<211> 241
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ. ID NO: 1) PLUS SEQ. ID NO:32

<400> 44

```
Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
```

```
1               5                   10                  15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
            20                  25                  30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
        35                  40                  45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
    50                  55                  60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Gly Gly
65                  70                  75                  80

Thr Cys Pro Gly Thr Lys Val His Val Glu Glu Thr Cys Gly Thr Arg
                85                  90                  95

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

Trp Cys Cys Arg Glu Cys Thr Met Pro Pro Leu Ser Phe Arg Ala Lys
        115                 120                 125

Asp Gly Cys Gly Gly Gly Gly Thr Ile Ile Val Asn His Val Asn Asp
    130                 135                 140

Thr Trp Gly Leu Lys Val Arg Gln Ser Leu Trp Phe His Leu Ser Cys
145                 150                 155                 160

Leu Thr Phe Gly Gln His Thr Val Gln Glu Phe Leu Val Ser Phe Gly
                165                 170                 175

Val Trp Ile Arg Thr Pro Ala Pro Tyr Arg Pro Pro Asn Ala Pro Ile
            180                 185                 190

Leu Ser Thr Leu Pro Glu His Thr Val Ile Arg Arg Arg Gly Gly Ala
        195                 200                 205

Arg Ala Ser Arg Ser Pro Arg Arg Arg Thr Pro Ser Pro Arg Arg Arg
    210                 215                 220
```

```
Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Ser Ala Asn
225                 230                 235                 240


Cys
```

<210> 45
<211> 280
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ. ID NO: 1) PLUS SEQ. ID NO:33

<400> 45

```
Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1               5                   10                  15


Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
            20                  25                  30


Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
        35                  40                  45


Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
    50                  55                  60


Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Gly Gly
65                  70                  75                  80


Thr Met Lys Gly Pro Trp His Ser Glu Glu Leu Glu Ile Arg Phe Glu
                85                  90                  95


Glu Cys Pro Gly Thr Lys Val His Val Glu Glu Thr Cys Gly Thr Arg
            100                 105                 110


Gly Pro Ser Leu Arg Ser Thr Thr Ala Ser Gly Arg Val Ile Glu Glu
        115                 120                 125
```

```
Trp Cys Cys Arg Glu Cys Thr Met Pro Pro Leu Ser Phe Arg Ala Lys
    130                 135                 140

Asp Gly Cys Trp Tyr Gly Met Glu Ile Arg Pro Arg Lys Glu Pro Glu
145                 150                 155                 160

Ser Asn Leu Val Arg Ser Met Val Thr Ala Gly Gly Gly Gly Thr Ile
                165                 170                 175

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

Leu Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln His Thr Val Gln
        195                 200                 205

Glu Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Ala Pro Tyr
    210                 215                 220

Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu His Thr Val
225                 230                 235                 240

Ile Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser Pro Arg Arg Arg
                245                 250                 255

Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg
            260                 265                 270

Ser Gln Ser Pro Ser Ala Asn Cys
        275                 280
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<210> 46
<211> 168
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> prM Furin Deficient

<400> 46

Ala Glu Val Thr Arg Arg Gly Ser Ala Tyr Tyr Met Tyr Leu Asp Arg
1 5 10 15

Asn Asp Ala Gly Glu Ala Ile Ser Phe Pro Thr Thr Leu Gly Met Asn
20 25 30

Lys Cys Tyr Ile Gln Ile Met Asp Leu Gly His Met Cys Asp Ala Thr
35 40 45

Met Ser Tyr Glu Cys Pro Met Leu Asp Glu Gly Val Glu Pro Asp Asp
50 55 60

Val Asp Cys Trp Cys Asn Thr Thr Ser Thr Trp Val Val Tyr Gly Thr
65 70 75 80

Cys His His Lys Lys Gly Glu Ala Gly Gly Ser Gly Gly Ala Val Thr
85 90 95

Leu Pro Ser His Ser Thr Arg Lys Leu Gln Thr Arg Ser Gln Thr Trp
100 105 110

Leu Glu Ser Arg Glu Tyr Thr Lys His Leu Ile Arg Val Glu Asn Trp
115 120 125

Ile Phe Arg Asn Pro Gly Phe Ala Leu Ala Ala Ala Ala Ile Ala Trp
130 135 140

Leu Leu Gly Ser Ser Thr Ser Gln Lys Val Ile Tyr Leu Val Met Ile
145 150 155 160

Leu Leu Ile Ala Pro Ala Tyr Ser
165

<210> 47
<211> 75
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> M full length

<400> 47

Ala Val Thr Leu Pro Ser His Ser Thr Arg Lys Leu Gln Thr Arg Ser
1 5 10 15

Gln Thr Trp Leu Glu Ser Arg Glu Tyr Thr Lys His Leu Ile Arg Val
20 25 30

Glu Asn Trp Ile Phe Arg Asn Pro Gly Phe Ala Leu Ala Ala Ala Ala
35 40 45

Ile Ala Trp Leu Leu Gly Ser Ser Thr Ser Gln Lys Val Ile Tyr Leu
50 55 60

Val Met Ile Leu Leu Ile Ala Pro Ala Tyr Ser
65 70 75

<210> 48
<211> 359
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 1) PLUS SEQ. ID NO:46

<400> 48

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1 5 10 15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
20 25 30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
35 40 45

```
Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
    50                  55                  60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Gly Gly
65                  70                  75                  80

Thr Ala Glu Val Thr Arg Arg Gly Ser Ala Tyr Tyr Met Tyr Leu Asp
                85                  90                  95

Arg Asn Asp Ala Gly Glu Ala Ile Ser Phe Pro Thr Thr Leu Gly Met
            100                 105                 110

Asn Lys Cys Tyr Ile Gln Ile Met Asp Leu Gly His Met Cys Asp Ala
        115                 120                 125

Thr Met Ser Tyr Glu Cys Pro Met Leu Asp Glu Gly Val Glu Pro Asp
    130                 135                 140

Asp Val Asp Cys Trp Cys Asn Thr Thr Ser Thr Trp Val Val Tyr Gly
145                 150                 155                 160

Thr Cys His His Lys Lys Gly Glu Ala Gly Gly Ser Gly Gly Ala Val
                165                 170                 175

Thr Leu Pro Ser His Ser Thr Arg Lys Leu Gln Thr Arg Ser Gln Thr
            180                 185                 190

Trp Leu Glu Ser Arg Glu Tyr Thr Lys His Leu Ile Arg Val Glu Asn
        195                 200                 205

Trp Ile Phe Arg Asn Pro Gly Phe Ala Leu Ala Ala Ala Ala Ile Ala
    210                 215                 220

Trp Leu Leu Gly Ser Ser Thr Ser Gln Lys Val Ile Tyr Leu Val Met
225                 230                 235                 240

Ile Leu Leu Ile Ala Pro Ala Tyr Ser Gly Gly Gly Gly Thr Ile Ile
                245                 250                 255

Val Asn His Val Asn Asp Thr Trp Gly Leu Lys Val Arg Gln Ser Leu
```

260 265 270

Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln His Thr Val Gln Glu
275 280 285

Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Ala Pro Tyr Arg
290 295 300

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

Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser Pro Arg Arg Arg Thr
325 330 335

Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser
340 345 350

Gln Ser Pro Ser Ala Asn Cys
355

<210> 49
<211> 266
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 1) PLUS SEQ. ID NO:47

<400> 49

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1 5 10 15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
20 25 30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
35 40 45

```
Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
    50                  55                  60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Gly Gly
65                  70                  75                  80

Thr Ala Val Thr Leu Pro Ser His Ser Thr Arg Lys Leu Gln Thr Arg
                85                  90                  95

Ser Gln Thr Trp Leu Glu Ser Arg Glu Tyr Thr Lys His Leu Ile Arg
            100                 105                 110

Val Glu Asn Trp Ile Phe Arg Asn Pro Gly Phe Ala Leu Ala Ala Ala
        115                 120                 125

Ala Ile Ala Trp Leu Leu Gly Ser Ser Thr Ser Gln Lys Val Ile Tyr
    130                 135                 140

Leu Val Met Ile Leu Leu Ile Ala Pro Ala Tyr Ser Gly Gly Gly Gly
145                 150                 155                 160

Thr Ile Ile Val Asn His Val Asn Asp Thr Trp Gly Leu Lys Val Arg
                165                 170                 175

Gln Ser Leu Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln His Thr
            180                 185                 190

Val Gln Glu Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Ala
        195                 200                 205

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

Thr Val Ile Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser Pro Arg
225                 230                 235                 240

Arg Arg Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg
                245                 250                 255

Arg Arg Ser Gln Ser Pro Ser Ala Asn Cys
            260                 265
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<210> 50
<211> 104
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> C full length

<400> 50

Met Lys Asn Pro Lys Lys Lys Ser Gly Gly Phe Arg Ile Val Asn Met
1 5 10 15

Leu Lys Arg Gly Val Ala Arg Val Ser Pro Phe Gly Gly Leu Lys Arg
20 25 30

Leu Pro Ala Gly Leu Leu Leu Gly His Gly Pro Ile Arg Met Val Leu
35 40 45

Ala Ile Leu Ala Phe Leu Arg Phe Thr Ala Ile Lys Pro Ser Leu Gly
50 55 60

Leu Ile Asn Arg Trp Gly Ser Val Gly Lys Lys Glu Ala Met Glu Thr
65 70 75 80

Ile Lys Lys Phe Lys Lys Asp Leu Ala Ala Met Leu Arg Ile Ile Asn
85 90 95

Ala Arg Lys Glu Lys Lys Arg Arg
100

<210> 51
<211> 25
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> C alpha 2

<400> 51

Gly His Gly Pro Ile Arg Met Val Leu Ala Ile Leu Ala Phe Leu Arg
1 5 10 15

Phe Thr Ala Ile Lys Pro Ser Leu Gly
20 25

<210> 52
<211> 295
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 1) PLUS SEQ ID NO:50

<400> 52

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1 5 10 15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
20 25 30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
35 40 45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
50 55 60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Gly Gly
65 70 75 80

Thr Met Lys Asn Pro Lys Lys Lys Ser Gly Gly Phe Arg Ile Val Asn
85 90 95

Met Leu Lys Arg Gly Val Ala Arg Val Ser Pro Phe Gly Gly Leu Lys

```
            100                 105                 110

Arg Leu Pro Ala Gly Leu Leu Leu Gly His Gly Pro Ile Arg Met Val
        115                 120                 125

Leu Ala Ile Leu Ala Phe Leu Arg Phe Thr Ala Ile Lys Pro Ser Leu
    130                 135                 140

Gly Leu Ile Asn Arg Trp Gly Ser Val Gly Lys Lys Glu Ala Met Glu
145                 150                 155                 160

Thr Ile Lys Lys Phe Lys Lys Asp Leu Ala Ala Met Leu Arg Ile Ile
                165                 170                 175

Asn Ala Arg Lys Glu Lys Lys Arg Arg Gly Gly Gly Gly Thr Ile Ile
            180                 185                 190

Val Asn His Val Asn Asp Thr Trp Gly Leu Lys Val Arg Gln Ser Leu
        195                 200                 205

Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln His Thr Val Gln Glu
    210                 215                 220

Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Ala Pro Tyr Arg
225                 230                 235                 240

Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu His Thr Val Ile
                245                 250                 255

Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser Pro Arg Arg Arg Thr
            260                 265                 270

Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg Ser
        275                 280                 285

Gln Ser Pro Ser Ala Asn Cys
    290                 295
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<210> 53
<211> 216
<212> PRT

<213> Artificial Sequence

<220>
<223> Synthetic Polypeptide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 1) PLUS SEQ ID NO:51

<400> 53

Met Asp Ile Asp Pro Tyr Lys Glu Phe Gly Ser Ser Tyr Gln Leu Leu
1 5 10 15

Asn Phe Leu Pro Leu Asp Phe Phe Pro Asp Leu Asn Ala Leu Val Asp
20 25 30

Thr Ala Thr Ala Leu Tyr Glu Glu Glu Leu Thr Gly Arg Glu His Cys
35 40 45

Ser Pro His His Thr Ala Ile Arg Gln Ala Leu Val Cys Trp Asp Glu
50 55 60

Leu Thr Lys Leu Ile Ala Trp Met Ser Ser Asn Ile Gly Gly Gly Gly
65 70 75 80

Thr Gly His Gly Pro Ile Arg Met Val Leu Ala Ile Leu Ala Phe Leu
85 90 95

Arg Phe Thr Ala Ile Lys Pro Ser Leu Gly Gly Gly Gly Gly Thr Ile
100 105 110

Ile Val Asn His Val Asn Asp Thr Trp Gly Leu Lys Val Arg Gln Ser
115 120 125

Leu Trp Phe His Leu Ser Cys Leu Thr Phe Gly Gln His Thr Val Gln
130 135 140

Glu Phe Leu Val Ser Phe Gly Val Trp Ile Arg Thr Pro Ala Pro Tyr
145 150 155 160

Arg Pro Pro Asn Ala Pro Ile Leu Ser Thr Leu Pro Glu His Thr Val
165 170 175

Ile Arg Arg Arg Gly Gly Ala Arg Ala Ser Arg Ser Pro Arg Arg Arg
180 185 190

Thr Pro Ser Pro Arg Arg Arg Arg Ser Gln Ser Pro Arg Arg Arg Arg
195 200 205

Ser Gln Ser Pro Ser Ala Asn Cys
210 215

<210> 54
<211> 564
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WOODCHUCK HEPATITIS CORE ANTIGEN (WHCAG)

<400> 54
atggacatcg acccatacaa ggaattcggt tcttcttacc aattgttgaa cttcttgcca 60

ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcac ttctgaacaa 240

gttagaacta tcatcgttaa ccacgttaac gacacttggg gtttgaaggt tagacaatct 300

ttgtggttcc acttgtcttg tttgactttc ggtcaacaca ctgttcaaga attcttggtt 360

tctttcggtg tttggatcag aactccagct ccatacagac caccaaacgc tccaatcttg 420

tctactttgc cagaacacac tgttatcaga agaagaggtg gtgctagagc ttctagatct 480

ccaagaagaa gaactccatc tccaagaaga agaagatctc aatctccaag aagaagaaga 540

tctcaatctc catctgctaa ctgt 564

<210> 55
<211> 408
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> Envelope domain 3 full length

<400> 55
cacttgaagt gtagattgaa gatggacaag ttgagattga agggtgtttc ttactctttg 60

tgtactgctg ctttcacttt cactaagatc ccagctgaaa ctttgcacgg tactgttact 120

gttgaagttc aatacgctgg tactgacggt ccatgtaagg ttccagctca aatggctgtt 180

gacatgcaaa ctttgactcc agttggtaga ttgatcactg ctaacccagt tatcactgaa 240

tctactgaaa actctaagat gatgttggaa ttggacccac cattcggtga ctcttacatc 300

gttatcggtg ttggtgaaaa gaagatcact caccactggc acagatctgg ttctactatc 360

ggtaaggctt tcgaagctac tgttagaggt gctaagagaa tggctgtt 408

<210> 56
<211> 240
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> Envelope domain 3 (EDIII) G loop-truncated

<400> 56
gctttcactt tcactaagat cccagctgaa actttgcacg gtactgttac tgttgaattg 60

caatacgctg gtactgacgg tccatgtaag gttccagctc aaatggctgt tgacatgcaa 120

actttgactc cagttggtag attgatcact gctaacccag ttatcactga atctactgaa 180

aactctaaga tgatgttgga attggaccca ccattcggtg actcttacat cgttatcggt 240

<210> 57
<211> 69
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> Envelope domain 3, A-B loop

<400> 57
gctttcactt tcactaagat cccagctgaa actttgcacg gtactgttac tgttgaattg 60

caatacgct 69

<210> 58
<211> 87
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> Envelope domain 3, CXCDDX loop

<400> 58
ccatgtaagg ttccagctca aatggctgtt gacatgcaaa ctttgactcc agttggtaga 60

ttgatcactg ctaacccagt tatcact 87

<210> 59
<211> 72
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> Envelope domain 3, DX-E loop

<400> 59
agattgatca ctgctaaccc agttatcact gaatctactg aaaactctaa gatgatgttg 60

gaattggacc ca 72

<210> 60
<211> 60
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> Envelope domain 3, F-G loop

<400> 60
ggtgactctt acatcgttat cggtgttggt gaaaagaaga tcactcacca ctggcacaga 60

<210> 61
<211> 39
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> Envelope fusion loop

<400> 61
gacagaggtt ggggtaacgg ttgtggtttg ttcggtaag 39

<210> 62
<211> 276
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> Envelope domain 2 (ED2) sequence A-E

<400> 62
actactactg tttctaacat ggctgaagtt agatcttact gttacgaagc ttctatctct 60

gacatggctt ctgactctag atgtccaact caaggtgaag cttacttgga caagcaatct 120

gacactcaat acgtttgtaa gagaactttg gttgacagag gttggggtaa cggttgtggt 180

ttgttcggta agggttcttt ggttacttgt gctaagttcg cttgttctaa gaagatgact 240

ggtaagtcta tccaaccaga aaacttggaa tacaga 276

<210> 63
<211> 183
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> Envelope domain 2 sequence B-D

<400> 63
gaagcttcta tctctgacat ggcttctgac tctagatgtc caactcaagg tgaagcttac 60

ttggacaagc aatctgacac tcaatacgtt tgtaagagaa ctttggttga cagaggttgg 120

ggtaacggtt gtggtttgtt cggtaagggt tctttggtta cttgtgctaa gttcgcttgt 180

tct 183

<210> 64
<211> 246
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> Envelope domain 1 glycan loop

<400> 64
atgactggta agtctatcca accagaaaac ttggaataca gaatcatgtt gtctgttcac 60

ggttctcaac actctggtat gatcgttaac gacactggtc acgaaactga cgaaaacaga 120

gctaaggttg aaatcactcc aaactctcca agagctgaag ctactttggg tggtttcggt 180

tctttgggtt tggactgtga accaagaact ggtttggact tctctgactt gtactacttg 240

actatg 246

<210> 65
<211> 981
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg POLYNUCLEOTIDE SEQUENCE (SEQ ID NO: 54) PLUS SEQ ID NO:55

<400> 65
atggacatcg acccatacaa ggaattcggt tcttcttacc aattgttgaa cttcttgcca 60

ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtggtggt 240

actcacttga agtgtagatt gaagatggac aagttgagat tgaagggtgt ttcttactct 300

ttgtgtactg ctgctttcac tttcactaag atcccagctg aaactttgca cggtactgtt 360

actgttgaag ttcaatacgc tggtactgac ggtccatgta aggttccagc tcaaatggct 420

gttgacatgc aaactttgac tccagttggt agattgatca ctgctaaccc agttatcact 480

gaatctactg aaaactctaa gatgatgttg gaattggacc caccattcgg tgactcttac 540

atcgttatcg gtgttggtga aaagaagatc actcaccact ggcacagatc tggttctact 600

atcggtaagg ctttcgaagc tactgttaga ggtgctaaga gaatggctgt tggtggtggt 660

ggtactatca tcgttaacca cgttaacgac acttggggtt tgaaggttag acaatctttg 720

tggttccact tgtcttgttt gactttcggt caacacactg ttcaagaatt cttggtttct 780

ttcggtgttt ggatcagaac tccagctcca tacagaccac caaacgctcc aatcttgtct 840

actttgccag aacacactgt tatcagaaga agaggtggtg ctagagcttc tagatctcca 900

agaagaagaa ctccatctcc aagaagaaga agatctcaat ctccaagaag aagaagatct 960

caatctccat ctgctaactg t 981

<210> 66
<211> 786
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>

<221> MISC_FEATURE
<223> WHcAg POLYNUCLEOTIDE SEQUENCE (SEQ ID NO: 54) PLUS SEQ ID NO:56

<400> 66
atggacatcg acccatacaa ggaattcggt tcttcttacc aattgttgaa cttcttgcca 60

ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgc tttcactttc 240

actaagatcc cagctgaaac tttgcacggt actgttactg ttgaattgca atacgctggt 300

actgacggtc catgtaaggt tccagctcaa atggctgttg acatgcaaac tttgactcca 360

gttggtagat tgatcactgc taacccagtt atcactgaat ctactgaaaa ctctaagatg 420

atgttggaat tggacccacc attcggtgac tcttacatcg ttatcggtac tatcatcgtt 480

aaccacgtta acgacacttg gggtttgaag gttagacaat ctttgtggtt ccacttgtct 540

tgtttgactt tcggtcaaca cactgttcaa gaattcttgg tttctttcgg tgtttggatc 600

agaactccag ctccatacag accaccaaac gctccaatct tgtctacttt gccagaacac 660

actgttatca gaagaagagg tggtgctaga gcttctagat ctccaagaag aagaactcca 720

tctccaagaa gaagaagatc tcaatctcca agaagaagaa gatctcaatc tccatctgct 780

aactgt 786

<210> 67
<211> 615
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg POLYNUCLEOTIDE SEQUENCE (SEQ ID NO: 54) PLUS SEQ ID NO:57

<400> 67
atggacatcg acccatacaa ggaattcggt tcttcttacc aattgttgaa cttcttgcca 60

ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgc tttcactttc 240

actaagatcc cagctgaaac tttgcacggt actgttactg ttgaattgca atacgctact 300

atcatcgtta accacgttaa cgacacttgg ggtttgaagg ttagacaatc tttgtggttc 360

cacttgtctt gtttgacttt cggtcaacac actgttcaag aattcttggt ttctttcggt 420

gtttggatca gaactccagc tccatacaga ccaccaaacg ctccaatctt gtctactttg 480

ccagaacaca ctgttatcag aagaagaggt ggtgctagag cttctagatc tccaagaaga 540

agaactccat ctccaagaag aagaagatct caatctccaa gaagaagaag atctcaatct 600

ccatctgcta actgt 615

<210> 68
<211> 633
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg POLYNUCLEOTIDE SEQUENCE (SEQ ID NO: 54) PLUS SEQ ID NO:58

<400> 68
atggacatcg acccatacaa ggaattcggt tcttcttacc aattgttgaa cttcttgcca 60

ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatccc atgtaaggtt 240

ccagctcaaa tggctgttga catgcaaact ttgactccag ttggtagatt gatcactgct 300

aacccagtta tcactactat catcgttaac cacgttaacg acacttgggg tttgaaggtt 360

agacaatctt tgtggttcca cttgtcttgt ttgactttcg gtcaacacac tgttcaagaa 420

ttcttggttt ctttcggtgt ttggatcaga actccagctc catacagacc accaaacgct 480

ccaatcttgt ctactttgcc agaacacact gttatcagaa gaagaggtgg tgctagagct 540

tctagatctc caagaagaag aactccatct ccaagaagaa gaagatctca atctccaaga 600

agaagaagat ctcaatctcc atctgctaac tgt 633

<210> 69

<211> 618
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg POLYNUCLEOTIDE SEQUENCE (SEQ ID NO: 54) PLUS SEQ ID NO:59

<400> 69
atggacatcg acccatacaa ggaattcggt tcttcttacc aattgttgaa cttcttgcca 60

ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcag attgatcact 240

gctaacccag ttatcactga atctactgaa aactctaaga tgatgttgga attggaccca 300

actatcatcg ttaaccacgt taacgacact tggggtttga aggttagaca atctttgtgg 360

ttccacttgt cttgtttgac tttcggtcaa cacactgttc aagaattctt ggtttctttc 420

ggtgtttgga tcagaactcc agctccatac agaccaccaa acgctccaat cttgtctact 480

ttgccagaac acactgttat cagaagaaga ggtggtgcta gagcttctag atctccaaga 540

agaagaactc catctccaag aagaagaaga tctcaatctc caagaagaag aagatctcaa 600

tctccatctg ctaactgt 618

<210> 70
<211> 606
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg POLYNUCLEOTIDE SEQUENCE (SEQ ID NO: 54) PLUS SEQ ID NO:60

<400> 70
atggacatcg acccatacaa ggaattcggt tcttcttacc aattgttgaa cttcttgcca 60

ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tgactcttac 240

atcgttatcg gtgttggtga aaagaagatc actcaccact ggcacagaac tatcatcgtt 300

aaccacgtta acgacacttg gggtttgaag gttagacaat ctttgtggtt ccacttgtct 360

tgtttgactt tcggtcaaca cactgttcaa gaattcttgg tttctttcgg tgtttggatc 420

agaactccag ctccatacag accaccaaac gctccaatct tgtctacttt gccagaacac 480

actgttatca gaagaagagg tggtgctaga gcttctagat ctccaagaag aagaactcca 540

tctccaagaa gaagaagatc tcaatctcca agaagaagaa gatctcaatc tccatctgct 600

aactgt 606

<210> 71
<211> 600
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg POLYNUCLEOTIDE SEQUENCE (SEQ ID NO: 54) PLUS SEQ ID NO:61

<400> 71
atggacatcg acccatacaa ggaattcggt tcttcttacc aattgttgaa cttcttgcca 60

ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtactgac 240

agaggttggg gtaacggttg tggtttgttc ggtaagggtg gtactatcat cgttaaccac 300

gttaacgaca cttggggttt gaaggttaga caatctttgt ggttccactt gtcttgtttg 360

actttcggtc aacacactgt tcaagaattc ttggtttctt tcggtgtttg gatcagaact 420

ccagctccat acagaccacc aaacgctcca atcttgtcta ctttgccaga acacactgtt 480

atcagaagaa gaggtggtgc tagagcttct agatctccaa gaagaagaac tccatctcca 540

agaagaagaa gatctcaatc tccaagaaga agaagatctc aatctccatc tgctaactgt 600

<210> 72
<211> 834
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg POLYNUCLEOTIDE SEQUENCE (SEQ ID NO: 54) PLUS SEQ ID NO:62

<400> 72
atggacatcg acccatacaa ggaattcggt tcttcttacc aattgttgaa cttcttgcca 60

ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtactact 240

actgtttcta acatggctga agttagatct tactgttacg aagcttctat ctctgacatg 300

gcttctgact ctagatgtcc aactcaaggt gaagcttact tggacaagca atctgacact 360

caatacgttt gtaagagaac tttggttgac agaggttggg gtaacggttg tggtttgttc 420

ggtaagggtt ctttggttac ttgtgctaag ttcgcttgtt ctaagaagat gactggtaag 480

tctatccaac cagaaaactt ggaatacaga ggtggtacta tcatcgttaa ccacgttaac 540

gacacttggg gtttgaaggt tagacaatct ttgtggttcc acttgtcttg tttgactttc 600

ggtcaacaca ctgttcaaga attcttggtt tctttcggtg tttggatcag aactccagct 660

ccatacagac caccaaacgc tccaatcttg tctactttgc cagaacacac tgttatcaga 720

agaagaggtg gtgctagagc ttctagatct ccaagaagaa gaactccatc tccaagaaga 780

agaagatctc aatctccaag aagaagaaga tctcaatctc catctgctaa ctgt 834

<210> 73
<211> 741
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE

<223> WHcAg POLYNUCLEOTIDE SEQUENCE (SEQ ID NO: 54) PLUS SEQ ID NO:63

<400> 73
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ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtgaagct 240

tctatctctg acatggcttc tgactctaga tgtccaactc aaggtgaagc ttacttggac 300

aagcaatctg acactcaata cgtttgtaag agaactttgg ttgacagagg ttggggtaac 360

ggttgtggtt tgttcggtaa gggttctttg gttacttgtg ctaagttcgc ttgttctggt 420

ggtactatca tcgttaacca cgttaacgac acttggggtt tgaaggttag acaatctttg 480

tggttccact tgtcttgttt gactttcggt caacacactg ttcaagaatt cttggtttct 540

ttcggtgttt ggatcagaac tccagctcca tacagaccac caaacgctcc aatcttgtct 600

actttgccag aacacactgt tatcagaaga agaggtggtg ctagagcttc tagatctcca 660

agaagaagaa ctccatctcc aagaagaaga agatctcaat ctccaagaag aagaagatct 720

caatctccat ctgctaactg t 741

<210> 74
<211> 804
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg POLYNUCLEOTIDE SEQUENCE (SEQ ID NO: 54) PLUS SEQ ID NO:64

<400> 74
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ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtatgact 240

ggtaagtcta tccaaccaga aaacttggaa tacagaatca tgttgtctgt tcacggttct 300

caacactctg gtatgatcgt taacgacact ggtcacgaaa ctgacgaaaa cagagctaag 360

gttgaaatca ctccaaactc tccaagagct gaagctactt tgggtggttt cggttctttg 420

ggtttggact gtgaaccaag aactggtttg gacttctctg acttgtacta cttgactatg 480

ggtggtacta tcatcgttaa ccacgttaac gacacttggg gtttgaaggt tagacaatct 540

ttgtggttcc acttgtcttg tttgactttc ggtcaacaca ctgttcaaga attcttggtt 600

tctttcggtg tttggatcag aactccagct ccatacagac caccaaacgc tccaatcttg 660

tctactttgc cagaacacac tgttatcaga agaagaggtg gtgctagagc ttctagatct 720

ccaagaagaa gaactccatc tccaagaaga agaagatctc aatctccaag aagaagaaga 780

tctcaatctc catctgctaa ctgt 804

<210> 75
<211> 51
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> NS1 Beta 1-2

<400> 75
gacgttggtt gttctgttga cttctctaag aaggaaacta gatgtggtac t 51

<210> 76
<211> 99
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> NS1 Beta 3-4

<400> 76
gacagataca agtaccaccc agactctcca agaagattgg ctgctgctgt taagcaagct 60

tgggaagacg gtatctgtgg tatctcttct gtttctaga 99

<210> 77
<211> 93
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> NS1 Alpha 2-Beta 5

<400> 77
atggaaaaca tcatgtggag atctgttgaa ggtgaattga acgctatctt ggaagaaaac 60

ggtgttcaat tgactgttgt tgttggttct gtt 93

<210> 78
<211> 270
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> NS1 Beta 4-5-6

<400> 78
tgtggtatct cttctgtttc tagaatggaa aacatcatgt ggagatctgt tgaaggtgaa 60

ttgaacgcta tcttggaaga aaacggtgtt caattgactg ttgttgttgg ttctgttaag 120

aacccaatgt ggagaggtcc acaaagattg ccagttccag ttaacgaatt gccacacggt 180

tggaaggctt ggggtaagtc ttacttcgtt agagctgcta agactaacaa ctctttcgtt 240

gttgacggtg acactttgaa ggaatgtgtt 270

<210> 79
<211> 132
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> NS1 Inter. Loop-Beta 6

<400> 79
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ggttggaagg cttggggtaa gtcttacttc gttagagctg ctaagactaa caactctttc 120

gttgttgacg gt 132

<210> 80
<211> 123
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> NS1 Beta 7-8-9

<400> 80
gacactttga aggaatgtcc attgaagcac agagcttgga actctttctt ggttgaagac 60

cacggtttcg gtgttttcca cacttctgtt tggttgaagg ttagagaaga ctactctttg 120

gaa 123

<210> 81
<211> 135
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> NS1 Beta 10-11-12-13

<400> 81
tgtgacccag ctgttatcgg tactgctgtt aagggtaagg aagctgttca ctctgacttg 60

ggttactgga tcgaatctga aaagaacgac acttggagat tgaagagagc tcacttgatc 120

gaaatgaaga cttgt 135

<210> 82
<211> 60
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> NS1 Beta 12-13

<400> 82
ggttactgga tcgaatctga aaagaacgac acttggagat tgaagagagc tcacttgatc 60

<210> 83
<211> 189
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> NS1 Spaghetti Loop-Beta 14

<400> 83
agagctcact tgatcgaaat gaagacttgt gaatggccaa agtctcacac tttgtggact 60

gacggtatcg aagaatctga cttgatcatc ccaaagtctt tggctggtcc attgtctcac 120

cacaacacta gagaaggtta cagaactcaa atgaagggtc catggcactc tgaagaattg 180

gaaatcaga 189

<210> 84
<211> 162
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> NS1 Beta 14-15-16-17

<400> 84

ttggaaatca gattcgaaga atgtccaggt actaaggttc acgttgaaga aacttgtggt 60

actagaggtc catctttgag atctactact gcttctggta gagttatcga agaatggtgt 120

tgtagagaat gtactatgcc accattgtct ttcagagcta ag 162

<210> 85
<211> 150
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> NS1 Beta 15-16-17-18

<400> 85
tgtccaggta ctaaggttca cgttgaagaa acttgtggta ctagaggtcc atctttgaga 60

tctactactg cttctggtag agttatcgaa gaatggtgtt gtagagaatg tactatgcca 120

ccattgtctt tcagagctaa ggacggttgt 150

<210> 86
<211> 267
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> NS1 Beta 14-15-16-17-18-19-C-term.

<400> 86
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aaggttcacg ttgaagaaac ttgtggtact agaggtccat ctttgagatc tactactgct 120

tctggtagag ttatcgaaga atggtgttgt agagaatgta ctatgccacc attgtctttc 180

agagctaagg acggttgttg gtacggtatg gaaatcagac caagaaagga accagaatct 240

aacttggtta gatctatggt tactgct 267

<210> 87

<211> 624
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 54) PLUS SEQ ID NO: 75

<400> 87
atggacatcg acccatacaa ggaattcggt tcttcttacc aattgttgaa cttcttgcca 60

ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtggtggt 240

actgacgttg gttgttctgt tgacttctct aagaaggaaa ctagatgtgg tactggtggt 300

ggtggtacta tcatcgttaa ccacgttaac gacacttggg gtttgaaggt tagacaatct 360

ttgtggttcc acttgtcttg tttgactttc ggtcaacaca ctgttcaaga attcttggtt 420

tctttcggtg tttggatcag aactccagct ccatacagac caccaaacgc tccaatcttg 480

tctactttgc cagaacacac tgttatcaga agaagaggtg gtgctagagc ttctagatct 540

ccaagaagaa gaactccatc tccaagaaga agaagatctc aatctccaag aagaagaaga 600

tctcaatctc catctgctaa ctgt 624

<210> 88
<211> 672
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 54) PLUS SEQ ID NO: 76

<400> 88
atggacatcg acccatacaa ggaattcggt tcttcttacc aattgttgaa cttcttgcca 60

ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtggtggt 240

actgacagat acaagtacca cccagactct ccaagaagat tggctgctgc tgttaagcaa 300

gcttgggaag acggtatctg tggtatctct tctgtttcta gaggtggtgg tggtactatc 360

atcgttaacc acgttaacga cacttggggt ttgaaggtta gacaatcttt gtggttccac 420

ttgtcttgtt tgactttcgg tcaacacact gttcaagaat tcttggtttc tttcggtgtt 480

tggatcagaa ctccagctcc atacagacca ccaaacgctc caatcttgtc tactttgcca 540

gaacacactg ttatcagaag aagaggtggt gctagagctt ctagatctcc aagaagaaga 600

actccatctc caagaagaag aagatctcaa tctccaagaa gaagaagatc tcaatctcca 660

tctgctaact gt 672

<210> 89
<211> 666
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 54) PLUS SEQ ID NO: 77

<400> 89
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ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtggtggt 240

actatggaaa acatcatgtg gagatctgtt gaaggtgaat tgaacgctat cttggaagaa 300

aacggtgttc aattgactgt tgttgttggt tctgttggtg gtggtggtac tatcatcgtt 360

aaccacgtta acgacacttg gggtttgaag gttagacaat ctttgtggtt ccacttgtct 420

tgtttgactt tcggtcaaca cactgttcaa gaattcttgg tttctttcgg tgtttggatc 480

agaactccag ctccatacag accaccaaac gctccaatct tgtctacttt gccagaacac 540

actgttatca gaagaagagg tggtgctaga gcttctagat ctccaagaag aagaactcca 600

tctccaagaa gaagaagatc tcaatctcca agaagaagaa gatctcaatc tccatctgct 660

aactgt 666

<210> 90
<211> 840
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 54) PLUS SEQ ID NO: 78

<400> 90
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ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtggtggt 240

acttgtggta tctcttctgt ttctagaatg gaaaacatca tgtggagatc tgttgaaggt 300

gaattgaacg ctatcttgga agaaaacggt gttcaattga ctgttgttgt tggttctgtt 360

aagaacccaa tgtggagagg tccacaaaga ttgccagttc cagttaacga attgccacac 420

ggttggaagg cttggggtaa gtcttacttc gttagagctg ctaagactaa caactctttc 480

gttgttgacg gtgacacttt gaaggaatgt ggtggtggtg gtactatcat cgttaaccac 540

gttaacgaca cttggggttt gaaggttaga caatctttgt ggttccactt gtcttgtttg 600

actttcggtc aacacactgt tcaagaattc ttggtttctt tcggtgtttg gatcagaact 660

ccagctccat acagaccacc aaacgctcca atcttgtcta ctttgccaga acacactgtt 720

atcagaagaa gaggtggtgc tagagcttct agatctccaa gaagaagaac tccatctcca 780

agaagaagaa gatctcaatc tccaagaaga agaagatctc aatctccatc tgctaactgt 840

<210> 91
<211> 705
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 54) PLUS SEQ ID NO: 79

<400> 91
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ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtggtggt 240

actaagaacc caatgtggag aggtccacaa agattgccag ttccagttaa cgaattgcca 300

cacggttgga aggcttgggg taagtcttac ttcgttagag ctgctaagac taacaactct 360

ttcgttgttg acggtggtgg tggtggtact atcatcgtta accacgttaa cgacacttgg 420

ggtttgaagg ttagacaatc tttgtggttc cacttgtctt gtttgacttt cggtcaacac 480

actgttcaag aattcttggt ttctttcggt gtttggatca gaactccagc tccatacaga 540

ccaccaaacg ctccaatctt gtctactttg ccagaacaca ctgttatcag aagaagaggt 600

ggtgctagag cttctagatc tccaagaaga agaactccat ctccaagaag aagaagatct 660

caatctccaa gaagaagaag atctcaatct ccatctgcta actgt 705

<210> 92
<211> 696
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 54) PLUS SEQ ID NO: 80

<400> 92
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ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtggtggt 240

actgacactt tgaaggaatg tccattgaag cacagagctt ggaactcttt cttggttgaa 300

gaccacggtt tcggtgtttt ccacacttct gtttggttga aggttagaga agactactct 360

ttggaaggtg gtggtggtac tatcatcgtt aaccacgtta acgacacttg gggtttgaag 420

gttagacaat ctttgtggtt ccacttgtct tgtttgactt tcggtcaaca cactgttcaa 480

gaattcttgg tttctttcgg tgtttggatc agaactccag ctccatacag accaccaaac 540

gctccaatct tgtctacttt gccagaacac actgttatca gaagaagagg tggtgctaga 600

gcttctagat ctccaagaag aagaactcca tctccaagaa gaagaagatc tcaatctcca 660

agaagaagaa gatctcaatc tccatctgct aactgt 696

<210> 93
<211> 708
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 54) PLUS SEQ ID NO: 81

<400> 93
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ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtggtggt 240

acttgtgacc cagctgttat cggtactgct gttaagggta aggaagctgt tcactctgac 300

ttgggttact ggatcgaatc tgaaaagaac gacacttgga gattgaagag agctcacttg 360

atcgaaatga agacttgtgg tggtggtggt actatcatcg ttaaccacgt taacgacact 420

tggggtttga aggttagaca atctttgtgg ttccacttgt cttgtttgac tttcggtcaa 480

cacactgttc aagaattctt ggtttctttc ggtgtttgga tcagaactcc agctccatac 540

agaccaccaa acgctccaat cttgtctact ttgccagaac acactgttat cagaagaaga 600

ggtggtgcta gagcttctag atctccaaga agaagaactc catctccaag aagaagaaga 660

tctcaatctc caagaagaag aagatctcaa tctccatctg ctaactgt 708

<210> 94
<211> 633
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 54) PLUS SEQ ID NO: 82

<400> 94
atggacatcg acccatacaa ggaattcggt tcttcttacc aattgttgaa cttcttgcca 60

ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtggtggt 240

actggttact ggatcgaatc tgaaaagaac gacacttgga gattgaagag agctcacttg 300

atcggtggtg gtggtactat catcgttaac cacgttaacg acacttgggg tttgaaggtt 360

agacaatctt tgtggttcca cttgtcttgt ttgactttcg gtcaacacac tgttcaagaa 420

ttcttggttt ctttcggtgt ttggatcaga actccagctc catacagacc accaaacgct 480

ccaatcttgt ctactttgcc agaacacact gttatcagaa gaagaggtgg tgctagagct 540

tctagatctc caagaagaag aactccatct ccaagaagaa gaagatctca atctccaaga 600

agaagaagat ctcaatctcc atctgctaac tgt 633

<210> 95
<211> 762
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 54) PLUS SEQ ID NO: 83

<400> 95
atggacatcg acccatacaa ggaattcggt tcttcttacc aattgttgaa cttcttgcca 60

ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtggtggt 240

actagagctc acttgatcga aatgaagact tgtgaatggc caaagtctca cactttgtgg 300

actgacggta tcgaagaatc tgacttgatc atcccaaagt ctttggctgg tccattgtct 360

caccacaaca ctagagaagg ttacagaact caaatgaagg gtccatggca ctctgaagaa 420

ttggaaatca gaggtggtgg tggtactatc atcgttaacc acgttaacga cacttggggt 480

ttgaaggtta gacaatcttt gtggttccac ttgtcttgtt tgactttcgg tcaacacact 540

gttcaagaat tcttggtttc tttcggtgtt tggatcagaa ctccagctcc atacagacca 600

ccaaacgctc caatcttgtc tactttgcca gaacacactg ttatcagaag aagaggtggt 660

gctagagctt ctagatctcc aagaagaaga actccatctc caagaagaag aagatctcaa 720

tctccaagaa gaagaagatc tcaatctcca tctgctaact gt 762

<210> 96
<211> 735
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 54) PLUS SEQ ID NO: 84

<400> 96
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ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtggtggt 240

actttggaaa tcagattcga agaatgtcca ggtactaagg ttcacgttga agaaacttgt 300

ggtactagag gtccatcttt gagatctact actgcttctg gtagagttat cgaagaatgg 360

tgttgtagag aatgtactat gccaccattg tctttcagag ctaagggtgg tggtggtact 420

atcatcgtta accacgttaa cgacacttgg ggtttgaagg ttagacaatc tttgtggttc 480

cacttgtctt gtttgacttt cggtcaacac actgttcaag aattcttggt ttctttcggt 540

gtttggatca gaactccagc tccatacaga ccaccaaacg ctccaatctt gtctactttg 600

ccagaacaca ctgttatcag aagaagaggt ggtgctagag cttctagatc tccaagaaga 660

agaactccat ctccaagaag aagaagatct caatctccaa gaagaagaag atctcaatct 720

ccatctgcta actgt 735

<210> 97
<211> 723
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 54) PLUS SEQ ID NO: 85

<400> 97
atggacatcg acccatacaa ggaattcggt tcttcttacc aattgttgaa cttcttgcca 60

ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtggtggt 240

acttgtccag gtactaaggt tcacgttgaa gaaacttgtg gtactagagg tccatctttg 300

agatctacta ctgcttctgg tagagttatc gaagaatggt gttgtagaga atgtactatg 360

ccaccattgt ctttcagagc taaggacggt tgtggtggtg gtggtactat catcgttaac 420

cacgttaacg acacttgggg tttgaaggtt agacaatctt tgtggttcca cttgtcttgt 480

ttgactttcg gtcaacacac tgttcaagaa ttcttggttt ctttcggtgt ttggatcaga 540

actccagctc catacagacc accaaacgct ccaatcttgt ctactttgcc agaacacact 600

gttatcagaa gaagaggtgg tgctagagct tctagatctc caagaagaag aactccatct 660

ccaagaagaa gaagatctca atctccaaga agaagaagat ctcaatctcc atctgctaac 720

tgt 723

<210> 98
<211> 840
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 54) PLUS SEQ ID NO: 86

<400> 98
atggacatcg acccatacaa ggaattcggt tcttcttacc aattgttgaa cttcttgcca 60

ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtggtggt 240

actatgaagg gtccatggca ctctgaagaa ttggaaatca gattcgaaga atgtccaggt 300

actaaggttc acgttgaaga aacttgtggt actagaggtc catctttgag atctactact 360

gcttctggta gagttatcga agaatggtgt tgtagagaat gtactatgcc accattgtct 420

ttcagagcta aggacggttg ttggtacggt atggaaatca gaccaagaaa ggaaccagaa 480

tctaacttgg ttagatctat ggttactgct ggtggtggtg gtactatcat cgttaaccac 540

gttaacgaca cttggggttt gaaggttaga caatctttgt ggttccactt gtcttgtttg 600

actttcggtc aacacactgt tcaagaattc ttggtttctt tcggtgtttg gatcagaact 660

ccagctccat acagaccacc aaacgctcca atcttgtcta ctttgccaga acacactgtt 720

atcagaagaa gaggtggtgc tagagcttct agatctccaa gaagaagaac tccatctcca 780

agaagaagaa gatctcaatc tccaagaaga agaagatctc aatctccatc tgctaactgt 840

<210> 99
<211> 504
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> prM Furin Deficient

<400> 99
gctgaagtta ctagaagagg ttctgcttac tacatgtact tggacagaaa cgacgctggt 60

gaagctatct ctttcccaac tactttgggt atgaacaagt gttacatcca aatcatggac 120

ttgggtcaca tgtgtgacgc tactatgtct tacgaatgtc caatgttgga cgaaggtgtt 180

gaaccagacg acgttgactg ttggtgtaac actacttcta cttgggttgt ttacggtact 240

tgtcaccaca agaagggtga agctggtggt tctggtggtg ctgttacttt gccatctcac 300

tctactagaa agttgcaaac tagatctcaa acttggttgg aatctagaga atacactaag 360

cacttgatca gagttgaaaa ctggatcttc agaaacccag gtttcgcttt ggctgctgct 420

gctatcgctt ggttgttggg ttcttctact tctcaaaagg ttatctactt ggttatgatc 480

ttgttgatcg ctccagctta ctct 504

<210> 100
<211> 225
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> M full length

<400> 100
gctgttactt tgccatctca ctctactaga aagttgcaaa ctagatctca aacttggttg 60

gaatctagag aatacactaa gcacttgatc agagttgaaa actggatctt cagaaaccca 120

ggtttcgctt tggctgctgc tgctatcgct tggttgttgg gttcttctac ttctcaaaag 180

gttatctact tggttatgat cttgttgatc gctccagctt actct 225

<210> 101
<211> 1077
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 62) PLUS SEQ ID NO:99

<400> 101
atggacatcg acccatacaa ggaattcggt tcttcttacc aattgttgaa cttcttgcca 60

ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtggtggt 240

actgctgaag ttactagaag aggttctgct tactacatgt acttggacag aaacgacgct 300

ggtgaagcta tctctttccc aactactttg ggtatgaaca agtgttacat ccaaatcatg 360

gacttgggtc acatgtgtga cgctactatg tcttacgaat gtccaatgtt ggacgaaggt 420

gttgaaccag acgacgttga ctgttggtgt aacactactt ctacttgggt tgtttacggt 480

acttgtcacc acaagaaggg tgaagctggt ggttctggtg gtgctgttac tttgccatct 540

cactctacta gaaagttgca aactagatct caaacttggt tggaatctag agaatacact 600

aagcacttga tcagagttga aaactggatc ttcagaaacc caggtttcgc tttggctgct 660

gctgctatcg cttggttgtt gggttcttct acttctcaaa aggttatcta cttggttatg 720

atcttgttga tcgctccagc ttactctggt ggtggtggta ctatcatcgt taaccacgtt 780

aacgacactt ggggtttgaa ggttagacaa tctttgtggt tccacttgtc ttgtttgact 840

ttcggtcaac acactgttca agaattcttg gtttctttcg gtgtttggat cagaactcca 900

gctccataca gaccaccaaa cgctccaatc ttgtctactt tgccagaaca cactgttatc 960

agaagaagag gtggtgctag agcttctaga tctccaagaa gaagaactcc atctccaaga 1020

agaagaagat ctcaatctcc aagaagaaga agatctcaat ctccatctgc taactgt 1077

<210> 102
<211> 798
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>

<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 62) PLUS SEQ ID NO: 100

<400> 102
atggacatcg acccatacaa ggaattcggt tcttcttacc aattgttgaa cttcttgcca 60

ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtggtggt 240

actgctgtta ctttgccatc tcactctact agaaagttgc aaactagatc tcaaacttgg 300

ttggaatcta gagaatacac taagcacttg atcagagttg aaaactggat cttcagaaac 360

ccaggtttcg ctttggctgc tgctgctatc gcttggttgt tgggttcttc tacttctcaa 420

aaggttatct acttggttat gatcttgttg atcgctccag cttactctgg tggtggtggt 480

actatcatcg ttaaccacgt taacgacact tggggtttga aggttagaca atctttgtgg 540

ttccacttgt cttgtttgac tttcggtcaa cacactgttc aagaattctt ggtttctttc 600

ggtgtttgga tcagaactcc agctccatac agaccaccaa acgctccaat cttgtctact 660

ttgccagaac acactgttat cagaagaaga ggtggtgcta gagcttctag atctccaaga 720

agaagaactc catctccaag aagaagaaga tctcaatctc caagaagaag aagatctcaa 780

tctccatctg ctaactgt 798

<210> 103
<211> 312
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> C full length

<400> 103
atgaagaacc caaagaagaa gtctggtggt ttcagaatcg ttaacatgtt gaagagaggt 60

gttgctagag tttctccatt cggtggtttg aagagattgc cagctggttt gttgttgggt 120

cacggtccaa tcagaatggt tttggctatc ttggctttct tgagattcac tgctatcaag 180

ccatctttgg gtttgatcaa cagatggggt tctgttggta agaaggaagc tatggaaact 240

atcaagaagt tcaagaagga cttggctgct atgttgagaa tcatcaacgc tagaaaggaa 300

aagaagagaa ga 312

<210> 104
<211> 75
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> C alpha 2

<400> 104
ggtcacggtc caatcagaat ggttttggct atcttggctt tcttgagatt cactgctatc 60

aagccatctt tgggt 75

<210> 105
<211> 885
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 62) PLUS SEQ ID NO:103

<400> 105
atggacatcg acccatacaa ggaattcggt tcttcttacc aattgttgaa cttcttgcca 60

ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtggtggt 240

actatgaaga acccaaagaa gaagtctggt ggtttcagaa tcgttaacat gttgaagaga 300

ggtgttgcta gagtttctcc attcggtggt ttgaagagat tgccagctgg tttgttgttg 360

ggtcacggtc caatcagaat ggttttggct atcttggctt tcttgagatt cactgctatc 420

aagccatctt tgggtttgat caacagatgg ggttctgttg gtaagaagga agctatggaa 480

actatcaaga agttcaagaa ggacttggct gctatgttga gaatcatcaa cgctagaaag 540

gaaaagaaga gaagaggtgg tggtggtact atcatcgtta accacgttaa cgacacttgg 600

ggtttgaagg ttagacaatc tttgtggttc cacttgtctt gtttgacttt cggtcaacac 660

actgttcaag aattcttggt ttctttcggt gtttggatca gaactccagc tccatacaga 720

ccaccaaacg ctccaatctt gtctactttg ccagaacaca ctgttatcag aagaagaggt 780

ggtgctagag cttctagatc tccaagaaga agaactccat ctccaagaag aagaagatct 840

caatctccaa gaagaagaag atctcaatct ccatctgcta actgt 885

<210> 106
<211> 648
<212> DNA
<213> Artificial Sequence

<220>
<223> Synthetic Polynucleotide

<220>
<221> MISC_FEATURE
<223> WHcAg (SEQ ID NO: 62) PLUS SEQ ID NO:104

<400> 106
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ttggacttct tcccagactt gaacgctttg gttgacactg ctactgcttt gtacgaagaa 120

gaattgactg gtagagaaca ctgttctcca caccacactg ctatcagaca agctttggtt 180

tgttgggacg aattgactaa gttgatcgct tggatgtctt ctaacatcgg tggtggtggt 240

actggtcacg gtccaatcag aatggttttg gctatcttgg ctttcttgag attcactgct 300

atcaagccat ctttgggtgg tggtggtggt actatcatcg ttaaccacgt taacgacact 360

tggggtttga aggttagaca atctttgtgg ttccacttgt cttgtttgac tttcggtcaa 420

cacactgttc aagaattctt ggtttctttc ggtgtttgga tcagaactcc agctccatac 480

agaccaccaa acgctccaat cttgtctact ttgccagaac acactgttat cagaagaaga 540

ggtggtgcta gagcttctag atctccaaga agaagaactc catctccaag aagaagaaga 600

tctcaatctc caagaagaag aagatctcaa tctccatctg ctaactgt 648