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<150> US62/608,213
<151> 2017-12-20

<160> 12

<170> PatentIn version 3.5

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Asn Pro Phe Ala Ala Pro Arg Arg Pro Trp Phe Pro Arg Thr Asp Pro
            20                  25                  30


Phe Leu Ala Met Gln Val Gln Glu Leu Thr Arg Ser Met Ala Asn Leu
        35                  40                  45


Thr Phe Lys Gln Arg Arg Asp Ala Pro Pro Glu Gly Pro Ser Ala Lys
    50                  55                  60


Lys Pro Lys Lys Glu Ala Ser Gln Lys Gln Lys Gly Gly Gly Gln Gly
65                  70                  75                  80


Lys Lys Lys Lys Asn Gln Gly Lys Lys Lys Ala Lys Thr Gly Pro Pro
                85                  90                  95


Asn Pro Lys Ala Gln Asn Gly Asn Lys Lys Lys Thr Asn Lys Lys Pro
            100                 105                 110
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Gly Lys Arg Gln Arg Met Val Met Lys Leu Glu Ser Asp Lys Thr Phe
        115                 120                 125

Pro Ile Met Leu Glu Gly Lys Ile Asn Gly Tyr Ala Cys Val Val Gly
    130                 135                 140

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

Val Leu Ala Ala Leu Lys Thr Lys Lys Ala Ser Lys Tyr Asp Leu Glu
                165                 170                 175

Tyr Ala Asp Val Pro Gln Asn Met Arg Ala Asp Thr Phe Lys Tyr Thr
            180                 185                 190

His Glu Lys Pro Gln Gly Tyr Tyr Ser Trp His His Gly Ala Val Gln
        195                 200                 205

Tyr Glu Asn Gly Arg Phe Thr Val Pro Lys Gly Val Gly Ala Lys Gly
    210                 215                 220

Asp Ser Gly Arg Pro Ile Leu Asp Asn Gln Gly Arg Val Val Ala Ile
225                 230                 235                 240

Val Leu Gly Gly Val Asn Glu Gly Ser Arg Thr Ala Leu Ser Val Val
                245                 250                 255

Met Trp Asn Glu Lys Gly Val Thr Val Lys Tyr Thr Pro Glu Asn Cys
            260                 265                 270

Glu Gln Trp
        275
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<210> 2
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<212> PRT
<213> Venezuelan Equine Encephalitis Virus

<400> 2

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Met Phe Pro Phe Gln Pro Met Tyr Pro Met Gln Pro Met Pro Tyr Arg
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Asn Pro Phe Ala Ala Pro Arg Arg Pro Trp Phe Pro Arg Thr Asp Pro
            20                  25                  30

Phe Leu Ala Met Gln Val Gln Glu Leu Thr Arg Ser Met Ala Asn Leu
        35                  40                  45

Thr Phe Lys Gln Arg Arg Asp Ala Pro Pro Glu Gly Pro Ser Ala Asn
    50                  55                  60

Lys Pro Lys Lys Glu Ala Ser Gln Lys Gln Lys Gly Gly Gly Gln Gly
65                  70                  75                  80

Lys Lys Lys Lys Asn Gln Gly Lys Lys Lys Ala Lys Thr Gly Pro Pro
                85                  90                  95

Asn Pro Lys Ala Gln Asn Gly Asn Lys Lys Lys Thr Asn Lys Lys Pro
            100                 105                 110

Gly Lys Arg Gln Arg Met Val Met Lys Leu Glu Ser Asp Lys Thr Phe
        115                 120                 125

Pro Ile Met Leu Glu Gly Lys Ile Asn Gly Tyr Ala Cys Val Val Gly
    130                 135                 140

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

Val Leu Ala Ala Leu Lys Thr Lys Lys Ala Ser Lys Tyr Asp Leu Glu
                165                 170                 175

Tyr Ala Asp Val Pro Gln Asn Met Arg Ala Asp Thr Phe Lys Tyr Thr
            180                 185                 190
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His Glu Lys Pro Gln Gly Tyr Tyr Ser Trp His His Gly Ala Val Gln
        195                 200                 205

Tyr Glu Asn Gly Arg Phe Thr Val Pro Lys Gly Val Gly Ala Lys Gly
    210                 215                 220

Asp Ser Gly Arg Pro Ile Leu Asp Asn Gln Gly Arg Val Val Ala Ile
225                 230                 235                 240

Val Leu Gly Gly Val Asn Glu Gly Ser Arg Thr Ala Leu Ser Val Val
                245                 250                 255

Met Trp Asn Glu Lys Gly Val Thr Val Lys Tyr Thr Pro Glu Asn Cys
            260                 265                 270

Glu Gln Trp
        275
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<210> 3
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<212> PRT
<213> Venezuelan Equine Encephalitis Virus

<400> 3

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Ser Leu Val Thr Thr Met Cys Leu Leu Ala Asn Val Thr Phe Pro Cys
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Ala Gln Pro Pro Ile Cys Tyr Asp Arg Lys Pro Ala Glu Thr Leu Ala
            20                  25                  30

Met Leu Ser Val Asn Val Asp Asn Pro Gly Tyr Asp Glu Leu Leu Glu
        35                  40                  45

Ala Ala Val Lys Cys Pro Gly Arg Lys Arg Arg Ser Thr Glu Glu Leu
    50                  55                  60
```

```
Phe Asn Glu Tyr Lys Leu Thr Arg Pro Tyr Met Ala Arg Cys Ile Arg
65                  70                  75                  80

Cys Ala Val Gly Ser Cys His Ser Pro Ile Ala Ile Glu Ala Val Lys
                85                  90                  95

Ser Asp Gly His Asp Gly Tyr Val Arg Leu Gln Thr Ser Ser Gln Tyr
            100                 105                 110

Gly Leu Asp Ser Ser Gly Asn Leu Lys Gly Arg Thr Met Arg Tyr Asp
        115                 120                 125

Met His Gly Thr Ile Lys Glu Ile Pro Leu His Gln Val Ser Leu Tyr
    130                 135                 140

Thr Ser Arg Pro Cys His Ile Val Asp Gly His Gly Tyr Phe Leu Leu
145                 150                 155                 160

Ala Arg Cys Pro Ala Gly Asp Ser Ile Thr Met Glu Phe Lys Lys Asp
                165                 170                 175

Ser Val Arg His Ser Cys Ser Val Pro Tyr Glu Val Lys Phe Asn Pro
            180                 185                 190

Val Gly Arg Glu Leu Tyr Thr His Pro Pro Glu His Gly Val Glu Gln
        195                 200                 205

Ala Cys Gln Val Tyr Ala His Asp Ala Gln Asn Arg Gly Ala Tyr Val
    210                 215                 220

Glu Met His Leu Pro Gly Ser Glu Val Asp Ser Ser Leu Val Ser Leu
225                 230                 235                 240

Ser Gly Ser Ser Val Thr Val Thr Pro Pro Asp Gly Thr Ser Ala Leu
                245                 250                 255

Val Glu Cys Glu Cys Gly Gly Thr Lys Ile Ser Glu Thr Ile Asn Lys
```

```
            260                 265                 270

Thr Lys Gln Phe Ser Gln Cys Thr Lys Lys Glu Gln Cys Arg Ala Tyr
        275                 280                 285

Arg Leu Gln Asn Asp Lys Trp Val Tyr Asn Ser Asp Lys Leu Pro Lys
    290                 295                 300

Ala Ala Gly Ala Thr Leu Lys Gly Lys Leu His Val Pro Phe Leu Leu
305                 310                 315                 320

Ala Asp Gly Lys Cys Thr Val Pro Leu Ala Pro Glu Pro Met Ile Thr
                325                 330                 335

Phe Gly Phe Arg Ser Val Ser Leu Lys Leu His Pro Lys Asn Pro Thr
            340                 345                 350

Tyr Leu Ile Thr Arg Gln Leu Ala Asp Glu Pro His Tyr Thr His Glu
        355                 360                 365

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

Trp Glu Phe Val Trp Gly Asn His Pro Pro Lys Arg Phe Trp Ala Gln
385                 390                 395                 400

Glu Thr Ala Pro Gly Asn Pro His Gly Leu Pro His Glu Val Ile Thr
                405                 410                 415

His Tyr Tyr His Arg Tyr Pro Met Ser Thr Ile Leu Gly Leu Ser Ile
            420                 425                 430

Cys Ala Ala Ile Ala Thr Val Ser Val Ala Ala Ser Thr Trp Leu Phe
        435                 440                 445

Cys Arg Ser Arg Val Ala Cys Leu Thr Pro Tyr Arg Leu Thr Pro Asn
    450                 455                 460
```

```
Ala Arg Ile Pro Phe Cys Leu Ala Val Leu Cys Cys Ala Arg Thr Ala
465                 470                 475                 480

Arg Ala Glu Thr Thr Trp Glu Ser Leu Asp His Leu Trp Asn Asn Asn
                485                 490                 495

Gln Gln Met Phe Trp Ile Gln Leu Leu Ile Pro Leu Ala Ala Leu Ile
            500                 505                 510

Val Val Thr Arg Leu Leu Arg Cys Val Cys Cys Val Val Pro Phe Leu
        515                 520                 525

Val Met Ala Gly Ala Ala Gly Ala Gly Ala Tyr Glu His Ala Thr Thr
    530                 535                 540

Met Pro Ser Gln Ala Gly Ile Ser Tyr Asn Thr Ile Val Asn Arg Ala
545                 550                 555                 560

Gly Tyr Ala Pro Leu Pro Ile Ser Ile Thr Pro Thr Lys Ile Lys Leu
                565                 570                 575

Ile Pro Thr Val Asn Leu Glu Tyr Val Thr Cys His Tyr Lys Thr Gly
            580                 585                 590

Met Asp Ser Pro Ala Ile Lys Cys Cys Gly Ser Gln Glu Cys Thr Pro
        595                 600                 605

Thr Tyr Arg Pro Asp Glu Gln Cys Lys Val Phe Thr Gly Val Tyr Pro
    610                 615                 620

Phe Met Trp Gly Gly Ala Tyr Cys Phe Cys Asp Thr Glu Asn Thr Gln
625                 630                 635                 640

Val Ser Lys Ala Tyr Val Met Lys Ser Asp Asp Cys Leu Ala Asp His
                645                 650                 655
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```
Ala Glu Ala Tyr Lys Ala His Thr Ala Ser Val Gln Ala Phe Leu Asn
            660                 665                 670

Ile Thr Val Gly Glu His Ser Ile Val Thr Thr Val Tyr Val Asn Gly
        675                 680                 685

Glu Thr Pro Val Asn Phe Asn Gly Val Lys Ile Thr Ala Gly Pro Leu
    690                 695                 700

Ser Thr Ala Trp Thr Pro Phe Asp Arg Lys Ile Val Gln Tyr Ala Gly
705                 710                 715                 720

Glu Ile Tyr Asn Tyr Asp Phe Pro Glu Tyr Gly Ala Gly Gln Pro Gly
                725                 730                 735

Ala Phe Gly Asp Ile Gln Ser Arg Thr Val Ser Ser Ser Asp Leu Tyr
            740                 745                 750

Ala Asn Thr Asn Leu Val Leu Gln Arg Pro Lys Ala Gly Ala Ile His
        755                 760                 765

Val Pro Tyr Thr Gln Ala Pro Ser Gly Phe Glu Gln Trp Lys Lys Asp
    770                 775                 780

Lys Ala Pro Ser Leu Lys Phe Thr Ala Pro Phe Gly Cys Glu Ile Tyr
785                 790                 795                 800

Thr Asn Pro Ile Arg Ala Glu Asn Cys Ala Val Gly Ser Ile Pro Leu
                805                 810                 815

Ala Phe Asp Ile Pro Asp Ala Leu Phe Thr Arg Val Ser Glu Thr Pro
            820                 825                 830

Thr Leu Ser Ala Ala Glu Cys Thr Leu Asn Glu Cys Val Tyr Ser Ser
        835                 840                 845
```

```
Asp Phe Gly Gly Ile Ala Thr Val Lys Tyr Ser Ala Ser Lys Ser Gly
    850                 855                 860

Lys Cys Ala Val His Val Pro Ser Gly Thr Ala Thr Leu Lys Glu Ala
865                 870                 875                 880

Ala Val Glu Leu Thr Glu Gln Gly Ser Ala Thr Ile His Phe Ser Thr
                885                 890                 895

Ala Asn Ile His Pro Glu Phe Arg Leu Gln Ile Cys Thr Ser Tyr Val
            900                 905                 910

Thr Cys Lys Gly Asp Cys His Pro Pro Lys Asp His Ile Val Thr His
        915                 920                 925

Pro Gln Tyr His Ala Gln Thr Phe Thr Ala Ala Val Ser Lys Thr Ala
    930                 935                 940

Trp Thr Trp Leu Thr Ser Leu Leu Gly Gly Ser Ala Val Ile Ile Ile
945                 950                 955                 960

Ile Gly Leu Val Leu Ala Thr Ile Val Ala Met Tyr Val Leu Thr Asn
                965                 970                 975

Gln Lys His Asn
            980
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<210> 4
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<212> PRT
<213> Venezuelan Equine Encephalitis Virus

<400> 4

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Ala Gln Pro Pro Ile Cys Tyr Asp Arg Lys Pro Ala Glu Thr Leu Ala
            20                  25                  30
```

```
Met Leu Ser Val Asn Val Asp Asn Pro Gly Tyr Asp Glu Leu Leu Glu
        35                  40                  45

Ala Ala Val Lys Cys Pro Gly Ser Gly Gly Gly Ser Ser Thr Glu Glu
    50                  55                  60

Leu Phe Asn Glu Tyr Lys Leu Thr Arg Pro Tyr Met Ala Arg Cys Ile
65                  70                  75                  80

Arg Cys Ala Val Gly Ser Cys His Ser Pro Ile Ala Ile Glu Ala Val
                85                  90                  95

Lys Ser Asp Gly His Asp Gly Tyr Val Arg Leu Gln Thr Ser Ser Gln
            100                 105                 110

Tyr Gly Leu Asp Ser Ser Gly Asn Leu Lys Gly Arg Thr Met Arg Tyr
        115                 120                 125

Asp Met His Gly Thr Ile Lys Glu Ile Pro Leu His Gln Val Ser Leu
    130                 135                 140

Tyr Thr Ser Arg Pro Cys His Ile Val Asp Gly His Gly Tyr Phe Leu
145                 150                 155                 160

Leu Ala Arg Cys Pro Ala Gly Asp Ser Ile Thr Met Glu Phe Lys Lys
                165                 170                 175

Asp Ser Val Arg His Ser Cys Ser Val Pro Tyr Glu Val Lys Phe Asn
            180                 185                 190

Pro Val Gly Arg Glu Leu Tyr Thr His Pro Pro Glu His Gly Val Glu
        195                 200                 205

Gln Ala Cys Gln Val Tyr Ala His Asp Ala Gln Asn Arg Gly Ala Tyr
    210                 215                 220
```

```
Val Glu Met His Leu Pro Gly Ser Glu Val Asp Ser Ser Leu Val Ser
225                 230                 235                 240

Leu Ser Gly Ser Ser Val Thr Val Thr Pro Pro Asp Gly Thr Ser Ala
                245                 250                 255

Leu Val Glu Cys Glu Cys Gly Gly Thr Lys Ile Ser Glu Thr Ile Asn
            260                 265                 270

Lys Thr Lys Gln Phe Ser Gln Cys Thr Lys Lys Glu Gln Cys Arg Ala
        275                 280                 285

Tyr Arg Leu Gln Asn Asp Lys Trp Val Tyr Asn Ser Asp Lys Leu Pro
    290                 295                 300

Lys Ala Ala Gly Ala Thr Leu Lys Gly Lys Leu His Val Pro Phe Leu
305                 310                 315                 320

Leu Ala Asp Gly Lys Cys Thr Val Pro Leu Ala Pro Glu Pro Met Ile
                325                 330                 335

Thr Phe Gly Phe Arg Ser Val Ser Leu Lys Leu His Pro Lys Asn Pro
            340                 345                 350

Thr Tyr Leu Ile Thr Arg Gln Leu Ala Asp Glu Pro His Tyr Thr His
        355                 360                 365

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

Gly Trp Glu Phe Val Trp Gly Asn His Pro Pro Lys Arg Phe Trp Ala
385                 390                 395                 400

Gln Glu Thr Ala Pro Gly Asn Pro His Gly Leu Pro His Glu Val Ile
                405                 410                 415
```

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Thr His Tyr Tyr His Arg Tyr Pro Met Ser Thr Ile Leu Gly Leu Ser
            420                 425                 430

Ile Cys Ala Ala Ile Ala Thr Val Ser Val Ala Ala Ser Thr Trp Leu
        435                 440                 445

Phe Cys Arg Ser Arg Val Ala Cys Leu Thr Pro Tyr Arg Leu Thr Pro
    450                 455                 460

Asn Ala Arg Ile Pro Phe Cys Leu Ala Val Leu Cys Cys Ala Arg Thr
465                 470                 475                 480

Ala Arg Ala Glu Thr Thr Trp Glu Ser Leu Asp His Leu Trp Asn Asn
                485                 490                 495

Asn Gln Gln Met Phe Trp Ile Gln Leu Leu Ile Pro Leu Ala Ala Leu
            500                 505                 510

Ile Val Val Thr Arg Leu Leu Arg Cys Val Cys Cys Val Val Pro Phe
        515                 520                 525

Leu Val Met Ala Gly Ala Ala Gly Ala Gly Ala Tyr Glu His Ala Thr
    530                 535                 540

Thr Met Pro Ser Gln Ala Gly Ile Ser Tyr Asn Thr Ile Val Asn Arg
545                 550                 555                 560

Ala Gly Tyr Ala Pro Leu Pro Ile Ser Ile Thr Pro Thr Lys Ile Lys
                565                 570                 575

Leu Ile Pro Thr Val Asn Leu Glu Tyr Val Thr Cys His Tyr Lys Thr
            580                 585                 590

Gly Met Asp Ser Pro Ala Ile Lys Cys Cys Gly Ser Gln Glu Cys Thr
        595                 600                 605

Pro Thr Tyr Arg Pro Asp Glu Gln Cys Lys Val Phe Thr Gly Val Tyr
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    610                 615                 620

Pro Phe Met Trp Gly Gly Ala Tyr Cys Phe Cys Asp Thr Glu Asn Thr
625                 630                 635                 640

Gln Val Ser Lys Ala Tyr Val Met Lys Ser Asp Asp Cys Leu Ala Asp
                645                 650                 655

His Ala Glu Ala Tyr Lys Ala His Thr Ala Ser Val Gln Ala Phe Leu
            660                 665                 670

Asn Ile Thr Val Gly Glu His Ser Ile Val Thr Thr Val Tyr Val Asn
        675                 680                 685

Gly Glu Thr Pro Val Asn Phe Asn Gly Val Lys Ile Thr Ala Gly Pro
    690                 695                 700

Leu Ser Thr Ala Trp Thr Pro Phe Asp Arg Lys Ile Val Gln Tyr Ala
705                 710                 715                 720

Gly Glu Ile Tyr Asn Tyr Asp Phe Pro Glu Tyr Gly Ala Gly Gln Pro
                725                 730                 735

Gly Ala Phe Gly Asp Ile Gln Ser Arg Thr Val Ser Ser Ser Asp Leu
            740                 745                 750

Tyr Ala Asn Thr Asn Leu Val Leu Gln Arg Pro Lys Ala Gly Ala Ile
        755                 760                 765

His Val Pro Tyr Thr Gln Ala Pro Ser Gly Phe Glu Gln Trp Lys Lys
    770                 775                 780

Asp Lys Ala Pro Ser Leu Lys Phe Thr Ala Pro Phe Gly Cys Glu Ile
785                 790                 795                 800

Tyr Thr Asn Pro Ile Arg Ala Glu Asn Cys Ala Val Gly Ser Ile Pro
                805                 810                 815
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Leu Ala Phe Asp Ile Pro Asp Ala Leu Phe Thr Arg Val Ser Glu Thr
            820                 825                 830

Pro Thr Leu Ser Ala Ala Glu Cys Thr Leu Asn Glu Cys Val Tyr Ser
        835                 840                 845

Ser Asp Phe Gly Gly Ile Ala Thr Val Lys Tyr Ser Ala Ser Lys Ser
    850                 855                 860

Gly Lys Cys Ala Val His Val Pro Ser Gly Thr Ala Thr Leu Lys Glu
865                 870                 875                 880

Ala Ala Val Glu Leu Thr Glu Gln Gly Ser Ala Thr Ile His Phe Ser
                885                 890                 895

Thr Ala Asn Ile His Pro Glu Phe Arg Leu Gln Ile Cys Thr Ser Tyr
            900                 905                 910

Val Thr Cys Lys Gly Asp Cys His Pro Pro Lys Asp His Ile Val Thr
        915                 920                 925

His Pro Gln Tyr His Ala Gln Thr Phe Thr Ala Ala Val Ser Lys Thr
    930                 935                 940

Ala Trp Thr Trp Leu Thr Ser Leu Leu Gly Gly Ser Ala Val Ile Ile
945                 950                 955                 960

Ile Ile Gly Leu Val Leu Ala Thr Ile Val Ala Met Tyr Val Leu Thr
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Asn Gln Lys His Asn
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