SEQUENCE LISTING

<110> OBSCHESTVO S OGRANICHENNOI OTVETSTVENNOSTIYU «PHARMENTERPRISES»

<120> ATTENUATED INFLUENZA VECTORS FOR THE PREVENTION AND/OR TREATMENT OF INFECTIOUS DISEASES AND FOR THE TREATMENT OF ONCOLOGICAL DISEASES

<130> 2420-301559RU/061

<140>
<141>

<150> 2015147703
<151> 06.11.2015

<150> 2016111907
<151> 30.03.2016

<160> 21

<170> PatentIn version 3.5

<210> 1
<211> 890
<212> DNA
<213> Influenza A virus

<220>
<223> NS fragment of influenza A/PR/8/34 (H1N1) virus

<400> 1
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tccttgatcg gcttcgccga gatcagaaat ccctaagagg aaggggcagc actcttggtc 180
tggacatcga gacagccaca cgtgctggaa agcagatagt ggagcggatt ctgaaagaag 240
aatccgatga ggcacttaaa atgaccatgg cctctgtacc tgcgtcgcgt tacctaaccg 300
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caggccctct ttgtatcaga atggaccagg cgatcatgga taaaaacatc atactgaaag 420
cgaacttcag tgtgattttt gaccggctgg agactctaat attgctaagg gctttcaccg 480
aagagggagc aattgttggc gaaatttcac cattgccttc tcttccagga catactgctg 540
aggatgtcaa aaatgcagtt ggagtcctca tcggaggact tgaatggaat gataacacag 600
ttcgagtctc tgaaactcta cagagattcg cttggagaag cagtaatgag aatgggagac 660
ctccactcac tccaaaacag aaacgagaaa tggcgggaac aattaggtca gaagtttgaa 720
gaaataagat ggttgattga agaagtgaga cacaaactga aggtaacaga gaatagtttt 780
gagcaaataa catttatgca agccttacat ctattgcttg aagtggagca agagataaga 840
actttctcat ttcagcttat ttaataataa aaaacaccct tgtttctact 890

<210> 2
<211> 869
<212> DNA
<213> Artificial sequence
<220>
<223> Recombinant NS fragment of influenza A virus with a truncated reading frame of an NS1 protein and a Nep sequence derived from A/Singapore/1/57 (H2N2) virus

<400> 2
agcaaaagca gggtgacaaa gacataatgg atccaaacac tgtgtcaagc tttcaggtag 60
attgctttct ttggcatgtc cgcaaacgag ttgcagacca agaactaggt gatgccccat 120
tccttgatcg gcttcgccga gatcagaaat ccctaagagg aaggggcagc actcttggtc 180

tggacatcga gacagccaca cgtgctggaa agcagatagt ggagcggatt ctgaaagaag 240
aatccgatga ggcacttaaa atgaccatgg cctctgtacc tgcgtcgcgt tacctaaccg 300
acatgactct tgaggaaatg tcaagggaat ggtccatgct catacccaag cagaaagtgg 360
caggccctct ttgtatcaga atggaccagg cgatcatgtg ataataaagt gtgatttttg 420
accggctgga gactctaata ttgctaaggg ctttcaccga agagggagca attgttggcg 480
aaatttcacc attgccttct cttccaggac atactaatga ggatgtcaaa aatgcaattg 540
gggtcctcat cggaggactt gaatggaatg ataacacagt tcgagtctct aaaactctac 600
agagattcgc ttggtgaaac agtaatgaga atgggagacc tccactcact ccaaaacaga 660
aacggaaaat ggcgagaaca attaggtcaa aagttcgaag aaataagatg gctgattgaa 720
gaagtgagac acaaattgaa gataacagag aatagttttg agcaaataac atttatgcaa 780
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taataataaa aaacaccctt gtttctact 869

<210> 3
<211> 869
<212> DNA
<213> Artificial sequence

<220>
<223> Recombinant NS fragment of influenza A virus with
a truncated reading frame of an NS1 protei and a Nep sequence
derived from A/Leningrad/134/47/57 (H2N2) virus

<400> 3
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tccttgatcg gcttcgccga gatcagaaat ccctaagagg aaggggcagc actcttggtc 180
tggacatcga gacagccaca cgtgctggaa agcagatagt ggagcggatt ctgaaagaag 240
aatccgatga ggcacttaaa atgaccatgg cctctgtacc tgcgtcgcgt tacctaaccg 300
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taataataaa aaacaccctt gtttctact 869

<210> 4
<211> 124
<212> PRT
<213> Artificial sequence
<220>
<223> Truncated NS1 protein without insertion of a foreign
sequence

<400> 4
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Trp His Val Arg Lys Arg Val Ala Asp Gln Glu Leu Gly Asp Ala
20 25 30
Pro Phe Leu Asp Arg Leu Arg Arg Asp Gln Lys Ser Leu Arg Gly
35 40 45
Arg Gly Ser Thr Leu Gly Leu Asp Ile Glu Thr Ala Thr Arg Ala
50 55 60
Gly Lys Gln Ile Val Glu Arg Ile Leu Lys Glu Glu Ser Asp Glu
65 70 75
Ala Leu Lys Met Thr Met Ala Ser Val Pro Ala Ser Arg Tyr Leu

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                  80                  85                  90
Thr Asp Met Thr Leu Glu Glu Met Ser Arg Glu Trp Ser Met Leu
                  95                 100                 105
Ile Pro Lys Gln Lys Val Ala Gly Pro Leu Cys Ile Arg Met Asp
                 110                 115                 120
Gln Ala Ile Met
```

<210> 5
<211> 311
<212> PRT
<213> Artificial sequence

<220>
<223> Truncated NS1 protein elongated by a sequence of an influenza A virus HA2 subunit fragment

<400> 5

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Met Asp Pro Asn Thr Val Ser Ser Phe Gln Val Asp Cys Phe Leu
 1               5                  10                  15
Trp His Val Arg Lys Arg Val Ala Asp Gln Glu Leu Gly Asp Ala
                 20                  25                  30
Pro Phe Leu Asp Arg Leu Arg Arg Asp Gln Lys Ser Leu Arg Gly
                 35                  40                  45
Arg Gly Ser Thr Leu Gly Leu Asp Ile Glu Thr Ala Thr Arg Ala
                 50                  55                  60
Gly Lys Gln Ile Val Glu Arg Ile Leu Lys Glu Glu Ser Asp Glu
                 65                  70                  75
Ala Leu Lys Met Thr Met Ala Ser Val Pro Ala Ser Arg Tyr Leu
                 80                  85                  90
Thr Asp Met Thr Leu Glu Glu Met Ser Arg Glu Trp Ser Met Leu
                 95                 100                 105
Ile Pro Lys Gln Lys Val Ala Gly Pro Leu Cys Ile Arg Met Asp
                110                 115                 120
Gln Ala Ile Met Gly Gly Gly Leu Phe Gly Ala Ile Ala Gly Phe
                125                 130                 135
Ile Glu Gly Gly Trp Thr Gly Met Ile Asp Gly Trp Tyr Gly Tyr
                140                 145                 150
His His Gln Asn Glu Gln Gly Ser Gly Tyr Ala Ala Asp Gln Lys
                155                 160                 165
Ser Thr Gln Asn Ala Ile Asn Gly Ile Thr Asn Lys Val Asn Thr
                170                 175                 180
Val Ile Glu Lys Met Asn Ile Gln Phe Thr Ala Val Gly Lys Glu
                185                 190                 195
Phe Asn Lys Leu Glu Lys Arg Met Glu Asn Leu Asn Lys Lys Val
                200                 205                 210
Asp Asp Gly Phe Leu Asp Ile Trp Thr Tyr Asn Ala Glu Leu Leu
                215                 220                 225
Val Leu Leu Glu Asn Glu Arg Thr Leu Asp Phe His Asp Ser Asn
                230                 235                 240
Val Lys Asn Leu Tyr Glu Lys Val Lys Ser Gln Leu Lys Asn Asn
                245                 250                 255
Ala Lys Glu Ile Gly Asn Gly Cys Phe Glu Phe Tyr His Lys Cys
                260                 265                 270
Asp Asn Glu Cys Met Glu Ser Val Arg Asn Gly Thr Tyr Asp Tyr
                275                 280                 285
Pro Lys Tyr Ser Glu Glu Ser Lys Leu Asn Arg Glu Lys Val Asp
                290                 295                 300
Gly Val Lys Leu Glu Ser Met Gly Ile Tyr Gln
                305                 310
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<210> 6
<211> 284
<212> PRT
<213> Artificial sequence

<220>
<223> Truncated NS1 protein elongated by a sequence of an influenza A virus HA2 subunit fragment

<400> 6
Met Asp Pro Asn Thr Val Ser Ser Phe Gln Val Asp Cys Phe Leu
1 5 10 15
Trp His Val Arg Lys Arg Val Ala Asp Gln Glu Leu Gly Asp Ala
20 25 30
Pro Phe Leu Asp Arg Leu Arg Arg Asp Gln Lys Ser Leu Arg Gly
35 40 45
Arg Gly Ser Thr Leu Gly Leu Asp Ile Glu Thr Ala Thr Arg Ala
50 55 60
Gly Lys Gln Ile Val Glu Arg Ile Leu Lys Glu Glu Ser Asp Glu
65 70 75
Ala Leu Lys Met Thr Met Ala Ser Val Pro Ala Ser Arg Tyr Leu
80 85 90
Thr Asp Met Thr Leu Glu Glu Met Ser Arg Glu Trp Ser Met Leu
95 100 105
Ile Pro Lys Gln Lys Val Ala Gly Pro Leu Cys Ile Arg Met Asp
110 115 120
Gln Ala Ile Met Gly Gly Ala Val Gly Lys Glu Phe Asn Lys Leu
125 130 135
Glu Lys Arg Met Glu Asn Leu Asn Lys Lys Val Asp Asp Gly Phe
140 145 150
Leu Asp Ile Trp Thr Tyr Asn Ala Glu Leu Leu Val Leu Leu Glu
155 160 165
Asn Glu Arg Thr Leu Asp Phe His Asp Ser Asn Val Lys Asn Leu
170 175 180
Tyr Glu Lys Val Lys Ser Gln Leu Lys Asn Asn Ala Lys Glu Ile
185 190 195
Gly Asn Gly Cys Phe Glu Phe Tyr His Lys Cys Asp Asn Glu Cys
200 205 210
Met Glu Ser Val Arg Asn Gly Thr Tyr Asp Tyr Pro Lys Tyr Ser
215 220 225
Glu Glu Ser Lys Leu Asn Arg Glu Lys Val Asp Gly Val Lys Leu
230 235 240
Glu Ser Met Gly Ile Tyr Gln Ile Leu Ala Ile Tyr Ser Thr Val
245 250 255
Ala Ser Ser Leu Val Leu Leu Val Ser Leu Gly Ala Ile Ser Phe
260 265 270
Trp Met Cys Ser Asn Gly Ser Leu Gln Cys Arg Ile Cys Ile
275 280

<210> 7
<211> 289
<212> PRT
<213> Artificial sequence
<220>
<223> Truncated NS1 protein elongated by a sequence of an influenza A virus HA2 subunit fragment

<400> 7
Met Asp Pro Asn Thr Val Ser Ser Phe Gln Val Asp Cys Phe Leu

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

<210> 8
<211> 294
<212> PRT
<213> Artificial sequence
<220>
<223> Truncated NS1 protein elongated by a sequence of an influenza B virus HA2 subunit fragment

<400> 8

```
Met Asp Pro Asn Thr Val Ser Ser Phe Gln Val Asp Cys Phe Leu
 1               5                  10                  15
Trp His Val Arg Lys Arg Val Ala Asp Gln Glu Leu Gly Asp Ala
            20                  25                  30
Pro Phe Leu Asp Arg Leu Arg Arg Asp Gln Lys Ser Leu Arg Gly
            35                  40                  45
Arg Gly Ser Thr Leu Gly Leu Asp Ile Glu Thr Ala Thr Arg Ala
            50                  55                  60
Gly Lys Gln Ile Val Glu Arg Ile Leu Lys Glu Glu Ser Asp Glu
            65                  70                  75
Ala Leu Lys Met Thr Met Ala Ser Val Pro Ala Ser Arg Tyr Leu
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```
                  80                  85                  90
Thr Asp Met Thr Leu Glu Glu Met Ser Arg Glu Trp Ser Met Leu
                  95                 100                 105
Ile Pro Lys Gln Lys Val Ala Gly Pro Leu Cys Ile Arg Met Asp
                 110                 115                 120
Gln Ala Ile Met Gly Gly Gly Phe Phe Gly Ala Ile Ala Gly Phe
                 125                 130                 135
Leu Glu Gly Gly Trp Glu Gly Met Ile Ala Gly Trp His Gly Tyr
                 140                 145                 150
Thr Ser His Gly Ala His Gly Val Ala Val Ala Ala Asp Leu Lys
                 155                 160                 165
Ser Thr Gln Glu Ala Ile Asn Lys Ile Thr Lys Asn Leu Asn Ser
                 170                 175                 180
Leu Ser Glu Leu Glu Val Lys Asn Leu Gln Arg Leu Ser Gly Ala
                 185                 190                 195
Met Asn Gly Leu His Asp Glu Ile Leu Glu Leu Asp Glu Lys Val
                 200                 205                 210
Asp Asp Leu Arg Ala Asp Thr Ile Ser Ser Gln Ile Glu Leu Ala
                 215                 220                 225
Val Leu Leu Ser Asn Glu Gly Ile Ile Asn Ser Glu Asp Glu His
                 230                 235                 240
Leu Leu Ala Leu Glu Arg Lys Leu Lys Lys Met Leu Gly Pro Ser
                 245                 250                 255
Ala Val Glu Ile Gly Asn Gly Cys Phe Glu Thr Lys His Lys Cys
                 260                 265                 270
Asn Gln Thr Cys Leu Asp Arg Ile Ala Ala Gly Thr Phe Asn Ala
                 275                 280                 285
Gly Asp Phe Ser Leu Pro Thr Phe Asp
                 290
```

<210> 9
<211> 158
<212> PRT
<213> Artificial sequence
<220>
<223> Truncated NS1 protein elongated by a sequence of an influenza A virus HA2 subunit fragment and a sequence of a B-cell epitope of influenza A virus NP protein

<400> 9

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

Glu Ser Arg Asn Pro Gly Asn Ala
155

<210> 10
<211> 158
<212> PRT
<213> Artificial sequence

<220>
<223> Truncated NS1 protein elongated by a sequence of an influenza A virus HA2 subunit fragment and a sequence of a B-cell epitope of influenza A virus NP protein

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

<210> 11
<211> 221
<212> PRT
<213> Artificial sequence

<220>
<223> Truncated NS1 protein elongated by a sequence of mycobacterium tuberculosis protein Esat6 protein

<400> 11
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1 5 10 15
Trp His Val Arg Lys Arg Val Ala Asp Gln Glu Leu Gly Asp Ala
20 25 30
Pro Phe Leu Asp Arg Leu Arg Arg Asp Gln Lys Ser Leu Arg Gly
35 40 45
Arg Gly Ser Thr Leu Gly Leu Asp Ile Glu Thr Ala Thr Arg Ala
50 55 60
Gly Lys Gln Ile Val Glu Arg Ile Leu Lys Glu Glu Ser Asp Glu
65 70 75
Ala Leu Lys Met Thr Met Ala Ser Val Pro Ala Ser Arg Tyr Leu
80 85 90
Thr Asp Met Thr Leu Glu Glu Met Ser Arg Glu Trp Ser Met Leu

```
                 95                  100                 105
Ile Pro Lys Gln Lys Val Ala Gly Pro Leu Cys Ile Arg Met Asp
                110                 115                 120
Gln Ala Ile Met Gly Gly Met Thr Glu Gln Gln Trp Asn Phe Ala
                125                 130                 135
Gly Ile Glu Ala Ala Ala Ser Ala Ile Gln Gly Asn Val Thr Ser
                140                 145                 150
Ile His Ser Leu Leu Asp Glu Gly Lys Gln Ser Leu Thr Lys Leu
                155                 160                 165
Ala Ala Ala Trp Gly Gly Ser Gly Ser Glu Ala Tyr Gln Gly Val
                170                 175                 180
Gln Gln Lys Trp Asp Ala Thr Ala Thr Glu Leu Asn Asn Ala Leu
                185                 190                 195
Gln Asn Leu Ala Arg Thr Ile Ser Glu Ala Gly Gln Ala Met Ala
                200                 205                 210
Ser Thr Glu Gly Asn Val Thr Gly Met Phe Ala
                215                 220
```

<210> 12
<211> 238
<212> Белок
<213> Artificial sequence

<220>
<223> Truncated NS1´protein elongated by a sequence of self-cleaving 2A peptide and a sequence of mycobacterium tuberculosis protein ESAT-6

<400> 12

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

<210> 13
<211> 172
<212> PRT
<213> Artificial sequence

<220>
<223> Truncated NS1 protein elongated by sequences of T-cell epitopes of herpes simplex virus (HSV) types I and II

<400> 13

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

<210> 14
<211> 2341
<212> DNA
<213> Influenza A virus/PR/8/34 (H1N1)

<220>
<223> Nucleotide sequence of PB2 genomic fragment

<400> 14

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aagaagtaca catcaggaag acaggagaag aacccagcac ttaggatgaa atggatgatg 180
gcaatgaaat atccaattac agcagacaag aggataacgg aaatgattcc tgagagaaat 240
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tggatcatca gaaactggga aactgttaaa attcagtggt cccagaaccc tacaatgcta 1740
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tacagtgggt ttgtaagaac tctgttccaa caaatgaggg atgtgcttgg gacatttgat 1860
accgcacaga taataaaact tcttcccttc gcagccgctc caccaaagca aagtagaatg 1920
cagttctcct catttactgt gaatgtgagg ggatcaggaa tgagaatact tgtaaggggc 1980
aattctcctg tattcaacta taacaaggcc acgaagagac tcacagttct cggaaaggat 2040
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aggggattcc tcattctggg caaagaagac aagagatatg ggccagcact aagcatcaat 2160
gaactgagca accttgcgaa aggagagaag gctaatgtgc taattgggca aggagacgtg 2220
gtgttggtaa tgaaacggaa acgggactct agcatactta ctgacagcca gacagcgacc 2280
aaaagaattc ggatggccat caattagtgt cgaatagttt aaaaacgacc ttgtttctac 2340
t 2341

<210> 15
<211> 2288
<212> DNA
<213> Influenza A virus/PR/8/34 (H1N1)

<220>
<223> Nucleotide sequence of PB1 genomic fragment

<400> 15
atggatgtca atccgacctt acttttctta aaagtgccag cacaaaatgc tataagcaca 60
actttccctt atactggaga ccctccttac agccatggga caggaacagg atacaccatg 120
gatactgtca acaggacaca tcagtactca gaaaagggaa gatggacaac aaacaccgaa 180
actggagcac cgcaactcaa cccgattgat gggccactgc cagaagacaa tgaaccaagt 240
ggttatgccc aaacagattg tgtattggag gcgatggctt tccttgagga atcccatcct 300
ggtatttttg aaaactcgtg tattgaaacg atggaggttg ttcagcaaac acgagtagac 360
aagctgacac aaggccgaca gacctatgac tggactctaa atagaaacca acctgctgca 420
acagcattgg ccaacacaat agaagtgttc agatcaaatg gcctcacggc caatgagtct 480
ggaaggctca tagacttcct taaggatgta atggagtcaa tgaacaaaga agaaatgggg 540
atcacaactc attttcagag aaagagacgg gtgagagaca atatgactaa gaaaatgata 600
acacagagaa caatgggtaa aaagaagcag agattgaaca aaaggagtta tctaattaga 660
gcattgaccc tgaacacaat gaccaaagat gctgagagag ggaagctaaa acggagagca 720
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agtatatgtg agaaacttga acaatcaggg ttgccagttg gaggcaatga gaagaaagca 840
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cttcaatcct ctgacgattt tgctctgatt gtgaatgcac ccaatcatga agggattcaa 1380
gccggagtcg acaggtttta tcgaacctgt aagctacttg gaatcaatat gagcaagaaa 1440

aagtcttaca taaacagaac aggtacattt gaattcacaa gtttttttcta tcgttatggg 1500
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gcggacatga gtattggagt tactgtcatc aaaaacaata tgataaacaa tgatcttggt 1620
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caggggcgtt tatgcaaccc actgaaccca tttgtcagcc ataaagaaat tgaatcaatg 1920
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cccagcagtt catacagaag accagtcggg atatccagta tggtggaggc tatggtttcc 2160
agagcccgaa ttgatgcacg gattgatttc gaatctggaa ggataaagaa agaagagttc 2220
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tagcttgt 2288

<210> 16
<211> 2233
<212> DNA
<213> Influenza A virus/PR/8/34 (H1N1)

<220>
<223> Nucleotide sequence of PA genomic fragment

<400> 16
agcgaaagca ggtactgatc caaaatggaa gattttgtgc gacaatgctt caatccgatg 60
attgtcgagc ttgcggaaaa aacaatgaaa gagtatgggg aggacctgaa aatcgaaaca 120
aacaaatttg cagcaatatg cactcacttg gaagtatgct tcatgtattc agattttcac 180
ttcatcaatg agcaaggcga gtcaataatc gtagaacttg gtgatccaaa tgcacttttg 240
aagcacagat ttgaaataat cgagggaaga gatcgcacaa tggcctggac agtagtaaac 300
agtatttgca acactacagg ggctgagaaa ccaaagtttc taccagattt gtatgattac 360
aaggagaata gattcatcga aattggagta acaaggagag aagttcacat atactatctg 420
gaaaaggcca ataaaattaa atctgagaaa acacacatcc acattttctc gttcactggg 480
gaagaaatgg ccacaaaggc agactacact ctcgatgaag aaagcagggc taggatcaaa 540
accagactat tcaccataag acaagaaatg gccagcagag gcctctggga ttcctttcgt 600
cagtccgaga gaggagaaga gacaattgaa gaaaggtttg aaatcacagg aacaatgcgc 660
aagcttgccg accaaagtct cccgccgaac ttctccagcc ttgaaaattt tagagcctat 720
gtggatggat tcgaaccgaa cggctacatt gagggcaagc tgtctcaaat gtccaaagaa 780
gtaaatgcta gaattgaacc ttttttgaaa acaacaccac gaccacttag acttccgaat 840
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gaggacccaa gtcatgaagg agagggaata ccgctatatg atgcaatcaa atgcatgaga 960
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tatgatagtg atgaaccaga attgaggtcg ctagcaagtt ggattcagaa tgagtttaac 1260
aaggcatgcg aactgacaga ttcaagctgg atagagctcg atgagattgg agaagatgtg 1320
gctccaattg aacacattgc aagcatgaga aggaattatt tcacatcaga ggtgtctcac 1380
tgcagagcca cagaatacat aatgaagggg gtgtacatca atactgcctt gcttaatgca 1440
tcttgtgcag caatggatga tttccaatta attccaatga taagcaagtg tagaactaag 1500
gagggaaggc gaaagaccaa cttgtatggt ttcatcataa aaggaagatc ccacttaagg 1560
aatgacaccg acgtggtaaa ctttgtgagc atggagtttt ctctcactga cccaagactt 1620
gaaccacata aatgggagaa gtactgtgtt cttgagatag gagatatgct tataagaagt 1680
gccataggcc aggtttcaag gcccatgttc ttgtatgtga gaacaaatgg aacctcaaaa 1740
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gagagtatga ttgaagctga gtcctctgtc aaagagaaag acatgaccaa agagttcttt 1860
gagaacaaat cagaaacatg gcccattgga gagtccccca aaggagtgga ggaaagttcc 1920
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agggacaacc ttgaacctgg gacctttgat cttgggggggc tatatgaagc aattgaggag 2100

tgcctgatta atgatccctg ggttttgctt aatgcttctt ggttcaactc cttccttaca 2160
catgcattga gttagttgtg gcagtgctac tatttgctat ccatactgtc caaaaaagta 2220
ccttgtttct act 2233

<210> 17
<211> 1027
<212> DNA
<213> Influenza A virus/PR/8/34 (H1N1)

<220>
<223> Nucleotide sequence of NP genomic fragment

<400> 17
agcgaaagca ggtagatatt gaaagatgag tcttctaacc gaggtcgaaa cgtacgtact 60
ctctatcatc ccgtcaggcc ccctcaaagc cgagatcgca cagagacttg aagatgtctt 120
tgcagggaag aacactgatc ttgaggttct catggaatgg ctaaagacaa gaccaatcct 180
gtcacctctg actaagggga ttttaggatt tgtgttcacg ctcaccgtgc ccagtgagcg 240
aggactgcag cgtagacgct ttgtccaaaa tgcccttaat gggaacgggg atccaaataa 300
catggacaaa gcagttaaac tgtataggaa gctcaagagg gagataacat tccatggggc 360
caaagaaatc tcactcagtt attctgctgg tgcacttgcc agttgtatgg gcctcatata 420
caacaggatg ggggctgtga ccactgaagt ggcatttggc ctggtatgtg caacctgtga 480
acagattgct gactcccagc atcggtctca taggcaaatg gtgacaacaa ccaatccact 540
aatcagacat gagaacagaa tggttttagc cagcactaca gctaaggcta tggagcaaat 600
ggctggatcg agtgagcaag cagcagaggc catggaggtt gctagtcagg ctagacaaat 660
ggtgcaagcg atgagaacca ttgggactca tcctagctcc agtgctggtc tgaaaaatga 720
tcttcttgaa aatttgcagg cctatcagaa acgaatgggg gtgcagatgc aacggttcaa 780
gtgatcctct cgctattgcc gcaaatatca ttgggatctt gcacttgaca ttgtggattc 840
ttgatcgtct ttttttcaaa tgcatttacc gtcgctttaa atacggactg aaaggagggc 900
cttctacgga aggagtgcca aagtctatga gggaagaata tcgaaaggaa cagcagagtg 960
ctgtggatgc tgacgatggt cattttgtca gcatagagct ggagtaaaaa actaccttgt 1020
ttctact 1027

<210> 18
<211> 1027
<212> DNA
<213> Influenza A virus/PR/8/34 (H1N1)

<220>
<223> Nucleotide sequence of M genomic fragment

<400> 18
agcgaaagca ggtagatatt gaaagatgag tcttctaacc gaggtcgaaa cgtacgtact 60
ctctatcatc ccgtcaggcc ccctcaaagc cgagatcgca cagagacttg aagatgtctt 120
tgcagggaag aacactgatc ttgaggttct catggaatgg ctaaagacaa gaccaatcct 180
gtcacctctg actaagggga ttttaggatt tgtgttcacg ctcaccgtgc ccagtgagcg 240
aggactgcag cgtagacgct ttgtccaaaa tgcccttaat gggaacgggg atccaaataa 300
catggacaaa gcagttaaac tgtataggaa gctcaagagg gagataacat tccatggggc 360
caaagaaatc tcactcagtt attctgctgg tgcacttgcc agttgtatgg gcctcatata 420
caacaggatg ggggctgtga ccactgaagt ggcatttggc ctggtatgtg caacctgtga 480
acagattgct gactcccagc atcggtctca taggcaaatg gtgacaacaa ccaatccact 540
aatcagacat gagaacagaa tggttttagc cagcactaca gctaaggcta tggagcaaat 600
ggctggatcg agtgagcaag cagcagaggc catggaggtt gctagtcagg ctagacaaat 660
ggtgcaagcg atgagaacca ttgggactca tcctagctcc agtgctggtc tgaaaaatga 720
tcttcttgaa aatttgcagg cctatcagaa acgaatgggg gtgcagatgc aacggttcaa 780
gtgatcctct cgctattgcc gcaaatatca ttgggatctt gcacttgaca ttgtggattc 840
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cttctacgga aggagtgcca aagtctatga gggaagaata tcgaaaggaa cagcagagtg 960
ctgtggatgc tgacgatggt cattttgtca gcatagagct ggagtaaaaa actaccttgt 1020
ttctact 1027

<210> 19
<211> 1701
<212> DNA
<213> Influenza A virus/California/09-like (H1N1pdm)
<220>
<223> Nucleotide sequence of HA genomic fragment

<400> 19
atgaaggcaa tactagtagt tctgctatat acatttgcaa ccgcaaatgc agacacatta 60
tgtataggtt atcatgcaaa caattcaaca gacactgtag acacagtact agaaaagaat 120
gtaacagtaa cacactctgt taaccttcta gaagacaagc ataacgggaa actatgcaaa 180
ctaagagggg tagccccatt gcatttgggt aaatgtaaca ttgctggctg gatcctggga 240
aatccagagt gtgaatcact ctccacagca agttcatggt cctacattgt ggaaacatct 300
agttcagaca atggaacgtg ttacccagga gatttcatca attatgagga gctaagagag 360
caattgagct cagtgtcatc atttgaaagg tttgagatat tccccaaaac aagttcatgg 420
cccaatcatg actcgaacaa aggtgtaacg gcagcatgtc ctcacgctgg agcaaaaagc 480
ttctacaaaa atttaatatg gctagttaaa aaaggaaatt catacccaaa gctcagccaa 540
tcctacatta atgataaagg gaaagaagtc ctcgtgctgt ggggcattca ccatccatct 600
actactgctg accaacaaag tctctatcag aatgcagatg catatgtttt tgtggggaca 660
tcaagataca gcaagaagtt caagccggaa atagcaataa gacccaaagt gagggatcaa 720
gaagggagaa tgaactatta ctggacacta gtagagccgg gagacaaaat aacattcgaa 780
gcaactggaa atctagtggt accgagatat gcattcacaa tggaaagaaa tgctggatct 840
ggtattatca tttcagatac accagtccac gattgcaata caacttgtca gacacccgag 900
ggtgctataa acaccagcct cccatttcag aatatacatc cgatcacaat tggaaaatgt 960
ccaaagtatg taaaaagcac aaaattgaga ctggccacag gattgaggaa tgtcccgtct 1020
attcaatcta gaggcctatt cggggccatt gccggcttca ttgaaggggg gtggacaggg 1080
atggtagatg gatggtacgg ttatcaccat caaaatgagc aggggtcagg atatgcagcc 1140
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gaaaagatga atacacagtt cacagcagtg ggtaaagagt tcaaccacct ggaaaaaaga 1260
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tgctttgaat tttaccacaa atgcgataac acgtgcatgg aaagtgtcaa aaatgggact 1500
tatgactacc caaaatactc agaggaagca aaattaaaca gagaaaaaat agatggggta 1560
aagctggaat caacaaggat ttaccagatt ttggcgatct attcaactgt cgccagttca 1620
ttggtgctgg tagtctccct gggggcaatc agcttctgga tgtgctctaa tgggtctcta 1680
cagtgtagaa tatgtattta a 1701

<210> 20
<211> 1410
<212> DNA
<213> Influenza A virus/California/09-like (H1N1pdm)

<220>
<223> Nucleotide sequence of NA genomic fragment

<400> 20
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aacttaatat tacaaattgg aaacataatc tcaatatgga ttagccactc aattcaagtt 120
gggaatcaaa gtcagatcga aacatgcaat caaagcgtca ttacttatga aaacaacact 180
tgggtaaatc agacatatgt taacatcagc aacaccaact ttgctgctgg gcagccagtg 240
gtttccgtga aattagcggg caattcctct ctctgccctg ttagtggatg ggctatatac 300
agtaaagaca acagtgtaag agtcggttcc aaggggatg tgtttgtcat aagggaacca 360
ttcatatcat gctccccctt ggaatgcaga accttcttct tgactcaagg ggccttgcta 420
aatgacaaac attccaatgg aaccattaaa gacaggagcc catatcgaac cttaatgagc 480
tgtcctattg gtgaagttcc ctctccatac aactcaagat ttgagtcagt cgcttggtca 540
gcaagtgctt gtcatgatgg catcaattgg ctaacaattg gaatttctgg cccagacagt 600
ggggcagtgg ctgtgttaaa gtacaacggc ataataacag acactatcaa gagttggaga 660
aacgatatat tgagaacaca agagtctgaa tgtgcatgtg taaatggttc ttgctttacc 720
ataatgaccg atggaccaag tgatggacag gcctcataca agatcttcag aatagaaaag 780

ggaaagatag tcaaatcagt cgaaatgaat gcccctaatt atcactatga ggaatgctcc 840
tgttatcctg attctagtga aatcacatgt gtgtgcaggg ataactggca tggctcgaat 900
cgaccgtggg tgtctttcaa ccagaatctg gaatatcaga taggatacat atgcagtggg 960
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agaactaaaa gcattagttc aagaaaaggt tttgagatga tttgggatcc aaatggatgg 1140
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ggatatagcg ggagttttgt tcagcatcca gaactaacag ggctggattg tataagacct 1260
tgcttctggg ttgaactaat cagagggcga cccaaagaga acacaatctg gactagtggg 1320
agcagcatat ccttttgtgg tgtaaacagt gacactgtgg gttggtcttg gccagacggt 1380
gctgagttgc catttaccat tgacaagtaa 1410

<210> 21
<211> 979
<212> DNA
<213> Artificial sequence

<220>
<223> Nucleotide sequence of a chimeric NS fragment gene

<400> 21
agcaaaagca gggtgacaaa gacataatgg atccaaacac tgtgtcaagc tttcaggtag 60
attgctttct ttggcatgtc cgcaaacgag ttgcagacca agaactaggt gatgccccat 120
tccttgatcg gcttcgccga gatcagaaat ccctaagagg aaggggcagc actcttggtc 180
tggacatcga gacagccaca cgtgctggaa agcagatagt ggagcggatt ctgaaagaag 240
aatccgatga ggcacttaaa atgaccatgg cctctgtacc tgcgtcgcgt tacctaaccg 300
acatgactct tgaggaaatg tcaagggaat ggtccatgct catacccaag cagaaagtgg 360
caggccctct ttgtatcaga atggaccagg cgatcatggg aggaggtttc ttcggagcta 420
ttgctggttt cttggaagga ggatgggaag gaatgattgc aggttgggga ggaagagaga 480
gccggaaccc agggaatgct tgataataag cggccgcagt gtgatttttg accggctgga 540
gactctaata ttgctaaggg ctttcaccga agagggagca attgttggcg aaatttcacc 600
attgccttct cttccaggac atactaatga ggatgtcaaa aatgcaattg gggtcctcat 660
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ttggagaagc agtaatgaga atgggagacc tccactcact ccaaaacaga aacggaaaat 780
ggcgagaaca attaggtcaa aagttcgaag aaataagatg gctgattgaa gaagtgagac 840
acaaattgaa gataacagag aatagttttg agcaaataac atttatacaa gccttacagc 900
tactatttga agtggaacaa gagataagaa ctttctcgtt tcagcttatt taataataaa 960
aaacaccctt gtttctact 979