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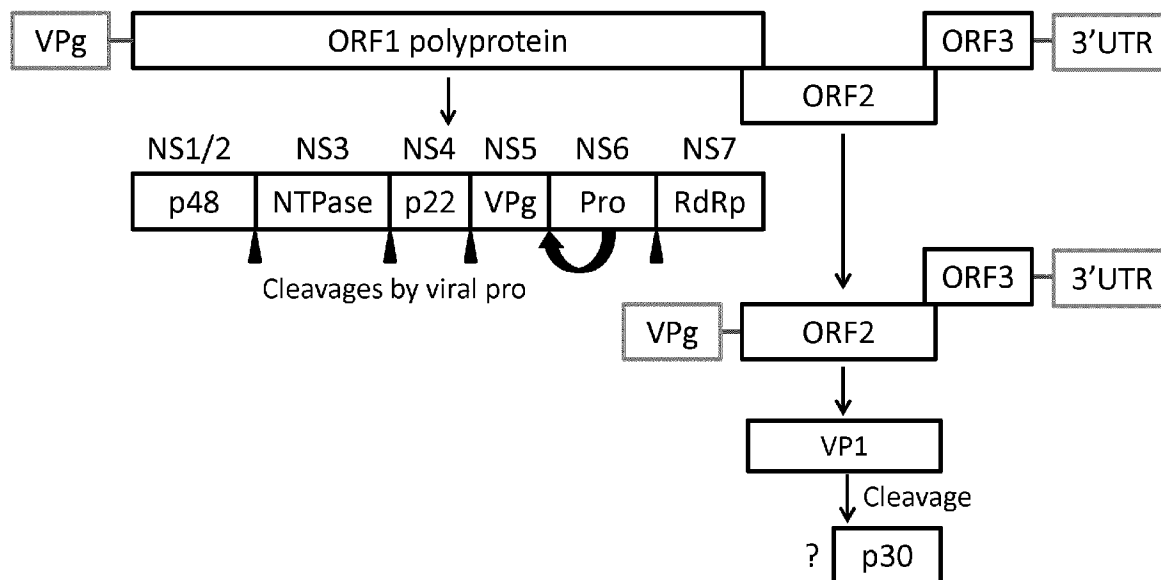
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(54) Titre : PROTEINES VP1 DE NOROVIRUS MODIFIEES ET PROTEINES VP1 DE NOROVIRUS COMPRENANT DES VLP  
(54) Title: MODIFIED NOROVIRUS VP1 PROTEINS AND VLPS COMPRISING MODIFIED NOROVIRUS VP1 PROTEINS

Figure 1A



(57) **Abrégé/Abstract:**

Nucleic acids encoding modified norovirus VP1 proteins, and VLPs comprising one or more of the modified norovirus VP1 proteins are provided. Methods for modified norovirus VP1 protein, and norovirus VLP, production in plants, portions of the plant or a plant cell, are also described.

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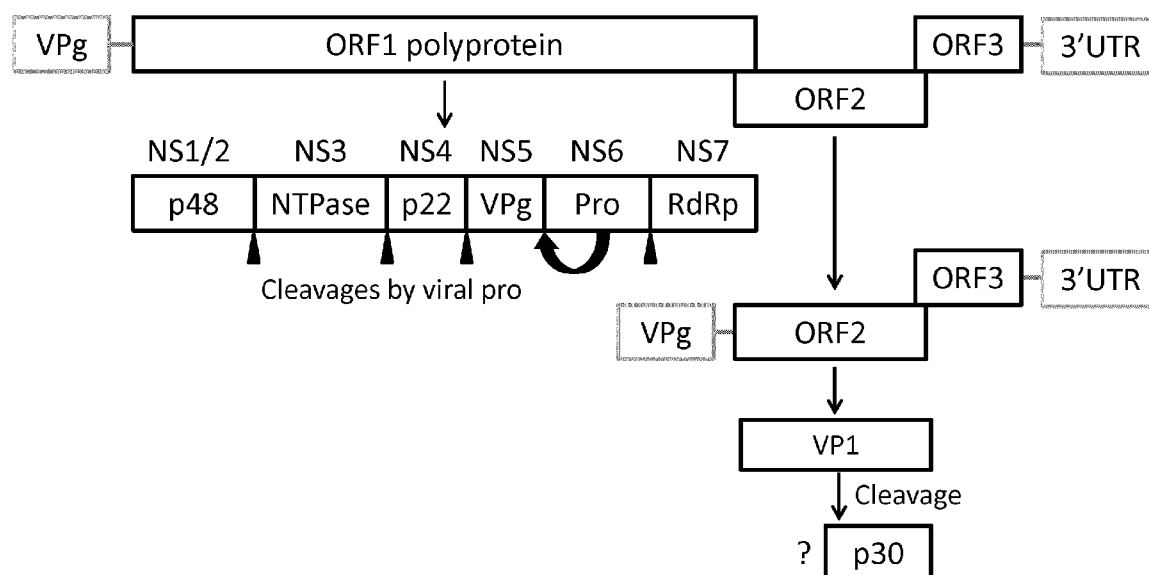
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(54) Title: MODIFIED NOROVIRUS VP1 PROTEINS AND VLPs COMPRISING MODIFIED NOROVIRUS VP1 PROTEINS

Figure 1A



(57) Abstract: Nucleic acids encoding modified norovirus VP1 proteins, and VLPs comprising one or more of the modified norovirus VP1 proteins are provided. Methods for modified norovirus VP1 protein, and norovirus VLP, production in plants, portions of the plant or a plant cell, are also described.

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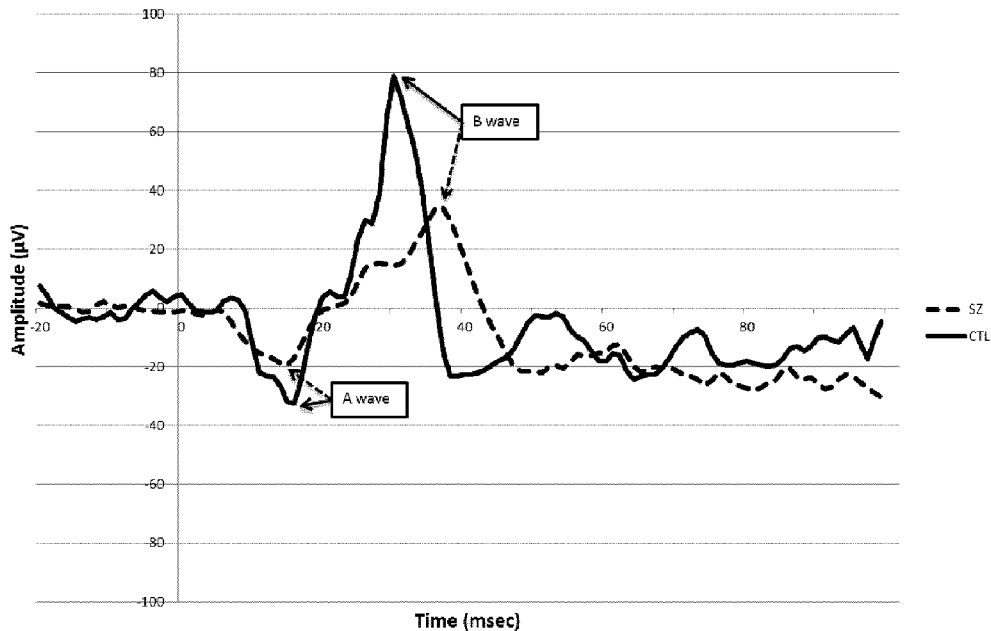
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## Claims

1. A modified norovirus VP1 protein comprising an amino acid sequence derived from an amino acid sequence of a wild type norovirus VP1 protein, the modified norovirus VP1 protein comprising,  
  
one or more than one amino acid substitution in the amino acid sequence of the wild type norovirus VP1 at a position selected from amino acids in sequence alignment with amino acids 43, 57, 84 and 94 of norovirus VP1 genotype GI.1 (SEQ ID NO:1), and  
  
the wild type norovirus VP1 protein is not a GI.1 genotype.
2. The modified norovirus VP1 protein of claim 1, wherein the wild type norovirus VP1 is selected from a group consisting of genotypes GI.3, GI.5, GI.7, GII.2, GII.3, GII.4, GII.6, GII.12 and GII.17.
3. The modified norovirus VP1 protein of claim 1, wherein the one or more than one substitution at the position in sequence alignment with amino acid 43 is to valine, isoleucine, leucine, methionine, threonine, aspartic acid, glutamic acid, asparagine, glutamine, lysine, or histidine.
4. The modified norovirus VP1 protein of claim 1, wherein the one or more than one substitution at the position in sequence alignment with amino acid 57 is to isoleucine, leucine, valine, alanine, glycine, serine, threonine, asparagine, glutamine, lysine, or histidine.
5. The modified norovirus VP1 protein of claim 1, wherein the one or more than one substitution at the position in sequence alignment with amino acid 84 is to serine, asparagine, cysteine, threonine, alanine, lysine or histidine.
6. The modified norovirus VP1 protein of claim 1, wherein the one or more than one substitution at the position in sequence alignment with amino acid 94 is to leucine, isoleucine, methionine, valine, threonine, aspartic acid, glutamic acid, asparagine, glutamine, lysine, histidine.
7. A recombinant polynucleotide encoding the modified norovirus VP1 protein of any one of claims 1 to 6.

8. The recombinant polynucleotide of claim 7, wherein the codon usage of the nucleotide sequence is optimized to human codon usage, increased GC content, or a combination thereof.
9. The recombinant polynucleotide of claim 7, wherein the polynucleotide comprises a vector.
10. A virus-like particle (VLP) comprising the norovirus VP1 of any one of claims 1 to 6.
11. The VLP of claim 10, further comprising a norovirus VP2 protein.
12. A method of producing a norovirus VP1 protein in a plant, portion of a plant or a plant cell, comprising:  
  
introducing the recombinant polynucleotide of any one of claims 7 to 9; and  
  
incubating the plant, portion of the plant or the plant cell under conditions that permit expression of the norovirus VP1 protein.
13. The method of claim 12, wherein the method further comprises a step of harvesting the plant, portion of the plant, or the plant cell.
14. The method of claim 13, wherein the method further comprises a step of extracting, purifying, or both extracting and purifying the norovirus VP1 protein from the plant, the portion of the plant or the plant cell.
15. A norovirus VP1 protein produced by the method of claim 13 or 14.
16. The method of claim 12, wherein in the step of introducing, a second polynucleotide encoding a norovirus VP2 protein is introduced into the plant, the portion of the plant or the plant cell, and in the step of incubating, the conditions permit co-expression and co-production of both the norovirus VP1 protein and the norovirus VP2 protein in the plant, portion of the plant, or the plant cell.
17. The method of claim 16, wherein the method further comprises a step of harvesting the plant, the portion of the plant or the plant cell.
18. The method of claim 17, wherein the method further comprises a step of extracting, purifying, or both extracting and purifying the norovirus VP1 protein and norovirus VP2 protein.

19. A method of producing a norovirus virus like particle (VLP) in a plant, portion of a plant or a plant cell, comprising:

introducing the recombinant polynucleotide of any one of claims 7 to 9; and

incubating the plant, portion of the plant or the plant cell under conditions that permit expression of the norovirus VLP.

20. The method of claim 19, wherein the method further comprises a step of harvesting the plant, portion of the plant, or the plant cell.

21. The method of claim 20, wherein the method further comprises a step of extracting, purifying, or both extracting and purifying the norovirus VLP from the plant, the portion of the plant or the plant cell.

22. A norovirus virus like particle (VLP) produced by the method of claim 21.

23. The method of claim 19, wherein in the step of introducing, a second polynucleotide encoding a norovirus VP2 protein is introduced into the plant, the portion of the plant or the plant cell, and in the step of incubating, the conditions permit co-expression and co-production of both the norovirus VP1 protein and the norovirus VP2 protein in the plant, portion of the plant, or the plant cell.

24. The method of claim 23, wherein the method further comprises a step of harvesting the plant, the portion of the plant or the plant cell.

25. The method of claim 24, wherein the method further comprises a step of extracting, purifying or both extracting and purifying a virus-like particle (VLP) from the plant, the portion of the plant or the plant cell, wherein the VLP comprises the norovirus VP1 protein and the norovirus VP2 protein.

26. A virus-like particle (VLP) comprising the norovirus VP1 protein and the norovirus VP2 protein produced by the method of claim 25.

27. A method of producing an antibody or antibody fragment comprising, administering the norovirus VP1 protein of any one of claims 1 to 6 to a subject, or a host animal, thereby producing the antibody or the antibody fragment.

28. A method of producing an antibody or an antibody fragment comprising, administering the norovirus VP1 protein of claim 15 to a subject, or a host animal, thereby producing the antibody or the antibody fragment.
29. A method of producing an antibody or an antibody fragment comprising, administering the VLP of claim 10 to a subject, or a host animal, thereby producing the antibody or the antibody fragment.
30. A method of producing an antibody or an antibody fragment comprising, administering the VLP of claim 11 to a subject, or a host animal, thereby producing the antibody or the antibody fragment.
31. A method of producing an antibody or an antibody fragment comprising, administering the VLP of claim 22 to a subject, or a host animal, thereby producing the antibody or the antibody fragment.
32. A method of producing an antibody or an antibody fragment comprising, administering the VLP of claim 26 to a subject, or a host animal, thereby producing the antibody or the antibody fragment.
33. A plant, portion of the plant, or plant cell comprising the norovirus VP1 protein of any one of claims 1 to 6.
34. A plant, portion of the plant, or plant cell comprising the norovirus VP1 protein of claim 15.
35. A plant, portion of the plant, or plant cell comprising the VLP of claim 10.
36. A plant, portion of the plant, or plant cell comprising the VLP of claim 11.
37. A plant, portion of the plant, or plant cell comprising the VLP of claim 22.
38. A plant, portion of the plant, or plant cell comprising the VLP of claim 26.
39. A plant, portion of the plant, or plant cell comprising the recombinant polynucleotide of claim 7.

40. A plant extract comprising the norovirus VP1 protein produced by the method of claim 14.
41. A plant extract comprising the norovirus VP1 produced by the method of claim 18.
42. A plant extract comprising the norovirus VLP produced by the method of claim 21.
43. A plant extract comprising the norovirus VLP produced by the method of claim 25.
44. A composition for inducing an immune response comprising, an effective dose of the norovirus VP1 protein of any one of claims 1 to 6, and a pharmaceutically acceptable carrier, adjuvant, vehicle or excipient.
45. A composition for inducing an immune response comprising, an effective dose of the VLP of claim 10, and a pharmaceutically acceptable carrier, adjuvant, vehicle or excipient.
46. A composition for inducing an immune response comprising, an effective dose of the VLP of claim 11, and a pharmaceutically acceptable carrier, adjuvant, vehicle or excipient.
47. A composition for inducing an immune response comprising, an effective dose of the norovirus VP1 protein of claim 15, and a pharmaceutically acceptable carrier, adjuvant, vehicle or excipient.
48. A composition for inducing an immune response comprising, an effective dose of the VLP of claim 22, and a pharmaceutically acceptable carrier, adjuvant, vehicle or excipient.
49. A composition for inducing an immune response comprising, an effective dose of the VLP of claim 26, and a pharmaceutically acceptable carrier, adjuvant, vehicle or excipient.
50. A vaccine comprising an effective dose of the norovirus VP1 protein of any one of claims 1 to 6, for inducing an immune response.
51. A vaccine comprising an effective dose of the VLP of claim 10, for inducing an immune response.
52. A vaccine comprising an effective dose of the VLP of claim 11, for inducing an immune response.

53. A vaccine comprising an effective dose of the norovirus VP1 protein of claim 15, for inducing an immune response.
54. A vaccine comprising an effective dose of the VLP of claim 22, for inducing an immune response.
55. A vaccine comprising an effective dose of the VLP of claim 26, for inducing an immune response.
56. An antibody or antibody fragment prepared by administering the norovirus VP1 protein of any one of claims 1 to 6 to a subject, or host animal.
57. An antibody or antibody fragment prepared by administering the norovirus VP1 protein of claim 15 to a subject, or host animal.
58. An antibody or antibody fragment prepared by administering the VLP claim 10 to a subject, or host animal.
59. An antibody or antibody fragment prepared by administering the VLP claim 11 to a subject, or host animal.
60. An antibody or antibody fragment prepared by administering the VLP claim 22 to a subject, or host animal.
61. An antibody or antibody fragment prepared by administering the VLP claim 26 to a subject, or host animal.
62. A method for inducing immunity to a norovirus infection in a subject, the method comprising administering the VLP of claim 10 to the subject.
63. A method for inducing immunity to a norovirus infection in a subject, the method comprising administering the VLP of claim 11 to the subject.
64. A method for inducing immunity to a norovirus infection in a subject, the method comprising administering the VLP of claim 22 to the subject.

65. A method for inducing immunity to a norovirus infection in a subject, the method comprising administering the VLP of claim 26 to the subject.
66. The method of claim 59, wherein the VLP is administered to the subject orally intranasally, intramuscularly, intraperitoneally, intravenously, subcutaneously, rectally, or intravaginally.
67. The method of claim 60, wherein the VLP is administered to the subject orally intranasally, intramuscularly, intraperitoneally, intravenously, subcutaneously, rectally, or intravaginally.
68. The method of claim 61, wherein the VLP is administered to the subject orally intranasally, intramuscularly, intraperitoneally, intravenously, subcutaneously, rectally, or intravaginally.
69. The method of claim 62, wherein the VLP is administered to the subject orally intranasally, intramuscularly, intraperitoneally, intravenously, subcutaneously, rectally, or intravaginally.

Figure 1A

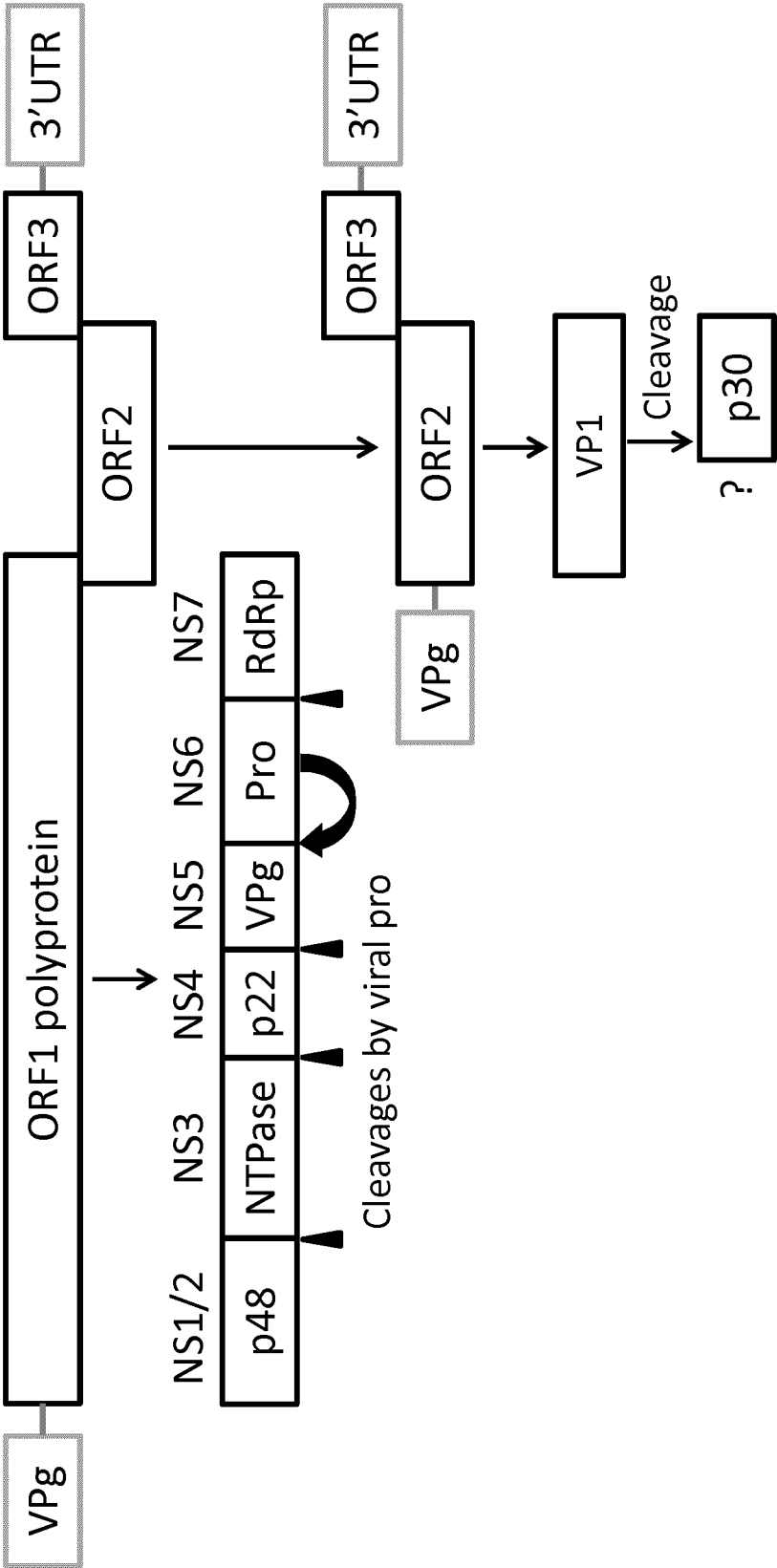


Figure 1B

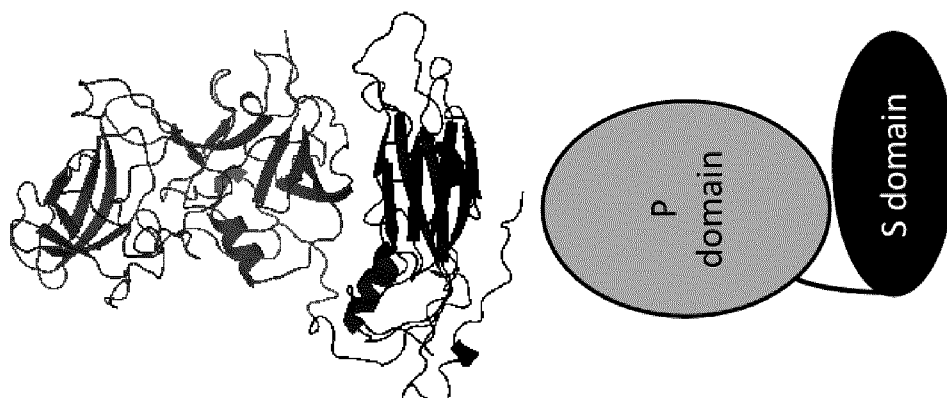


Figure 1C

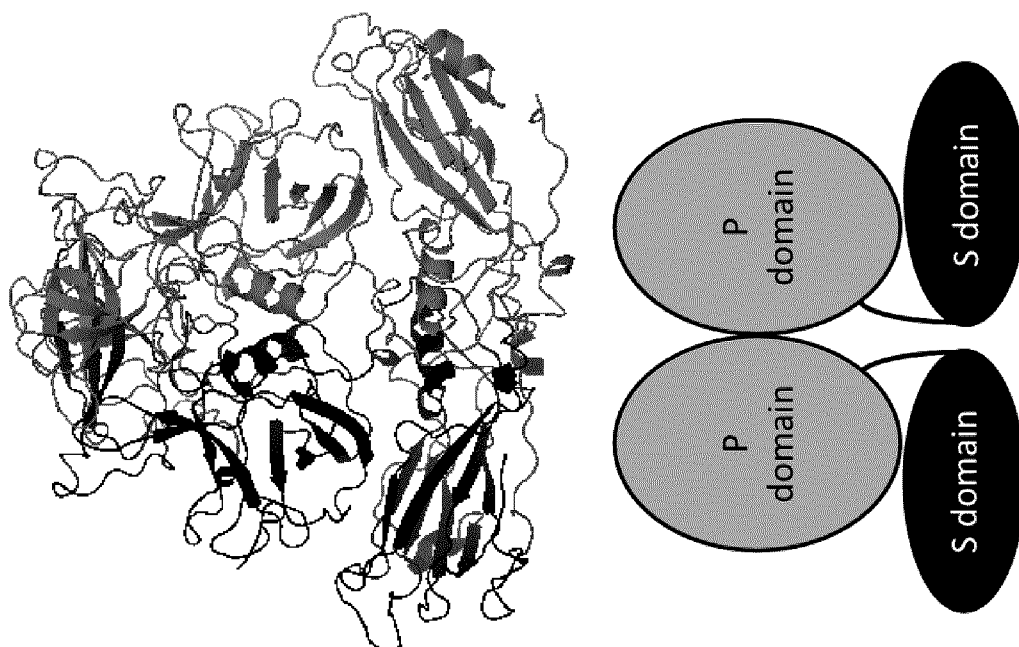


Figure 2A

| Norovirus VP1 Major Capsid Amino Acid Sequences |               |                                         |
|-------------------------------------------------|---------------|-----------------------------------------|
| Access (Uniprot)                                | Access (NCBI) | Strain Name                             |
| Q83884                                          | NP_056821     | Hu/GI.1/United States/Norwalk/1968      |
| D2DEL3                                          | ACU56258      | Hu/GI.2/Leuven/2003/BEL                 |
| H2DG70                                          | AEY77318      | Hu/GI.3/S29/2008/Lilla Edet/Sweden      |
| A0A023NFH0                                      | AHW99832      | Hu/GI.5/Siklos/HUN5407/2013/HUN         |
| A0A1I9WIM4                                      | APA31979      | Hu/GI.7/GA5043/USA/2014                 |
| H6V703                                          | AFA55174      | Hu/GII.1/Ascension208/2010/USA          |
| S5ZGB5                                          | AGT39206      | Hu/GII.2/CGMH47/2011/TW                 |
| U3RI89                                          | AGX01095      | Hu/GII.3/Jingzhou/2013402/CHN           |
| K4LM89                                          | AFV08795      | Hu/GII.4/Sydney/NSW0514/2012/AU         |
| A0A1I9WIL4                                      | APA31970      | Hu/USA/2015/GII.P16_GII.4_Sydney/CA3477 |
| A0A0U3E729                                      | ALT54485      | Hu/GII.5/AlbertaEI390/2013/CA           |
| M9T020                                          | AGI96397      | Hu/GII.6/Ohio/490/2012/USA              |
| F8SRB4                                          | AEI29586      | Hu/GII.12/HS206/2010/USA                |
| H9AWU4                                          | AFC89656      | Hu/GII.17/Kawasaki323/2014/JP           |
| H9AWV4                                          | AFC89665      | Hu/GII.21/Salisbury150/2011/USA         |
| Norovirus VP2 Minor Capsid Amino Acid Sequence  |               |                                         |
| Access (Uniprot)                                | Access (NCBI) | Strain Name                             |
| W6APL0                                          | AHI59155      | Hu/GII.6/HS245/2010/USA                 |

Figure 2B

| Norovirus VP1 Major Capsid Nucleotide Sequences |                                    |
|-------------------------------------------------|------------------------------------|
| Genome Access (NCBI)                            | Strain Name                        |
| M87661                                          | Hu/GI.1/United States/Norwalk/1968 |
| FJ515294                                        | Hu/GI.2/Leuven/2003/BEL            |
| JN603244                                        | Hu/GI.3/S29/2008/Lilla Edet/Sweden |
| KJ402295                                        | Hu/GI.5/Siklos/HUN5407/2013/HUN    |
| KX907730                                        | Hu/GI.7/GA5043/USA/2014            |
| JN797508                                        | Hu/GII.1/Ascension208/2010/USA     |
| KC464505                                        | Hu/GII.2/CGMH47/2011/TW            |
| KF306213                                        | Hu/GII.3/Jingzhou/2013402/CHN      |
| JX459908                                        | Hu/GII.4/Sydney/NSW0514/2012/AU    |
| KU311160                                        | Hu/GII.5/AlbertaEI390/2013/CA      |
| KC464321                                        | Hu/GII.6/Ohio/490/2012/USA         |
| HQ664990                                        | Hu/GII.12/HS206/2010/USA           |
| JN899242                                        | Hu/GII.17/Kawasaki323/2014/JP      |
| JN899245                                        | Hu/GII.21/Salisbury150/2011/USA    |
| Norovirus VP2 Minor Capsid Nucleotide Sequence  |                                    |
| Access (NCBI)                                   | Strain Name                        |
| KJ407072                                        | Hu/GII.6/HS245/2010/USA            |

Figure 2C-1

|                       |                                                                                                                       |    |    |    |    |     |
|-----------------------|-----------------------------------------------------------------------------------------------------------------------|----|----|----|----|-----|
| VP1_G11-SEQ_ID_NO_1   | M M A S K D A T S S V D G A S G A G Q L V P E V N A S D P L A M D P V A G S S T A V A T A G Q V N P I D P W I I       | 10 | 20 | 30 | 40 | 50  |
| VP1_G12-SEQ_ID_NO_4   | M M A S K D A P Q S A D G A S G A G Q L V P E V N T A D P L P M E P V A G P T T A V A T A G Q V N M I D P W I V       |    |    |    |    |     |
| VP1_G13-SEQ_ID_NO_6   | M M A S K D A P T N M D G T S G A G Q L V P E V S T A E P P I S M E P V A G A T T A A A T A G Q V N M I D P W I M     |    |    |    |    |     |
| VP1_G15-SEQ_ID_NO_12  | M M A S K D A P S A D G A N G A G Q L V P E V N A A E P P L P L D P V A G A S T A L A T A G Q V N M I D P W I F       |    |    |    |    |     |
| VP1_G17-SEQ_ID_NO_101 | M M A S K D A P S N M D G T S G A G Q L V P E V N A A E P P L P L D P V A G A S T A L A T A G Q V N M I D P W I M     |    |    |    |    |     |
| VP1_G11-SEQ_ID_NO_13  | M K M A S N D A A P S N D - - G A A G L V P E S - N N E V M A L E P V A G A L A A P V A T A G Q V N N I D P W I R     |    |    |    |    |     |
| VP1_G12-SEQ_ID_NO_14  | M K M A S N D A A P S T D - - G A A G L V P E S - N N E V M A L E P V A G A L A A P V A T A G Q V N N I D P W I R     |    |    |    |    |     |
| VP1_G13-SEQ_ID_NO_15  | M K M A S N D A A P S N D - - G A A N L V P E I - S S E V M A L E P V A G A L A A P V A T A G Q V N N I D P W I M     |    |    |    |    |     |
| VP1_G14-SEQ_ID_NO_16  | M K M A S S D A N P S D G - - S A A N L V P E V - N N E V M A L E P V A G A L A A P V A T A G Q V N N I D P W I R     |    |    |    |    |     |
| VP1_G15-SEQ_ID_NO_17  | M K M A S N D A T P S N D - - G A A G L V P E S - N N E V M A L E P V A G A L A A P V A T A G Q V N N I D P W I R     |    |    |    |    |     |
| VP1_G16-SEQ_ID_NO_20  | M K M A S N D A A P S N D - - G A A N L V P E A - N N E V M A L E P V A G A L A A P V A T A G Q V N N I D P W I R     |    |    |    |    |     |
| VP1_G17-SEQ_ID_NO_18  | M K M A S N D A A P S N D - - G A A G L V P E I - N N E V M A L E P V A G A L A A P V A T A G Q V N N I D P W I R     |    |    |    |    |     |
| VP1_G112-SEQ_ID_NO_19 | M K M A S N D A A P S N D - - G A A G L V P E V - N N E T M A L E P V A G A L A A P V A T A G Q V N N I D P W I R     |    |    |    |    |     |
| VP1_G113-SEQ_ID_NO_22 | M K M A S N D A A P S N D - - G A A S L V P E A - I N E T M A L E P V A G A L A A P V A T A G Q V N N I D P W I R     |    |    |    |    |     |
| VP1_G114-SEQ_ID_NO_32 | M K M A S N D A T P S D D - - G A A G L V P E I - N N E T M A L E P V A G A L A A P V A T A G Q V N N I D P W I R     |    |    |    |    |     |
| VP1_G117-SEQ_ID_NO_24 | M K M A S N D A A P S N D - - G A A G L V P E G - N N E T M A L E P V A G A L A A P V A T A G Q V N N I D P W I R     |    |    |    |    |     |
| VP1_G121-SEQ_ID_NO_26 | M K M A S N D A A P S N D - - G A T G L V P E I - N T E T L P L E P V A G A L A A P V A T A G Q V N N I D P W I R     |    |    |    |    |     |
| nsensus               | M k M A S n D A a p s n d G a s g A a g L V P E X n n n e X m a l e P v a G a s i A a p v X G Q X n i D P W i r       |    |    |    |    |     |
| VP1_G11-SEQ_ID_NO_1   | N N F V Q A P Q G E F T I S P N N T P G D V L F D L L Q L Q L F D L L S L G P H L N P F L L N P F L L A L A           | 60 | 70 | 80 | 90 | 100 |
| VP1_G12-SEQ_ID_NO_4   | N N F V Q A P Q G E F T I S P N N T P G D I L F D L L Q L Q L F D L L S L G P H L N P F L L N P F L L A L A           |    |    |    |    |     |
| VP1_G13-SEQ_ID_NO_6   | S N Y V Q A P Q G E F T I S P N N T P G D I L F D L L Q L Q L F D L L S L G P H L N P F L L N P F L L A L A           |    |    |    |    |     |
| VP1_G15-SEQ_ID_NO_12  | N N F V Q A P Q G E F T I S P N N T P G D I L F D L L Q L Q L F D L L S L G P H L N P F L L N P F L L A L A           |    |    |    |    |     |
| VP1_G17-SEQ_ID_NO_101 | N N F V Q A P E G E F T I S P N N T P G D I L F D L L Q L Q L F D L L S L G P H L N P F L L N P F L L A L A           |    |    |    |    |     |
| VP1_G11-SEQ_ID_NO_13  | M N F V Q A P N G E F T V S P R N S P G E V L L N L E L W S A P L E L L N L E L L N L E L L M N L E L L A             |    |    |    |    |     |
| VP1_G12-SEQ_ID_NO_14  | A N F V Q A P N G E F T V S P R N S P G E V L L N L E L L N L E L L N L E L L N L E L L N L E L L A                   |    |    |    |    |     |
| VP1_G13-SEQ_ID_NO_15  | N N F V Q A P G G E F T V S P R N S P G E V L L N L E L L N L E L L N L E L L N L E L L N L E L L A                   |    |    |    |    |     |
| VP1_G14-SEQ_ID_NO_16  | N N F V Q A P G G E F T V S P R N A P G E I L V N L E L L N L E L L N L E L L N L E L L N L E L L A                   |    |    |    |    |     |
| VP1_G15-SEQ_ID_NO_17  | T N F V Q A P N G E F T V S P R N S P G E M L L N L E L L N L E L L N L E L L N L E L L N L E L L A                   |    |    |    |    |     |
| VP1_G16-SEQ_ID_NO_20  | E N F V Q A P N G E F T V S P R N S P G E M L L N L E L L N L E L L N L E L L N L E L L N L E L L A                   |    |    |    |    |     |
| VP1_G17-SEQ_ID_NO_18  | N N F V Q A P N G E F T V S P R N S P G E V L L N L E L L N L E L L N L E L L N L E L L N L E L L A                   |    |    |    |    |     |
| VP1_G112-SEQ_ID_NO_19 | L N F V Q A P N G E F T V S P R N S P G E V L L N L E L L N L E L L N L E L L N L E L L N L E L L A                   |    |    |    |    |     |
| VP1_G113-SEQ_ID_NO_22 | T N F V Q A P N G E F T V S P R N S P G E L L L D L L N L E L L N L E L L N L E L L N L E L L A                       |    |    |    |    |     |
| VP1_G114-SEQ_ID_NO_32 | N N F V Q A P N G E F T V S P R N S P G E L L L D L L N L E L L N L E L L N L E L L N L E L L A                       |    |    |    |    |     |
| VP1_G117-SEQ_ID_NO_24 | T N F V Q A P N G E F T V S P R N S P G E L L L D L L N L E L L N L E L L N L E L L N L E L L A                       |    |    |    |    |     |
| VP1_G121-SEQ_ID_NO_26 | N N F V Q A P N G E F T V S P R N S P G E I L L M N L E L L N L E L L N L E L L N L E L L A                           |    |    |    |    |     |
| Consensus             | n n f v Q a P X G E F T v S P r n s P G e i L i n i e l e L G P X i n P y L a H l s r m Y n G y a G g m e v q v X L A |    |    |    |    |     |

Figure 2C-2

|                       |     |             |          |      |                   |        |           |       |      |     |     |    |      |      |     |
|-----------------------|-----|-------------|----------|------|-------------------|--------|-----------|-------|------|-----|-----|----|------|------|-----|
| VP1_G11-SEQ_ID_NO_1   | 120 | GNAFTTAGKII | VSCII    | PPPG | FGSHN             | LTIAQA | TLFPHVI   | ADVR  | TDLP | IEV | PLE | ED | VVRN | VLFH | 170 |
| VP1_G12-SEQ_ID_NO_4   |     | GNAFTSAGKII | VCCV     | PPPG | FTSSS             | LTIAQA | TLFPHVI   | ADVR  | TDLP | IEV | PLE | ED | VVRN | VLFH |     |
| VP1_G13-SEQ_ID_NO_6   |     | GNAFTTAGKII | ISCV     | PPPG | FAQNV             | SIQA   | TMFPHVI   | ADVR  | TDLP | IEV | PLE | ED | VVRN | VLFH |     |
| VP1_G15-SEQ_ID_NO_12  |     | GNAFTTAGKVI | ICCV     | PPPG | QSR               | LSIAQA | TMFPHVI   | ADVR  | TDLP | IEV | PLE | ED | VVRN | VLFH |     |
| VP1_G17-SEQ_ID_NO_101 |     | GNAFTSAGKII | ICCV     | PPPG | ESQNI             | SIQA   | TMFPHVI   | ADVR  | TDLP | IEV | PLE | ED | VVRN | VLFH |     |
| VP1_G11-SEQ_ID_NO_13  |     | GNAFTTAGKLV | FAAI     | PPPH | FPLEN             | LSQI   | TMFPHVI   | ADVR  | TDLP | IEV | PLE | ED | VVRN | VLFH |     |
| VP1_G12-SEQ_ID_NO_14  |     | GNAFTTAGKLV | FAAV     | PPPH | FPLEN             | LSQI   | TMFPHVI   | ADVR  | TDLP | IEV | PLE | ED | VVRN | VLFH |     |
| VP1_G13-SEQ_ID_NO_15  |     | GNAFTTAGKII | FAAI     | PPPN | FPI               | DNLSA  | QITMCPHVI | ADVR  | TDLP | IEV | PLE | ED | VVRN | VLFH |     |
| VP1_G14-SEQ_ID_NO_16  |     | GNAFTTAGKVI | FAAV     | PPPN | FPI               | TEGLSP | QITMCPHVI | ADVR  | TDLP | IEV | PLE | ED | VVRN | VLFH |     |
| VP1_G15-SEQ_ID_NO_17  |     | GNAFTTAGKII | FAAV     | PPPY | FPI               | VENLS  | QITMCPHVI | ADVR  | TDLP | IEV | PLE | ED | VVRN | VLFH |     |
| VP1_G16-SEQ_ID_NO_20  |     | GNAFTTAGKII | FAAV     | PPPH | FPI               | VENLS  | QITMCPHVI | ADVR  | TDLP | IEV | PLE | ED | VVRN | VLFH |     |
| VP1_G17-SEQ_ID_NO_18  |     | GNAFTTAGKII | FAAI     | PPPG | FPI               | VENLS  | QITMCPHVI | ADVR  | TDLP | IEV | PLE | ED | VVRN | VLFH |     |
| VP1_G112-SEQ_ID_NO_19 |     | GNAFTTAGKLV | FAAI     | PPPH | FPI               | VENLS  | QITMCPHVI | ADVR  | TDLP | IEV | PLE | ED | VVRN | VLFH |     |
| VP1_G113-SEQ_ID_NO_22 |     | GNAFTTAGKII | FAAI     | PPPN | FPI               | VENLS  | QITMCPHVI | ADVR  | TDLP | IEV | PLE | ED | VVRN | VLFH |     |
| VP1_G114-SEQ_ID_NO_32 |     | GNAFTTAGKII | FAAI     | PPS  | FPI               | VENLS  | QITMCPHVI | ADVR  | TDLP | IEV | PLE | ED | VVRN | VLFH |     |
| VP1_G117-SEQ_ID_NO_24 |     | GNAFTTAGKII | FAAV     | PPPN | FPI               | VENLS  | QITMCPHVI | ADVR  | TDLP | IEV | PLE | ED | VVRN | VLFH |     |
| 1_G121-SEQ_ID_NO_26   |     | GNAFTTAGKII | FAAV     | PPPN | FPI               | VENLS  | QITMCPHVI | ADVR  | TDLP | IEV | PLE | ED | VVRN | VLFH |     |
| Consensus             |     | GNAFTTAGKII | faavppx  | ffp  | xenlspaqitmtfphvi | x      | dvrtdlpv  | x     | x    | x   | x   | x  | x    | x    |     |
| VP1_G11-SEQ_ID_NO_1   | 180 | NNDRNQQTMR  | LVCM     | LYTP | LR                | TGGGTG | SSFFV     | VAGRV | MT   | 210 | CF  | LV | PP   | TV   |     |
| VP1_G12-SEQ_ID_NO_4   |     | TND-NQPTMR  | LVCM     | LYTP | LR                | TGGGTG | SSFFV     | VAGRV | MT   | 220 | CF  | LV | PP   | TV   |     |
| VP1_G13-SEQ_ID_NO_6   |     | NND-STPTMR  | LVCM     | LYTP | LR                | TGGGTG | SSFFV     | VAGRV | MT   |     | CF  | LV | PP   | TV   |     |
| VP1_G15-SEQ_ID_NO_12  |     | TND-NQPTMR  | LVCM     | LYTP | LR                | TGGGTG | SSFFV     | VAGRV | MT   |     | CF  | LV | PP   | TV   |     |
| VP1_G17-SEQ_ID_NO_101 |     | TNE-NRPTMR  | LVCM     | LYTP | LR                | TGGGTG | SSFFV     | VAGRV | MT   |     | CF  | LV | PP   | TV   |     |
| VP1_G11-SEQ_ID_NO_13  |     | YNQKPEPR    | LVAM     | LYTP | LR                | TGGGTG | SSFFV     | VAGRV | MT   |     | CF  | LV | PP   | TV   |     |
| VP1_G12-SEQ_ID_NO_14  |     | YNQKDDPR    | LVAM     | LYTP | LR                | TGGGTG | SSFFV     | VAGRV | MT   |     | CF  | LV | PP   | TV   |     |
| VP1_G13-SEQ_ID_NO_15  |     | YNQKSDPR    | LVAM     | LYTP | LR                | TGGGTG | SSFFV     | VAGRV | MT   |     | CF  | LV | PP   | TV   |     |
| VP1_G14-SEQ_ID_NO_16  |     | YNQKNDPR    | LVAM     | LYTP | LR                | TGGGTG | SSFFV     | VAGRV | MT   |     | CF  | LV | PP   | TV   |     |
| VP1_G15-SEQ_ID_NO_17  |     | FNQKDEPR    | LVAM     | LYTP | LR                | TGGGTG | SSFFV     | VAGRV | MT   |     | CF  | LV | PP   | TV   |     |
| VP1_G16-SEQ_ID_NO_20  |     | YNQENTSR    | LVAM     | LYTP | LR                | TGGGTG | SSFFV     | VAGRV | MT   |     | CF  | LV | PP   | TV   |     |
| VP1_G17-SEQ_ID_NO_18  |     | YNQKNDPR    | LVAM     | LYTP | LR                | TGGGTG | SSFFV     | VAGRV | MT   |     | CF  | LV | PP   | TV   |     |
| VP1_G112-SEQ_ID_NO_19 |     | YNQKNDPR    | LVAM     | LYTP | LR                | TGGGTG | SSFFV     | VAGRV | MT   |     | CF  | LV | PP   | TV   |     |
| VP1_G113-SEQ_ID_NO_22 |     | FNQKNDPR    | LVAM     | LYTP | LR                | TGGGTG | SSFFV     | VAGRV | MT   |     | CF  | LV | PP   | TV   |     |
| VP1_G114-SEQ_ID_NO_32 |     | YNQKNDPR    | LVAM     | LYTP | LR                | TGGGTG | SSFFV     | VAGRV | MT   |     | CF  | LV | PP   | TV   |     |
| VP1_G117-SEQ_ID_NO_24 |     | YNQKNDPR    | LVAM     | LYTP | LR                | TGGGTG | SSFFV     | VAGRV | MT   |     | CF  | LV | PP   | TV   |     |
| VP1_G121-SEQ_ID_NO_26 |     | FNQKNDPR    | LVAM     | LYTP | LR                | TGGGTG | SSFFV     | VAGRV | MT   |     | CF  | LV | PP   | TV   |     |
| Consensus             |     | YNQKNDPR    | lvamlytp | lrs  | xngsgdgt          | d      | vftv      | scrv  | l    | t   | r   | p  | s    | p    | t   |

Figure 3A

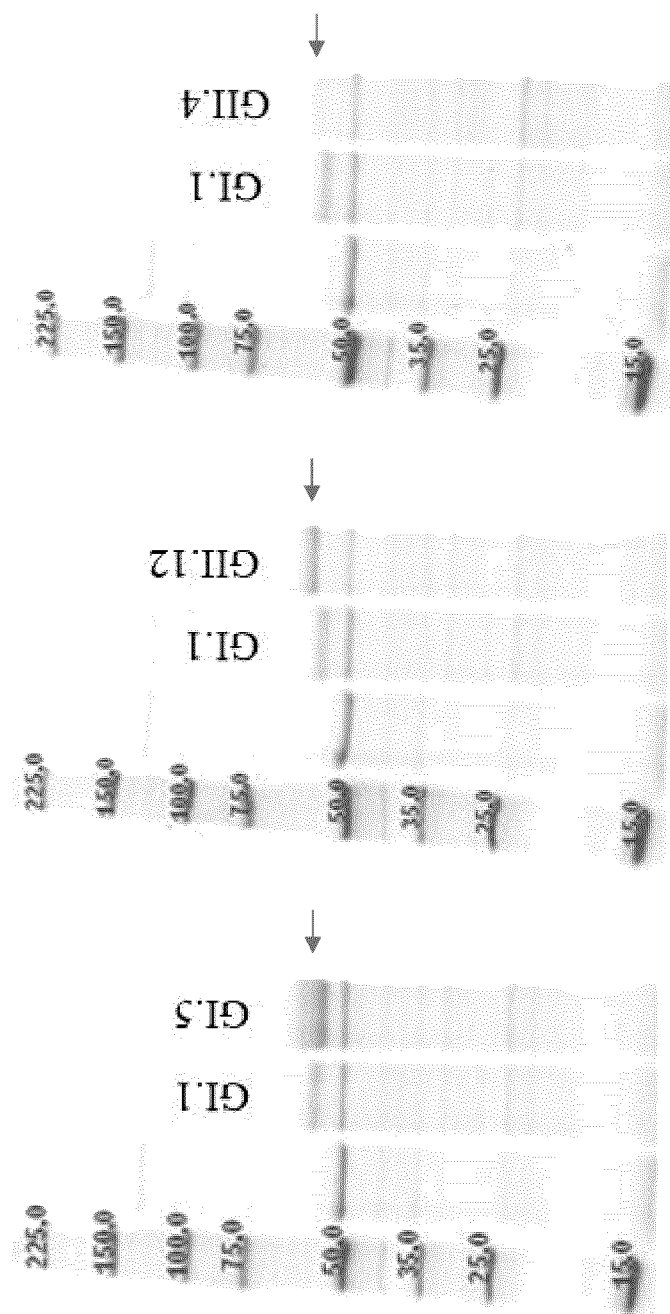


FIGURE 3B

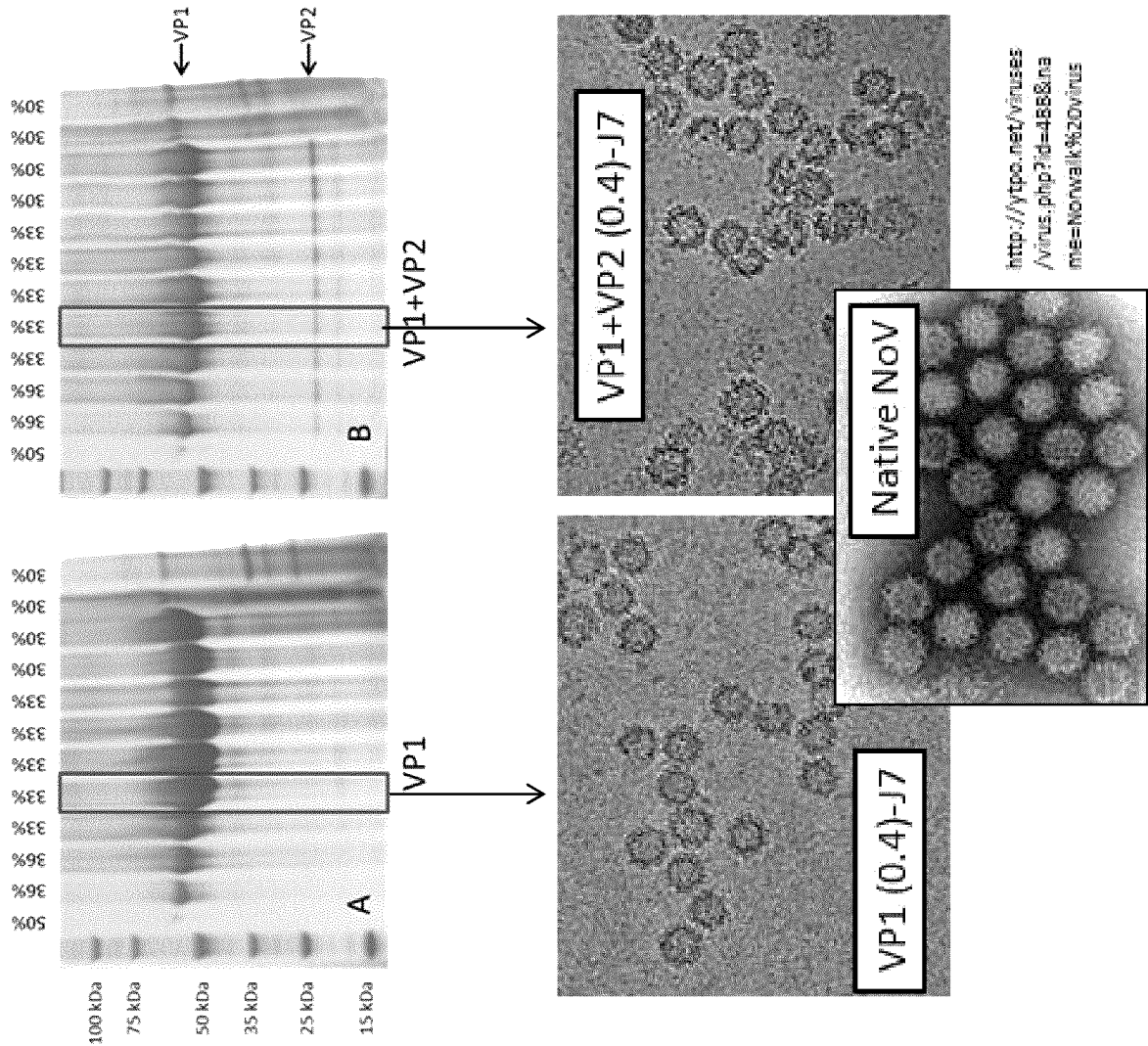


Figure 3C

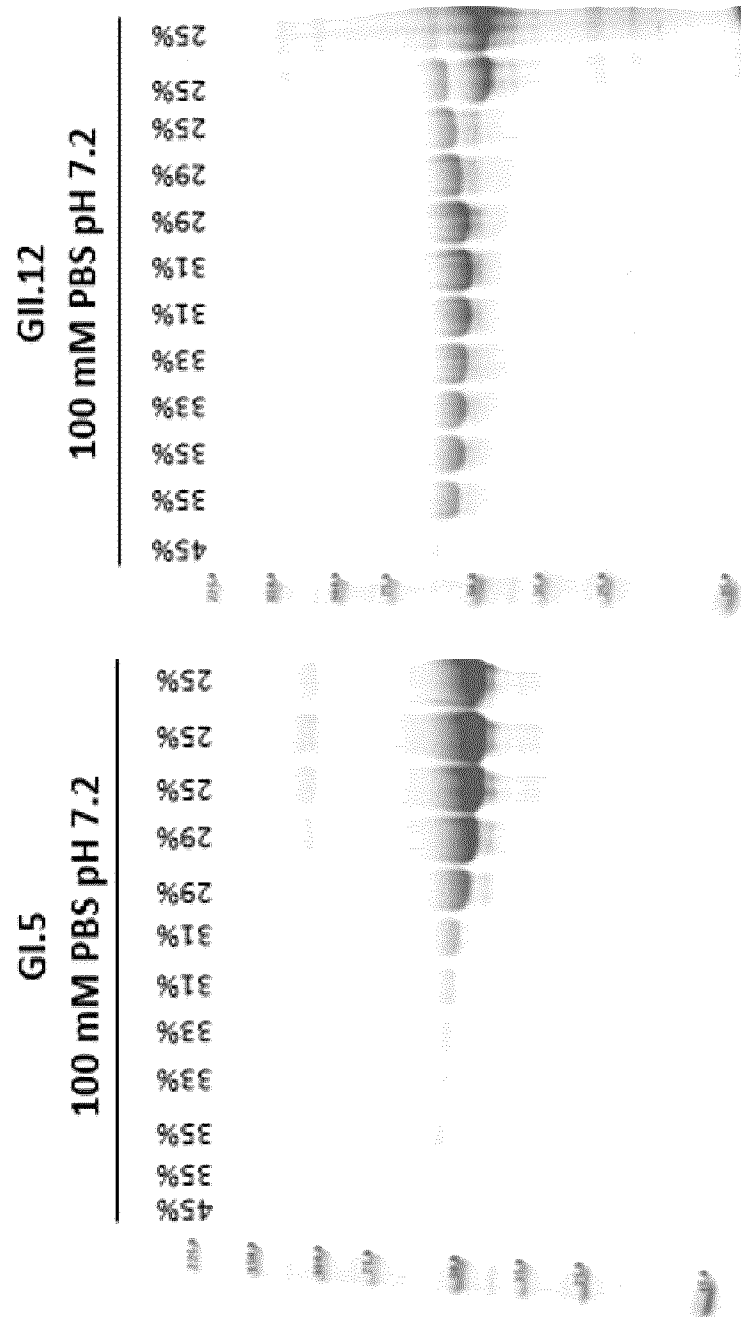


FIGURE 3D

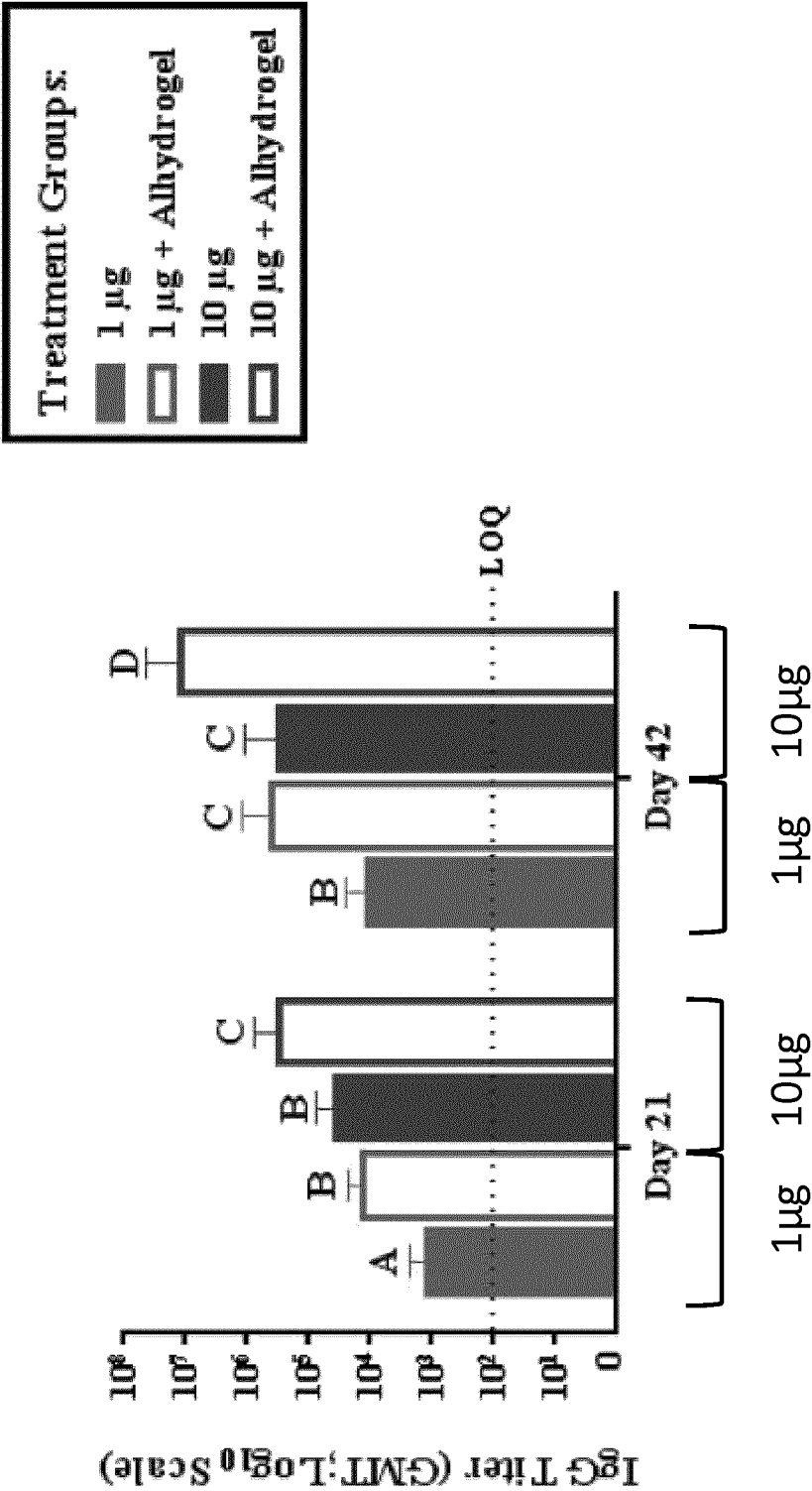


Figure 4B

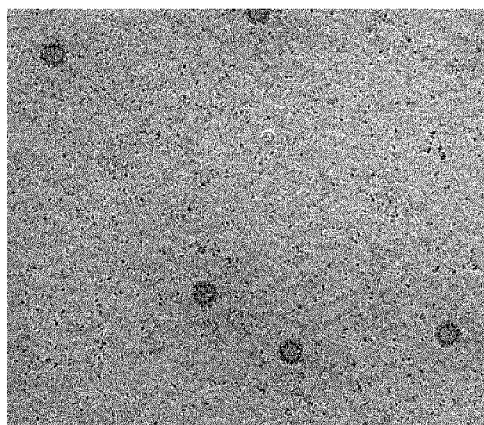
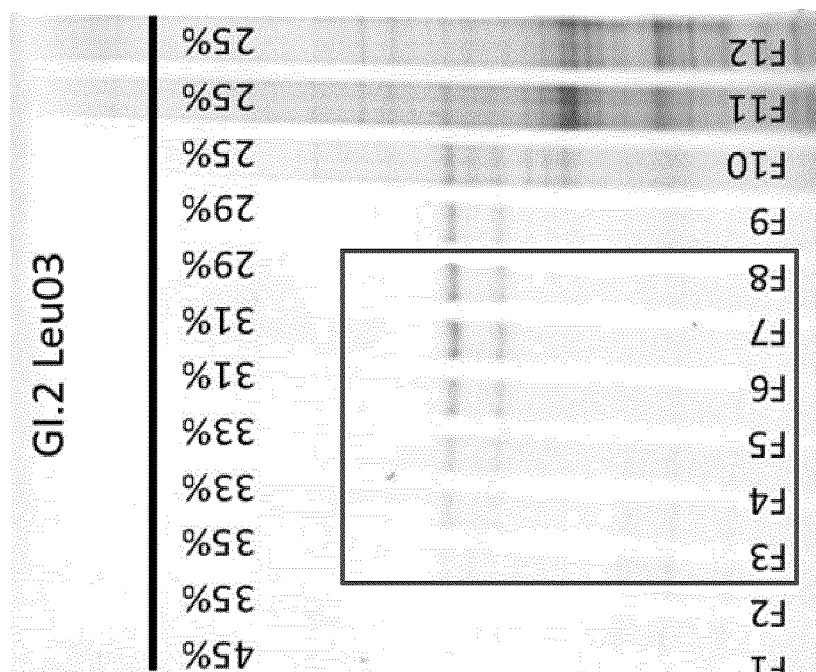
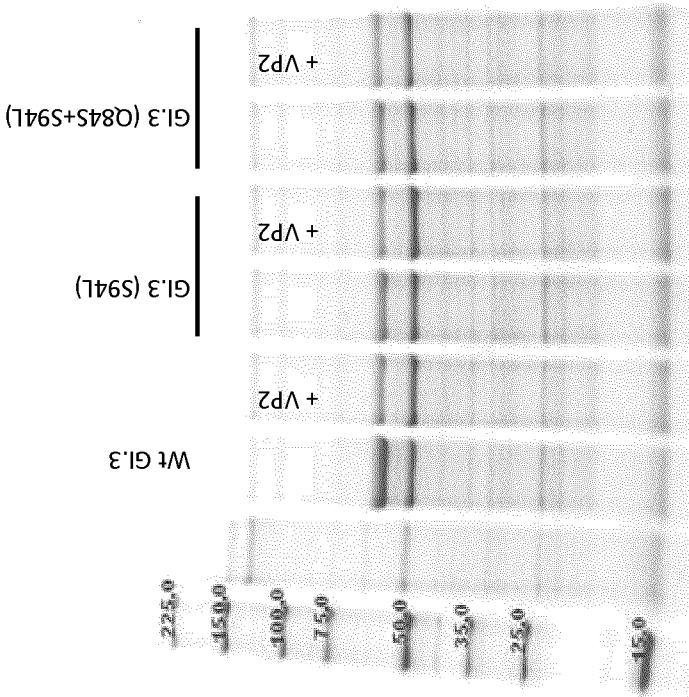


Figure 4A



GI.3/S29/2008/Lila Edet/Sweden

Figure 5A



GI.3/S29/2008/Lila Edet/Sweden

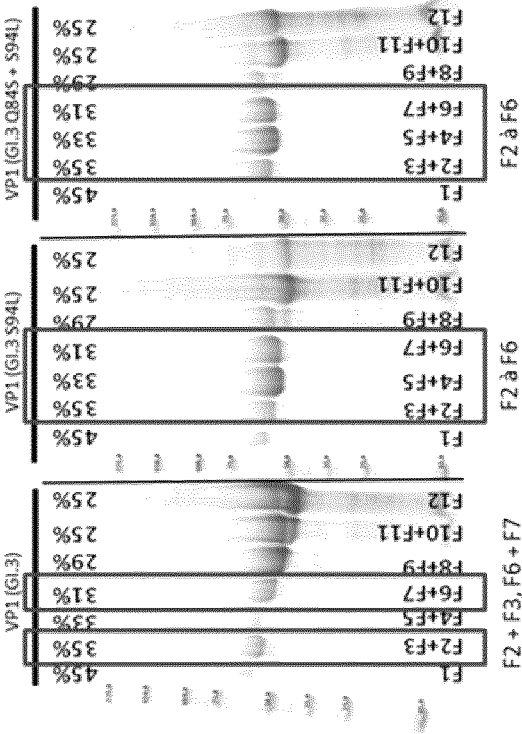


Figure 5B

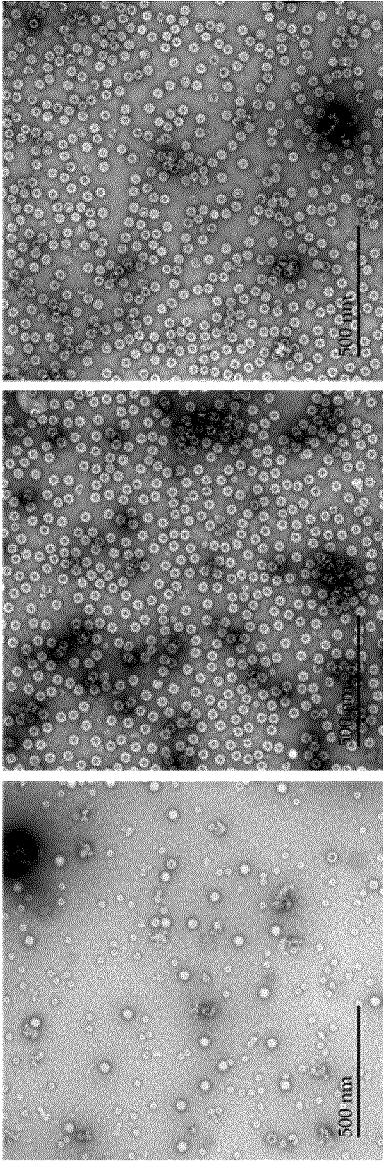


Figure 5C

**GI.3/S29/2008/Lila Edet/Sweden**

VP1 (GI.3\_M57I+S94L)

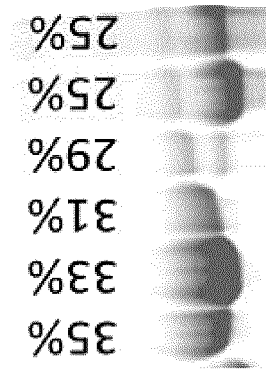


Figure 5D

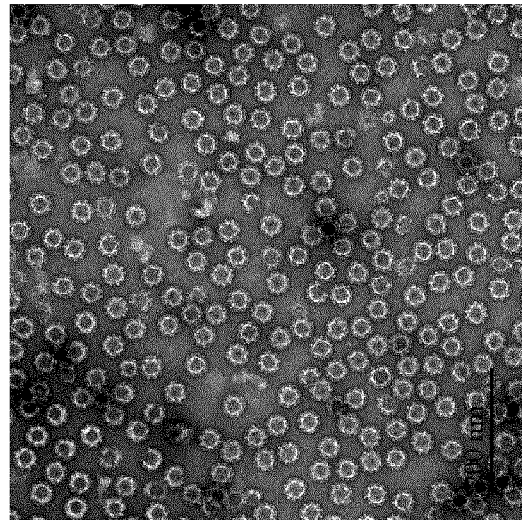
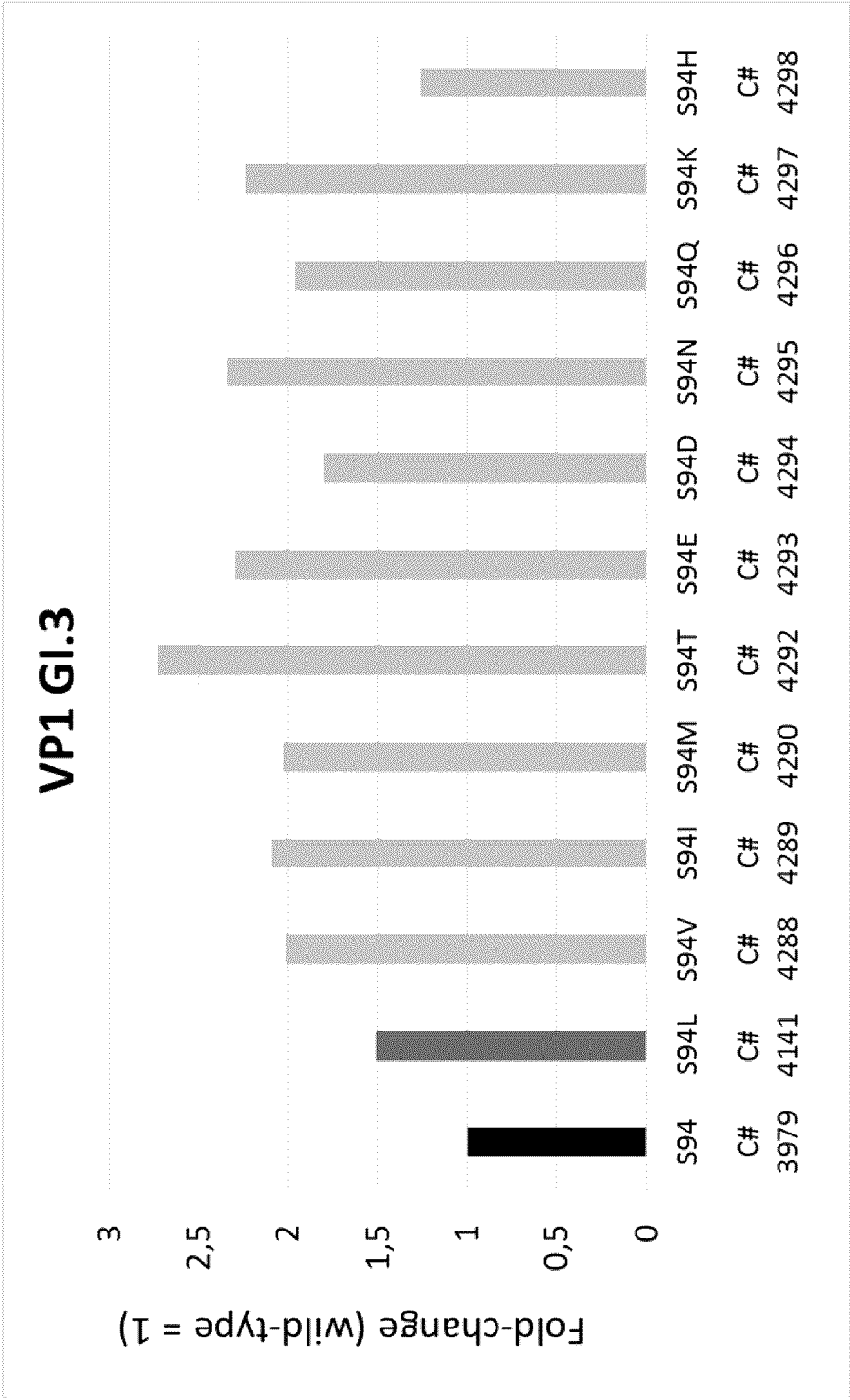


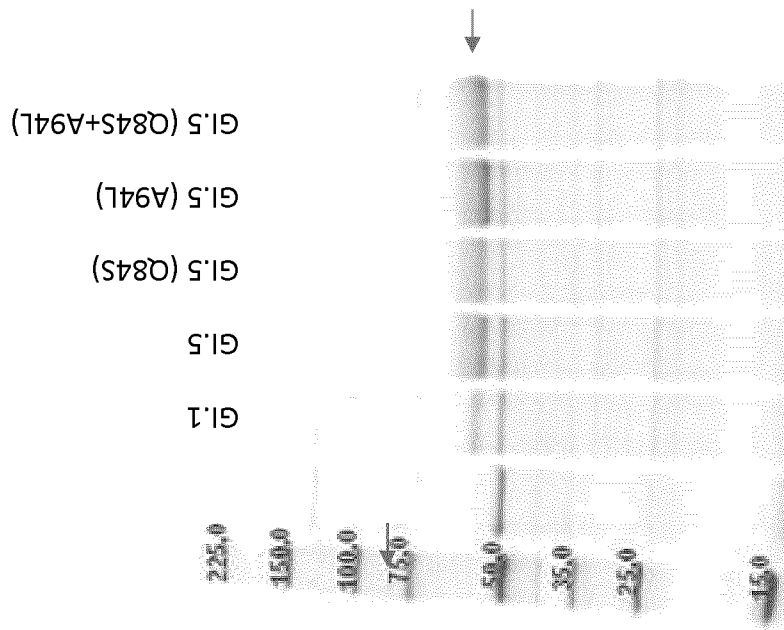
Figure 5E

Figure 5F



# GI.5/Siklos/HUN54107/2013/HUN

Figure 6A



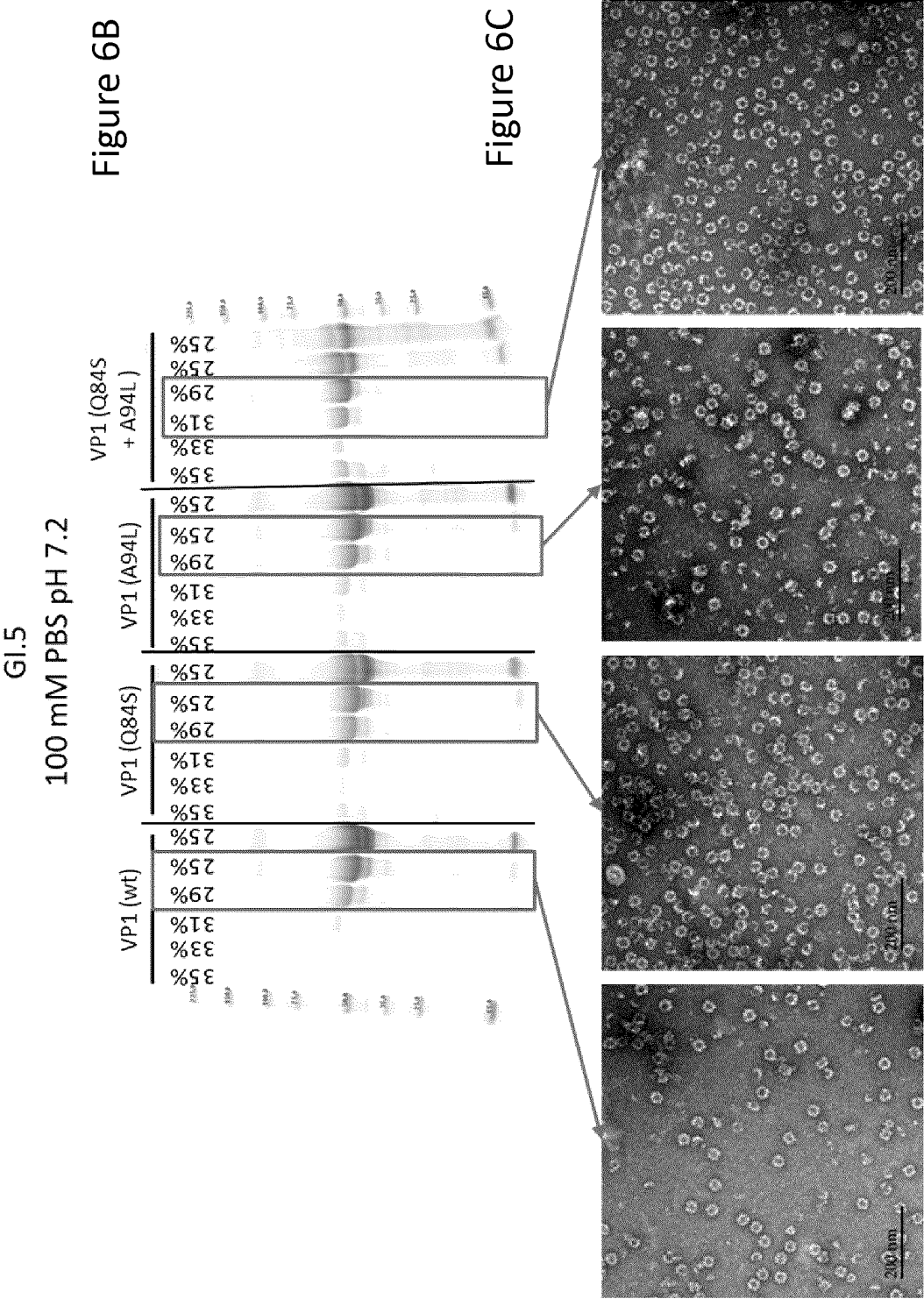
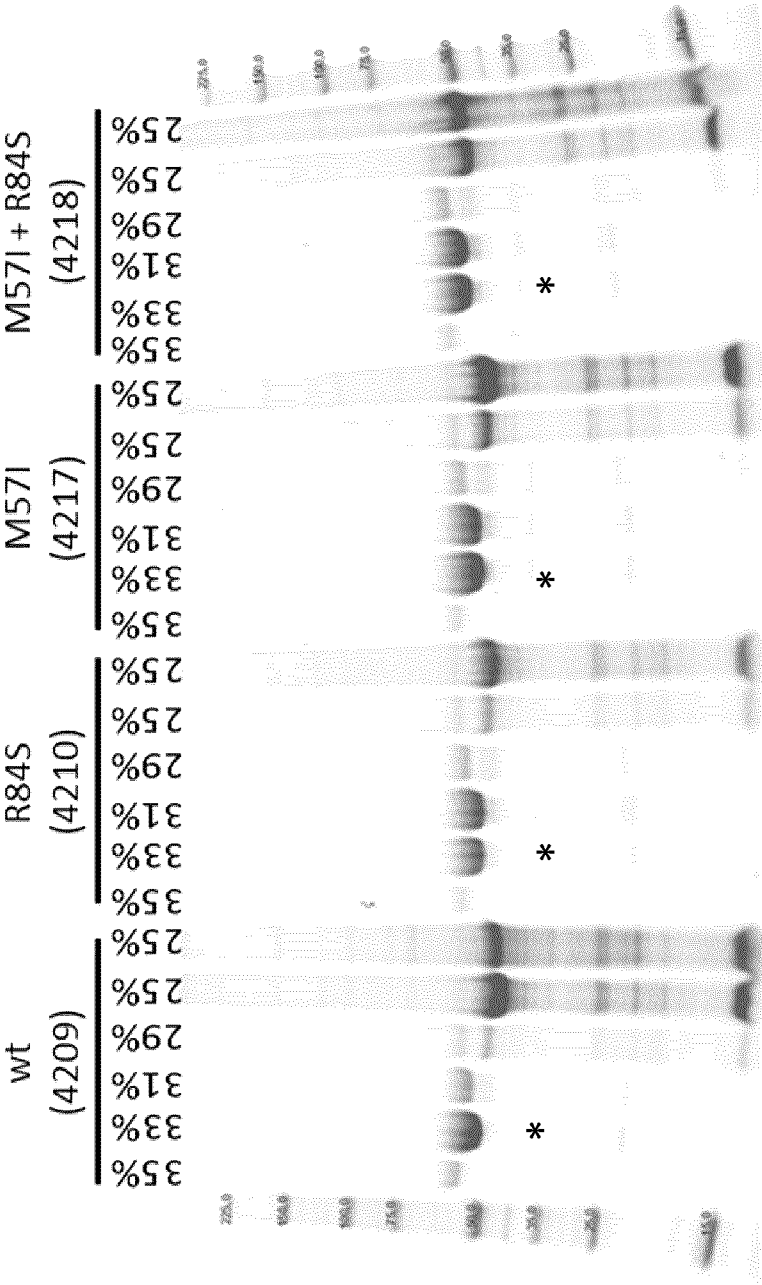


Figure 6D

VP1 (GI.7 USA14)



VP1 GI.7/GA5043/USA/2014

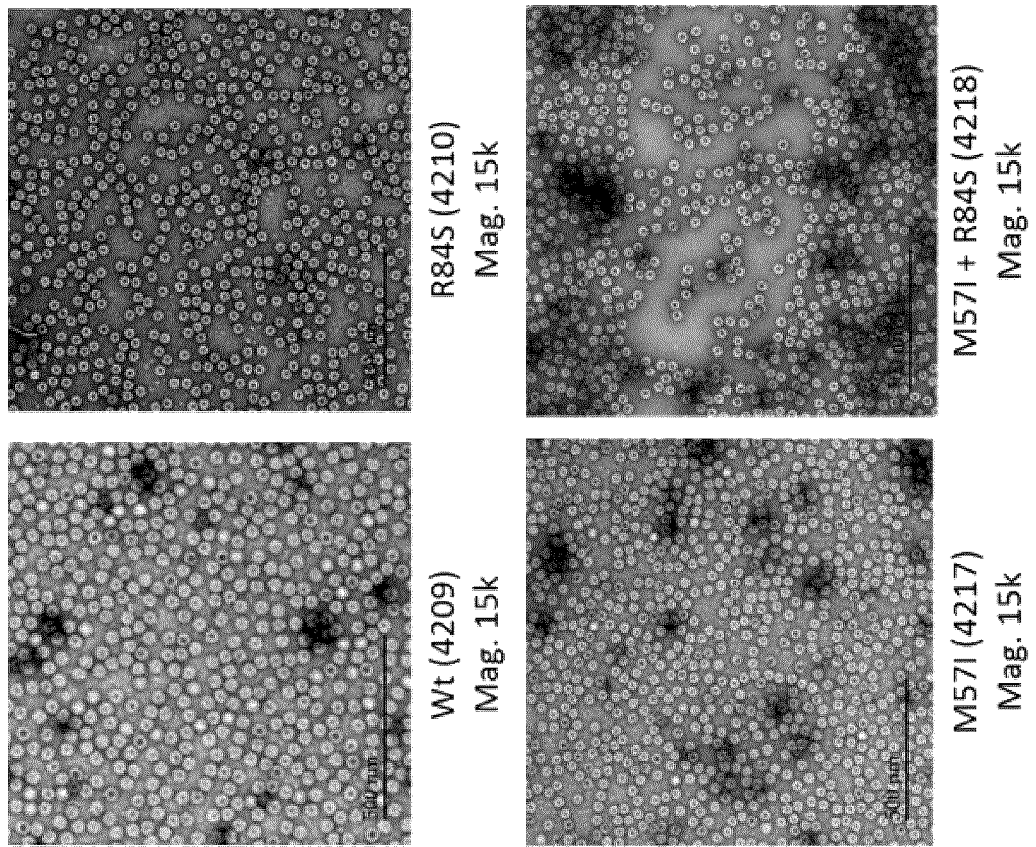


Figure 6E

Figure 6F

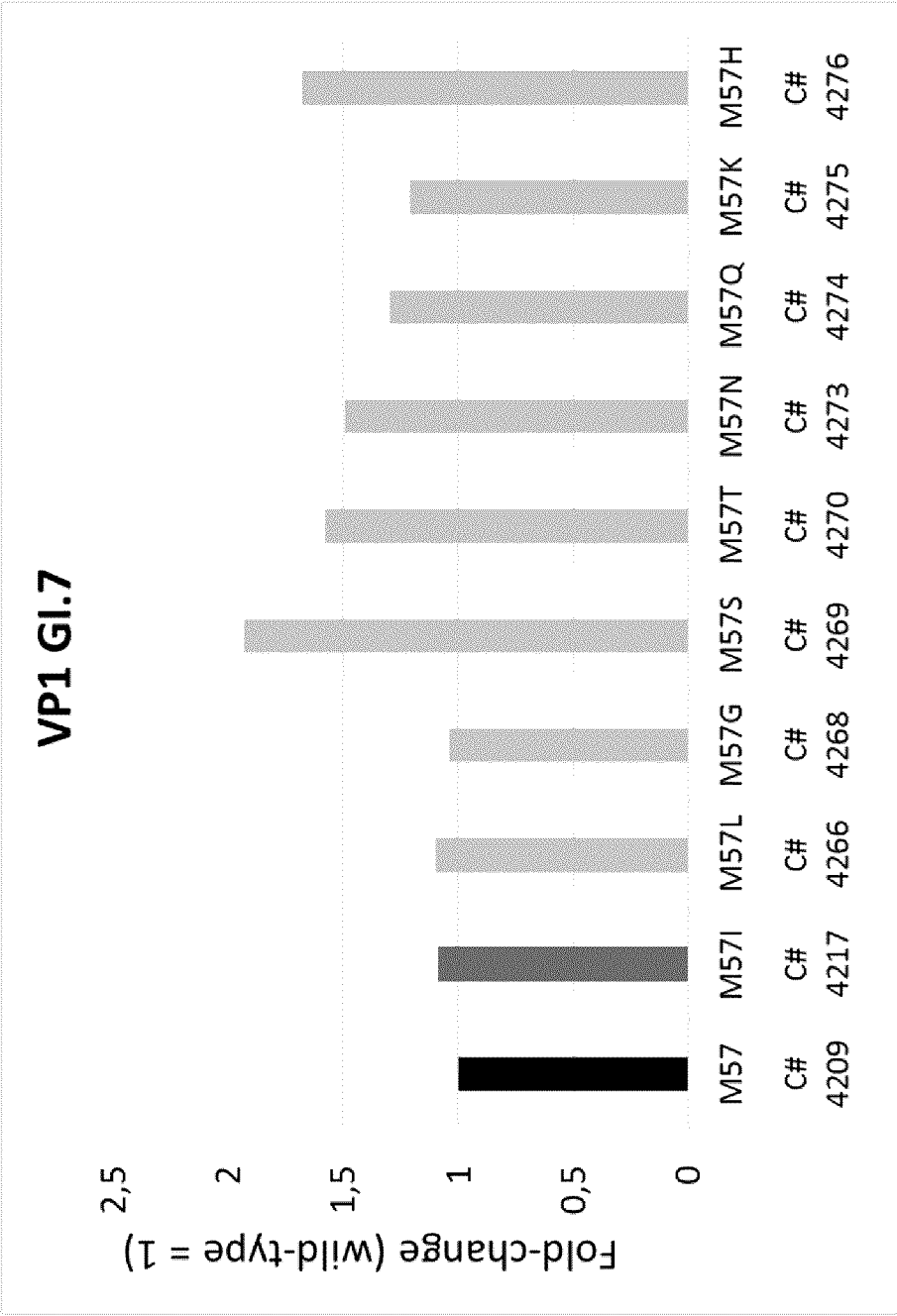


Figure 7A

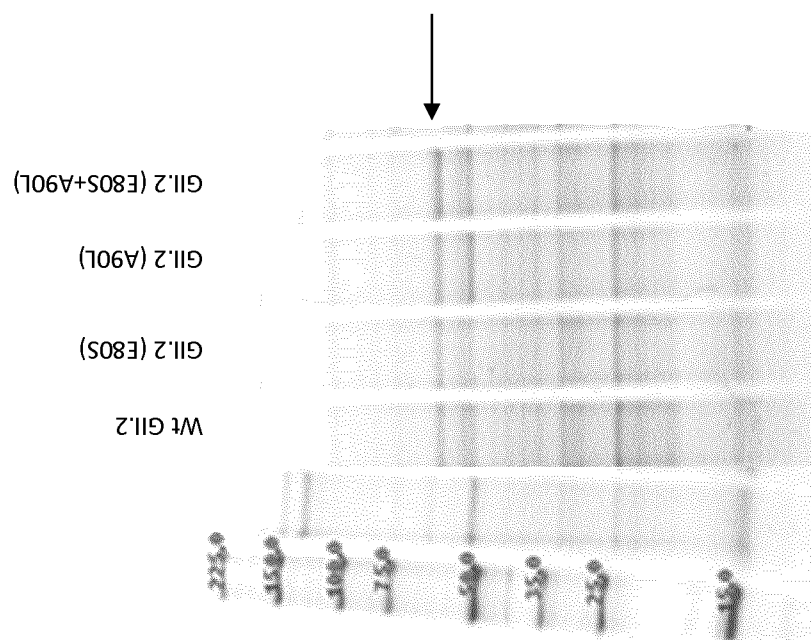
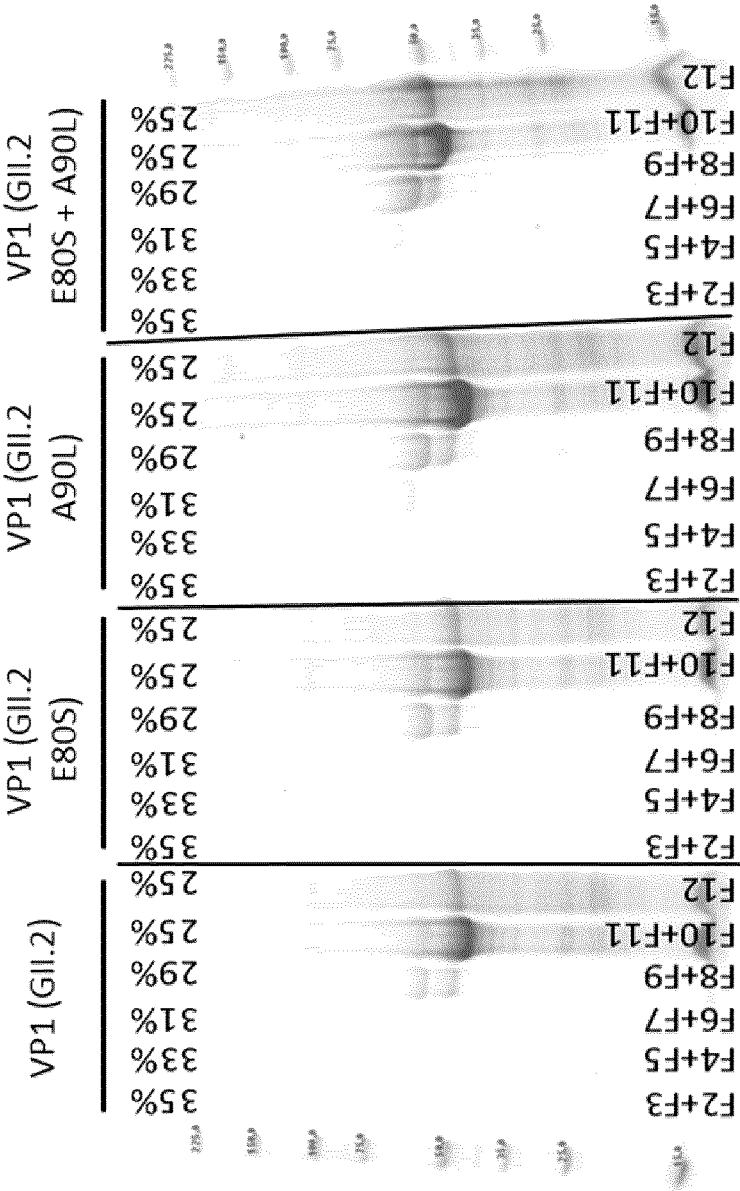
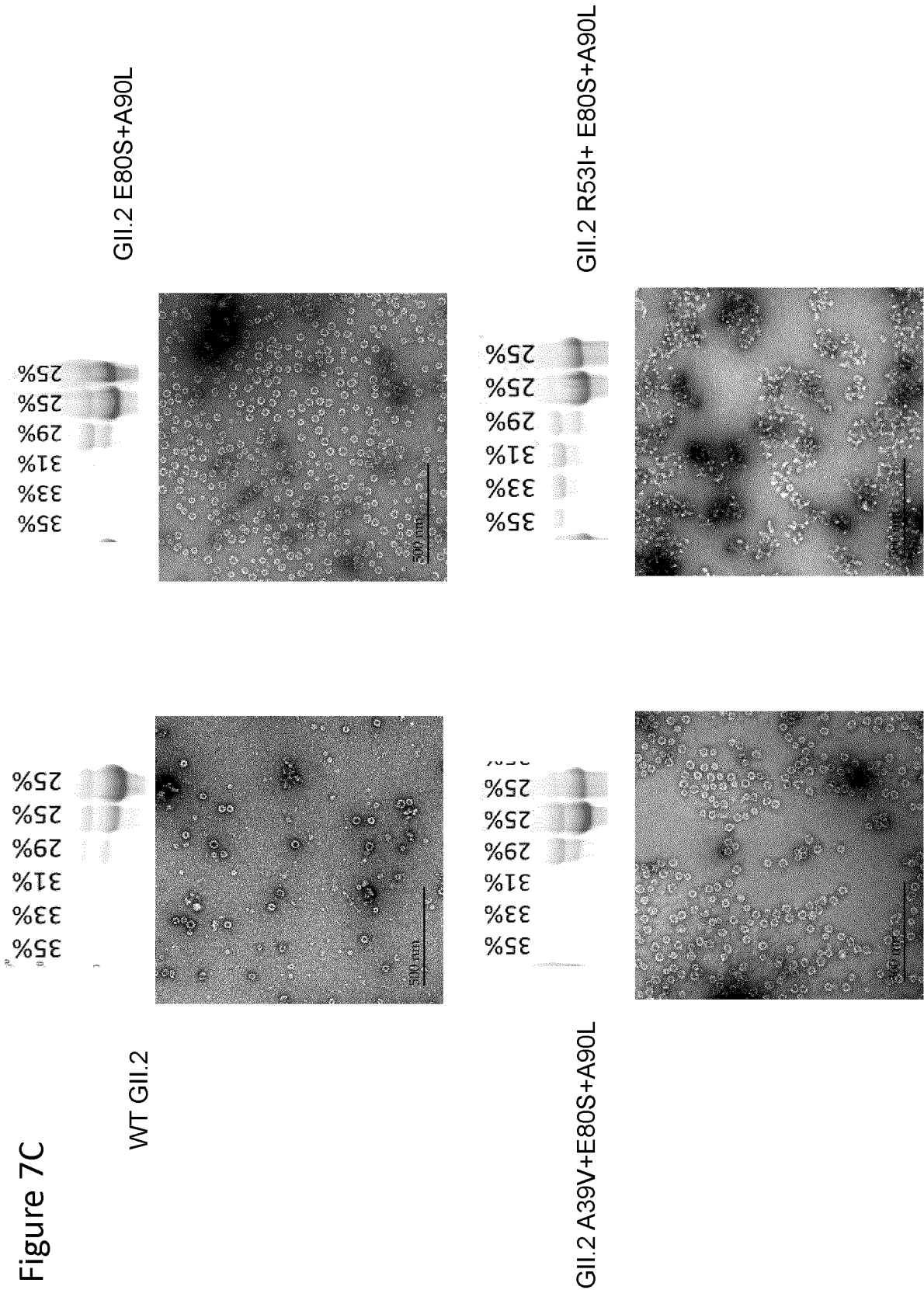


Figure 7B





GII.3/Jingzhou/2013402/CHN

Figure 8A

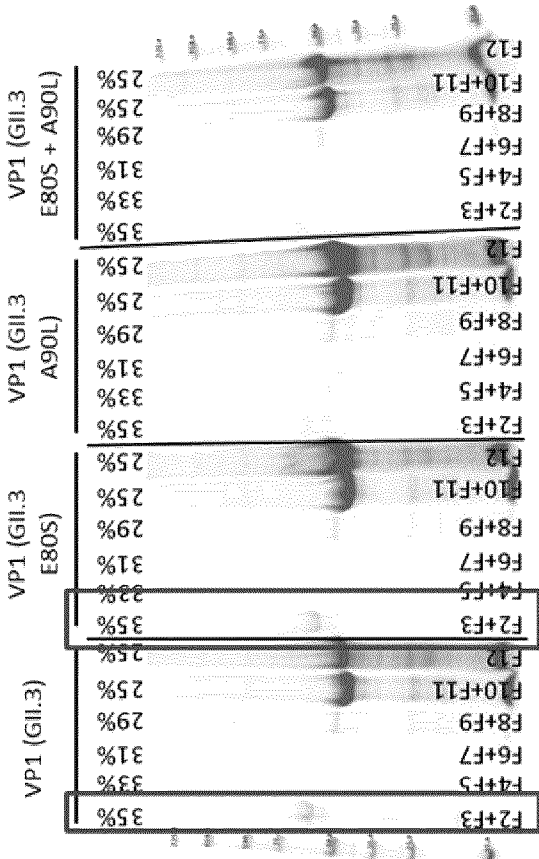
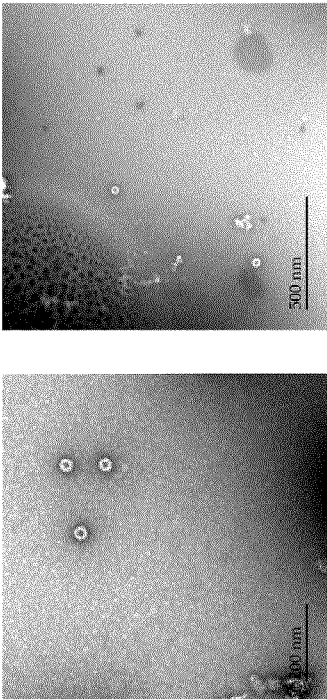
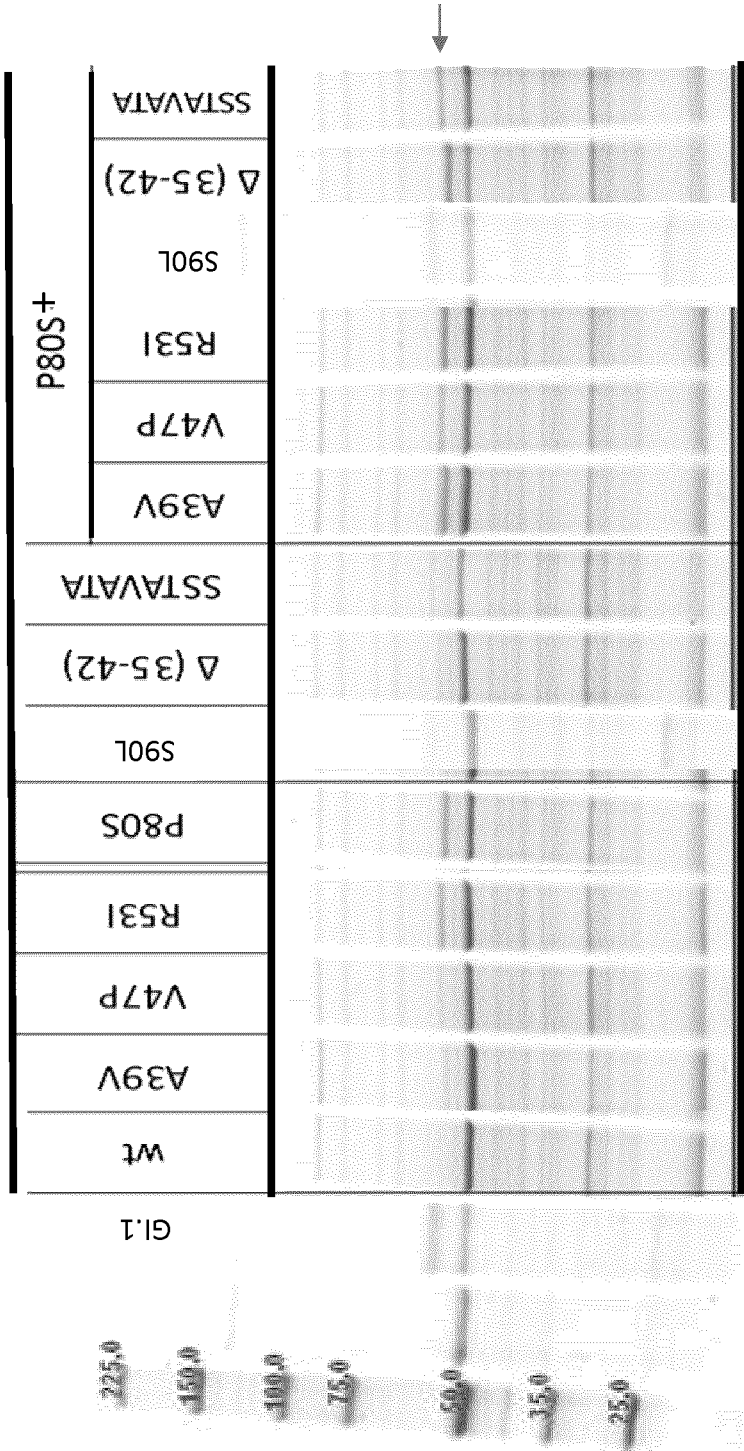


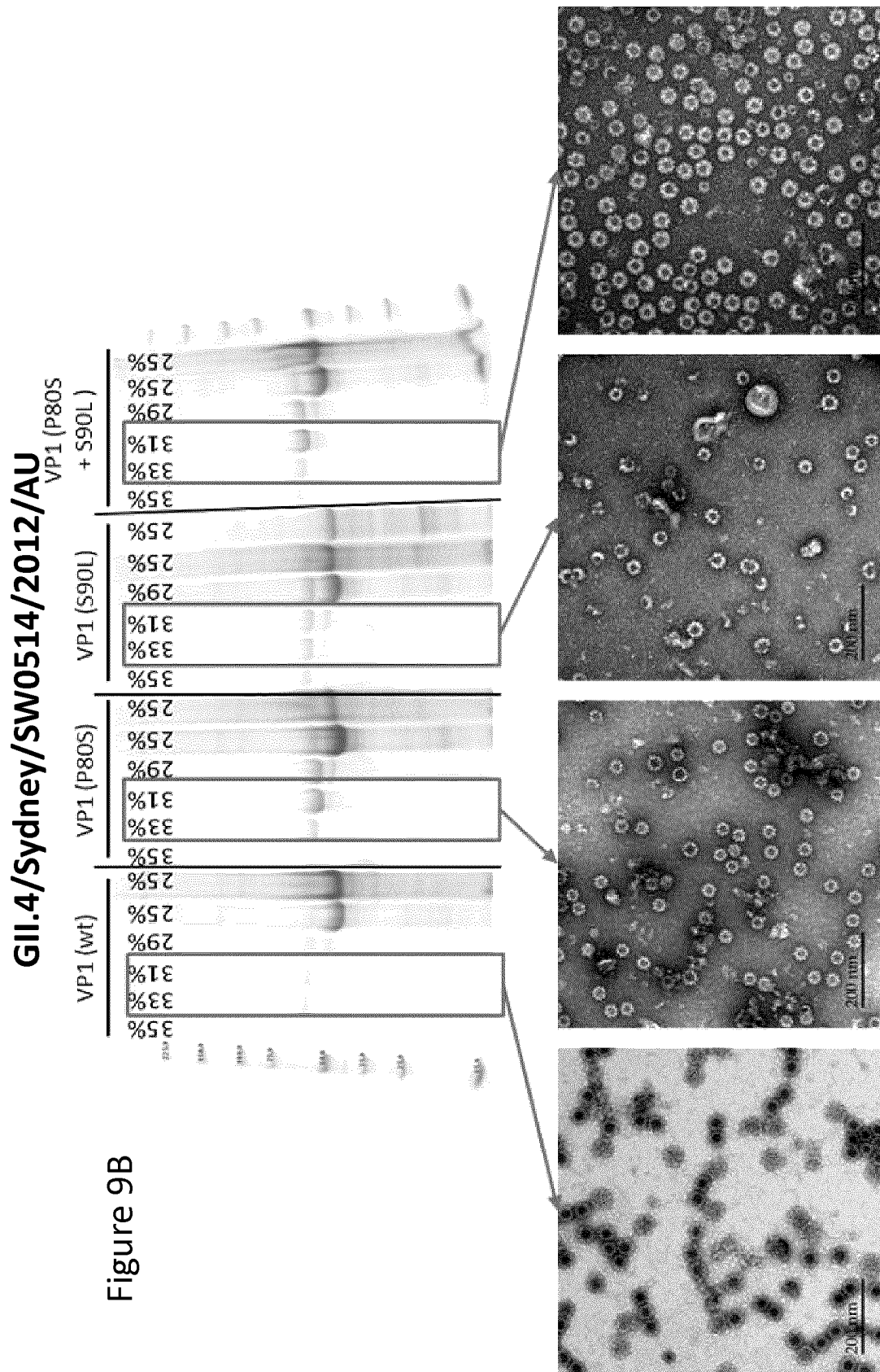
Figure 8B



GII.4/Sydney/SW0514/2012/AU

Figure 9A





GII.4/Sydney/SW0514/2012/AU

Figure 9C

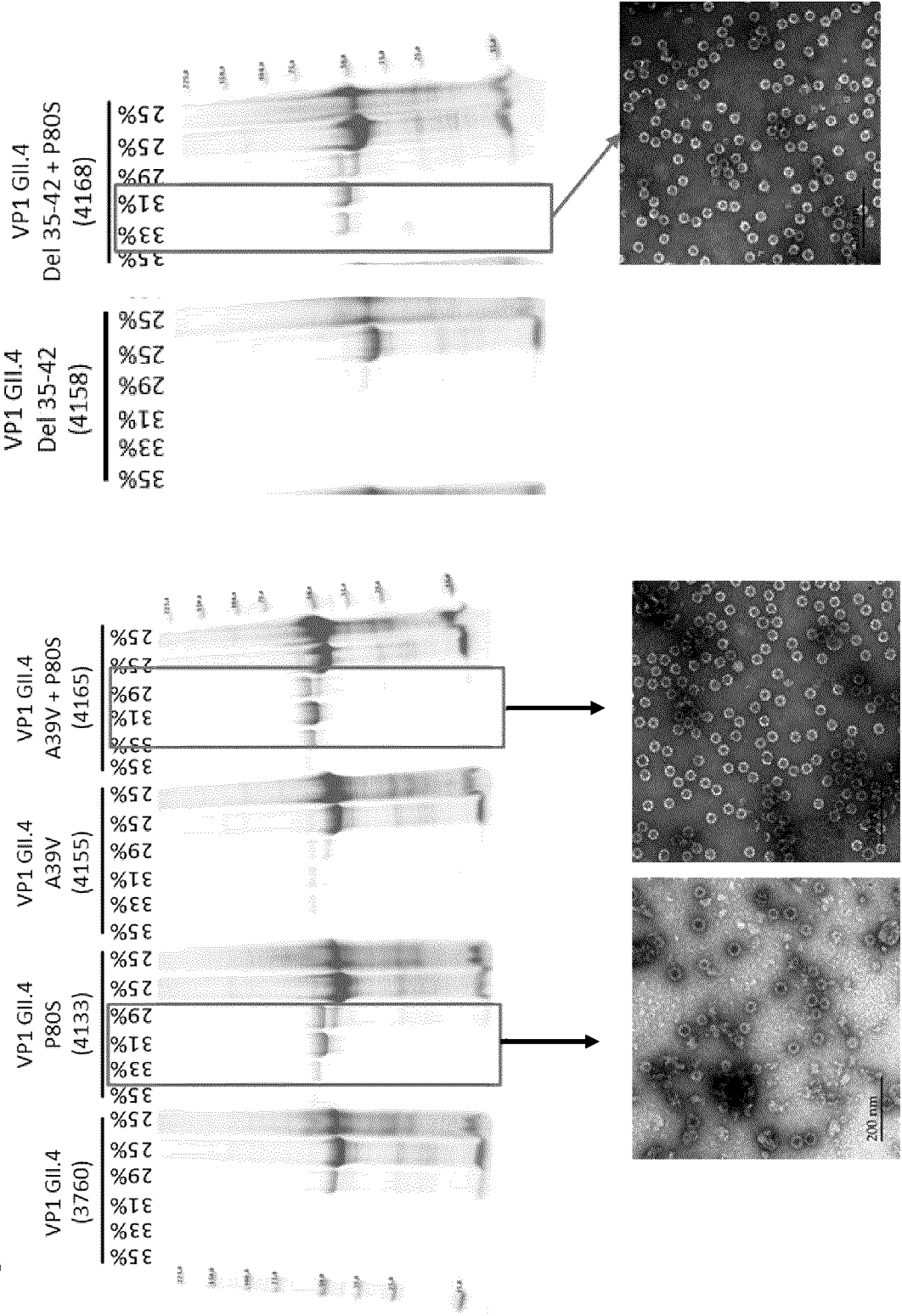


Figure 9D

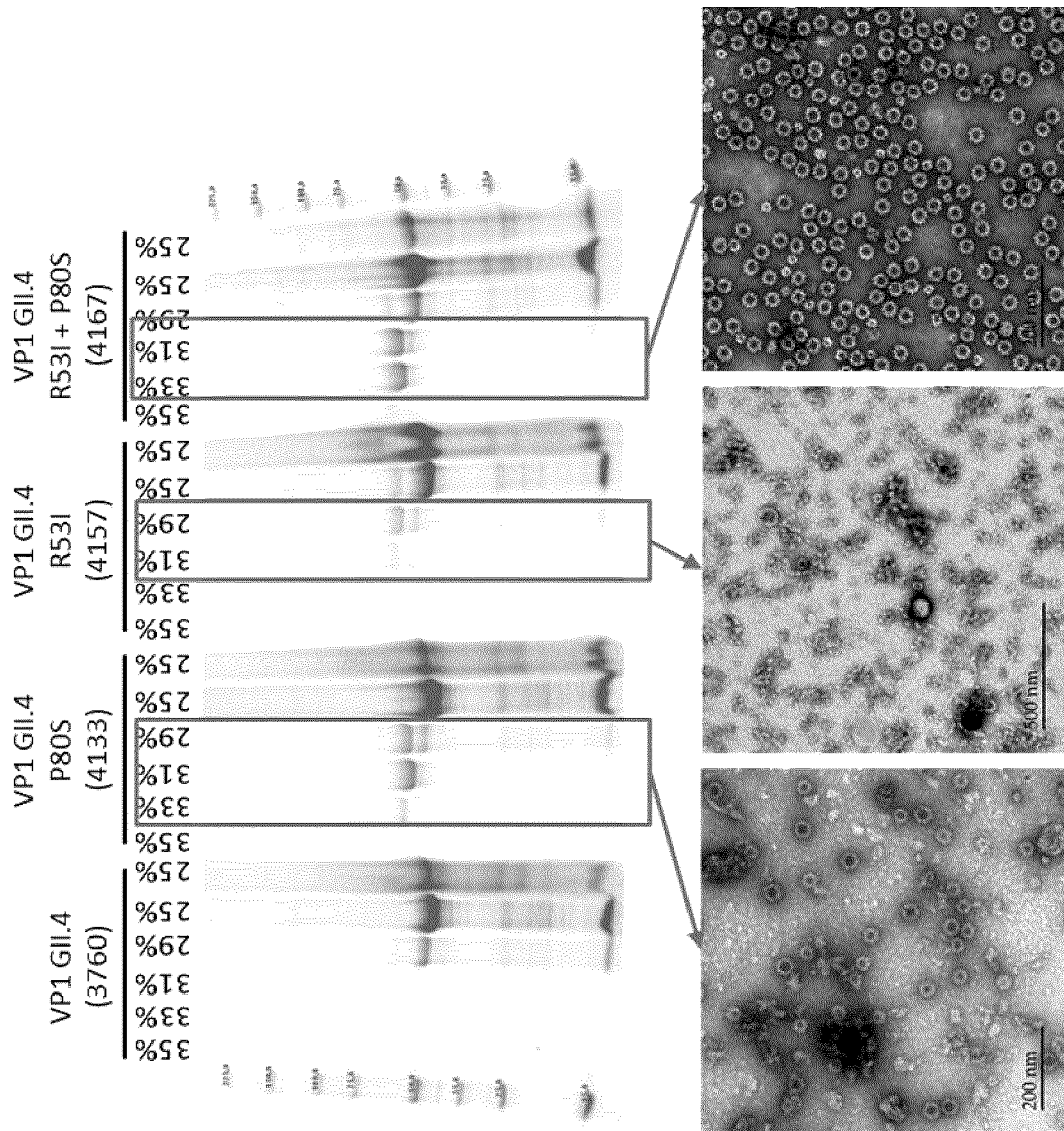


Figure 9E

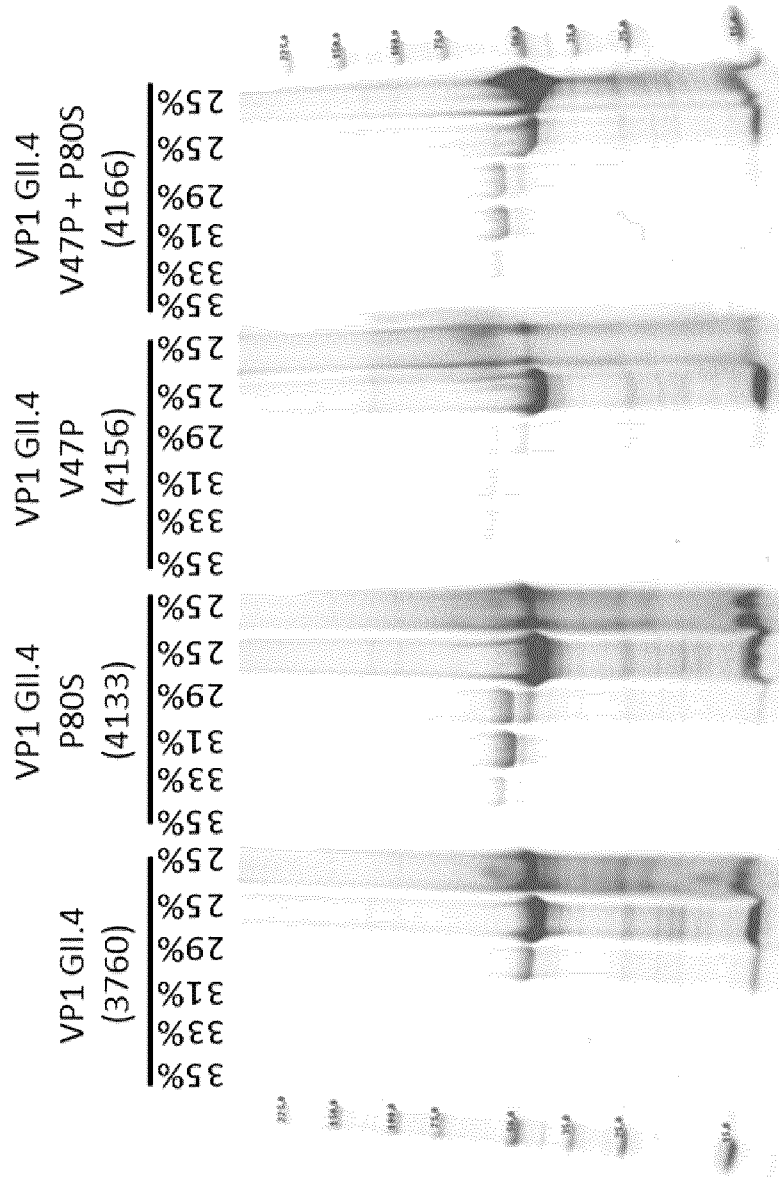


Figure 9F

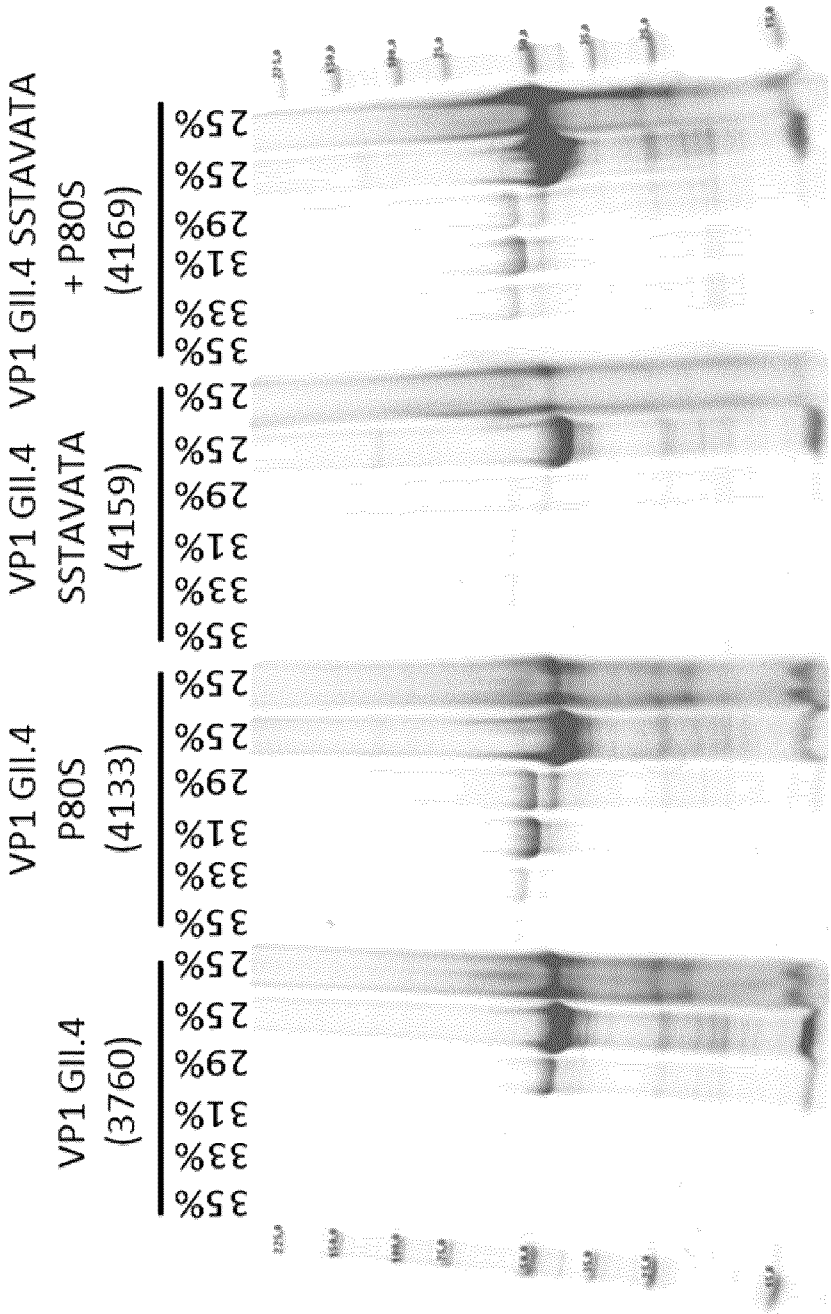


Figure 9G

**GII.4/Sydney/SW0514/2012/AU**

GII.4\_A39V+R53I+P80S

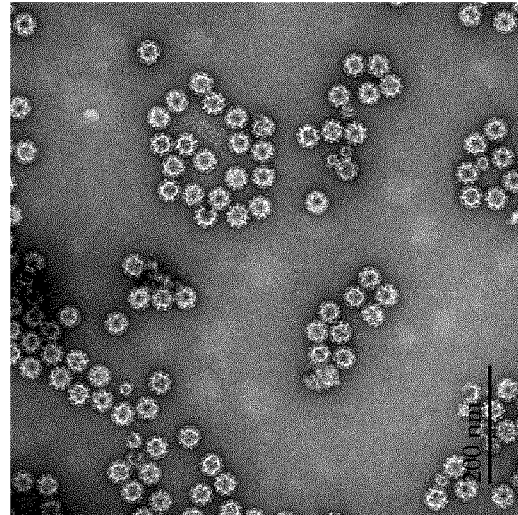
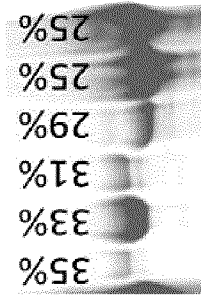


Figure 9H

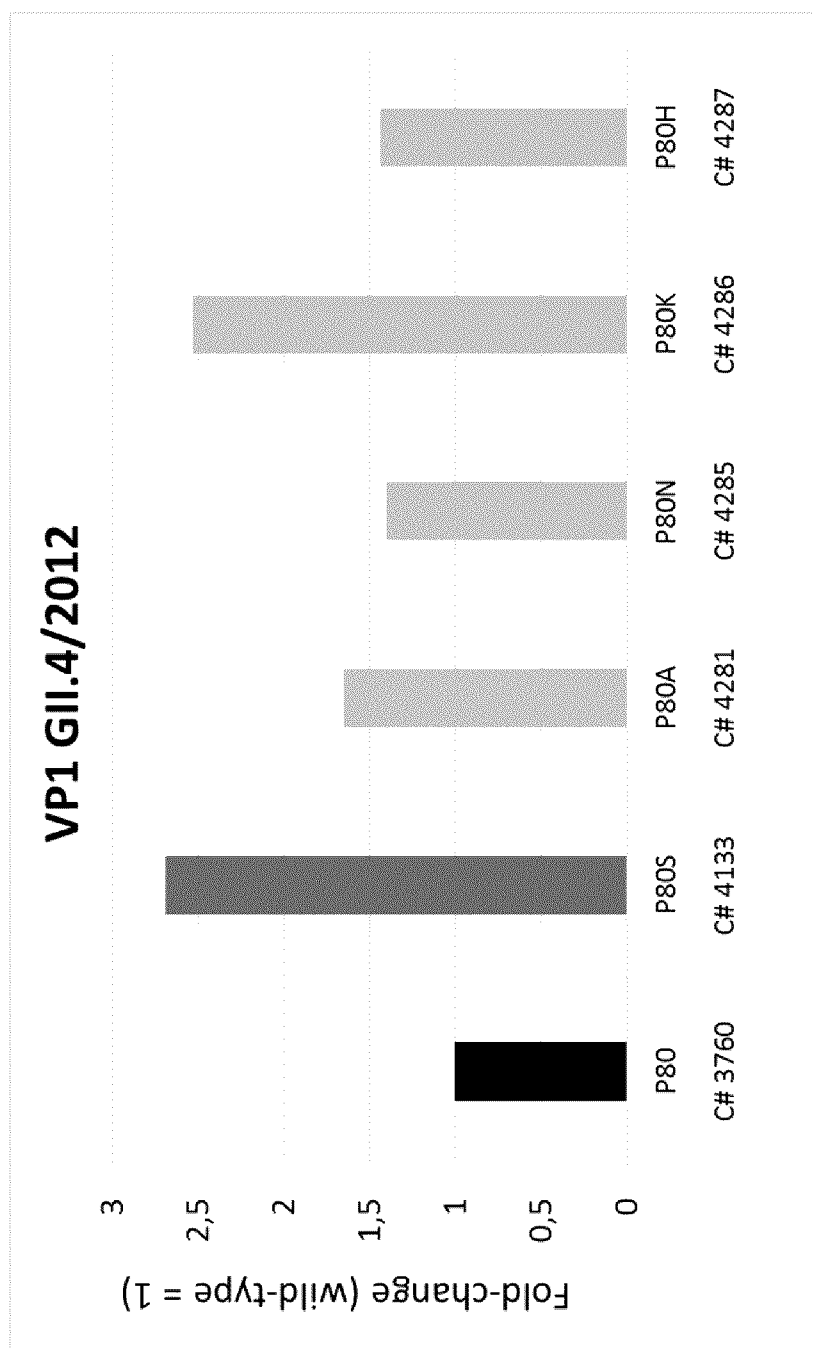
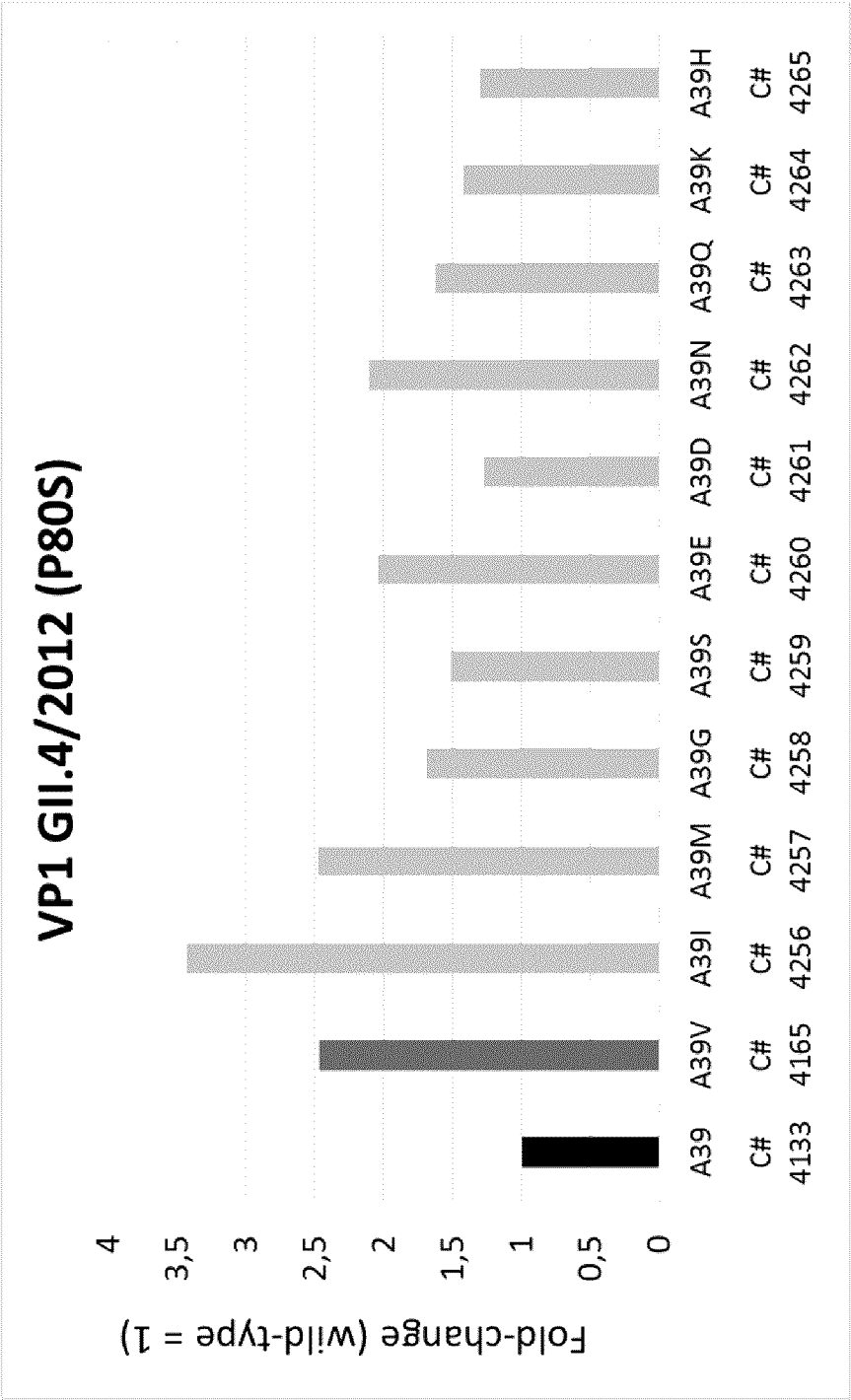


Figure 9I



GII.6/Ohio/490/2012/USA

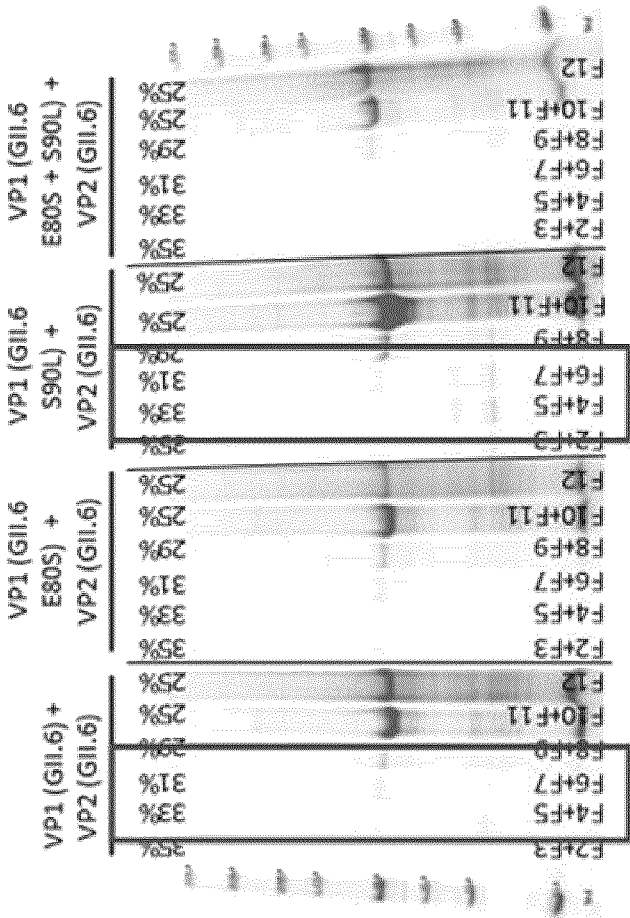


Figure 10A

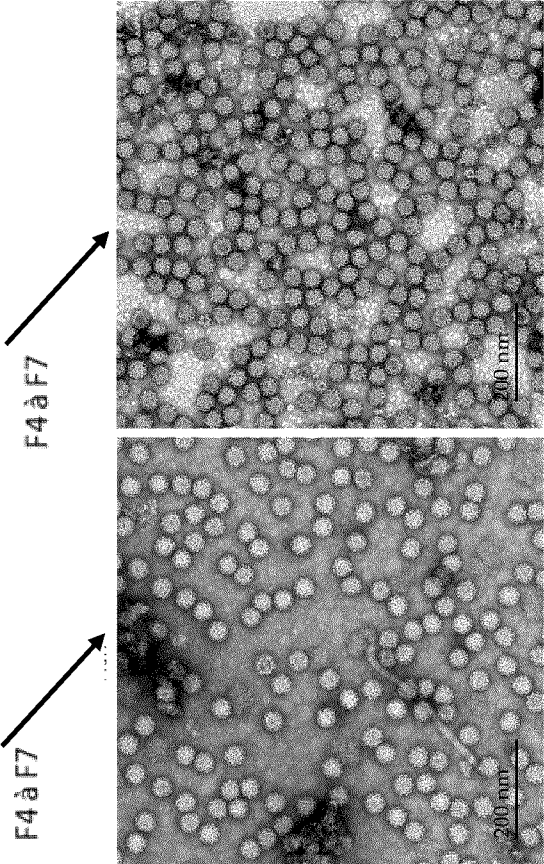
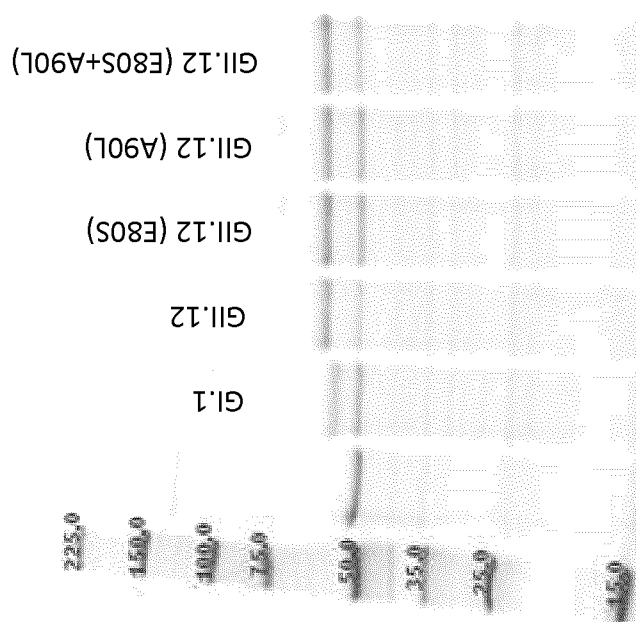


Figure 10B

**GII.12/HS206/2010/USA****Figure 11A**

GII.12/HS206/2010/USA

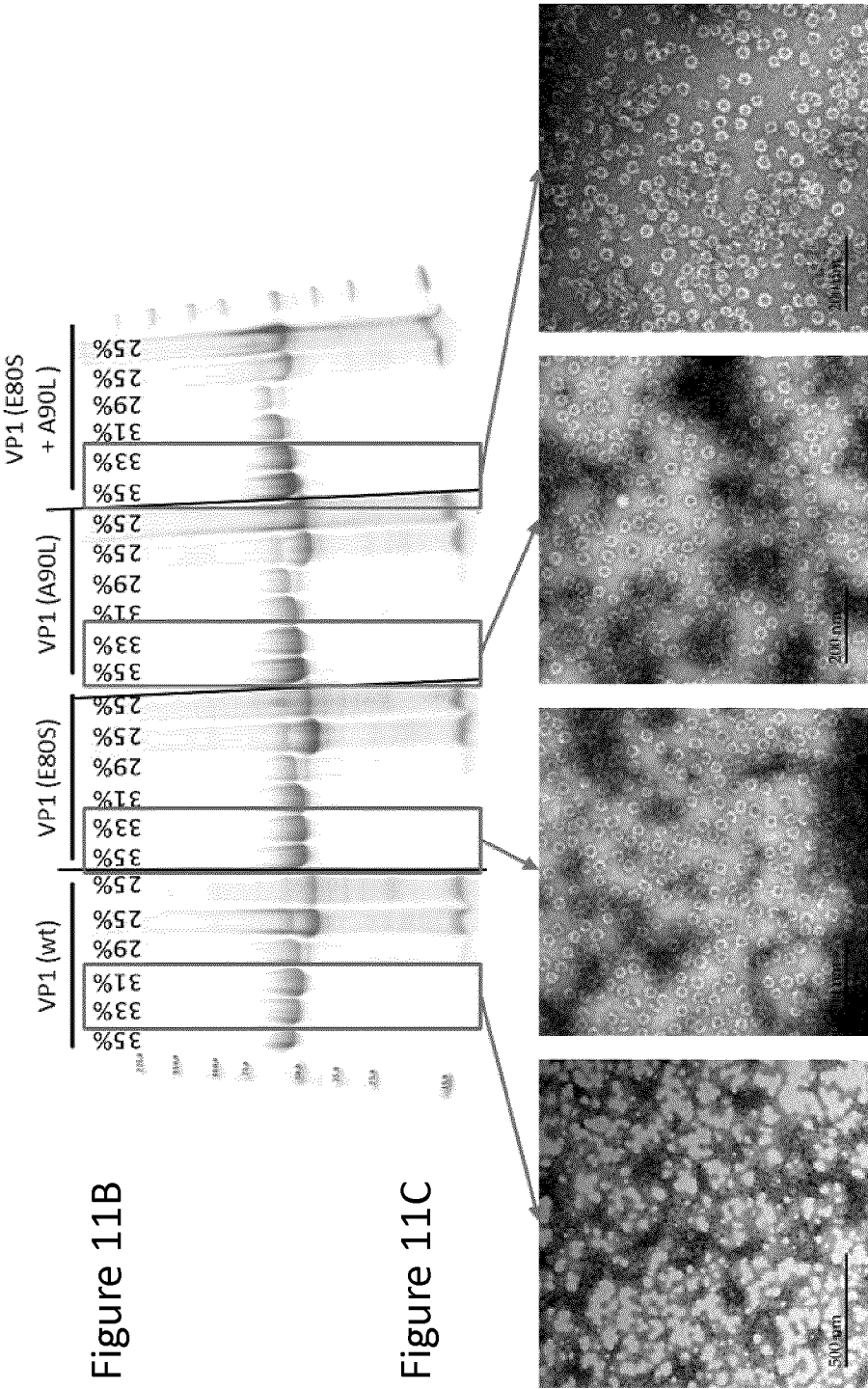
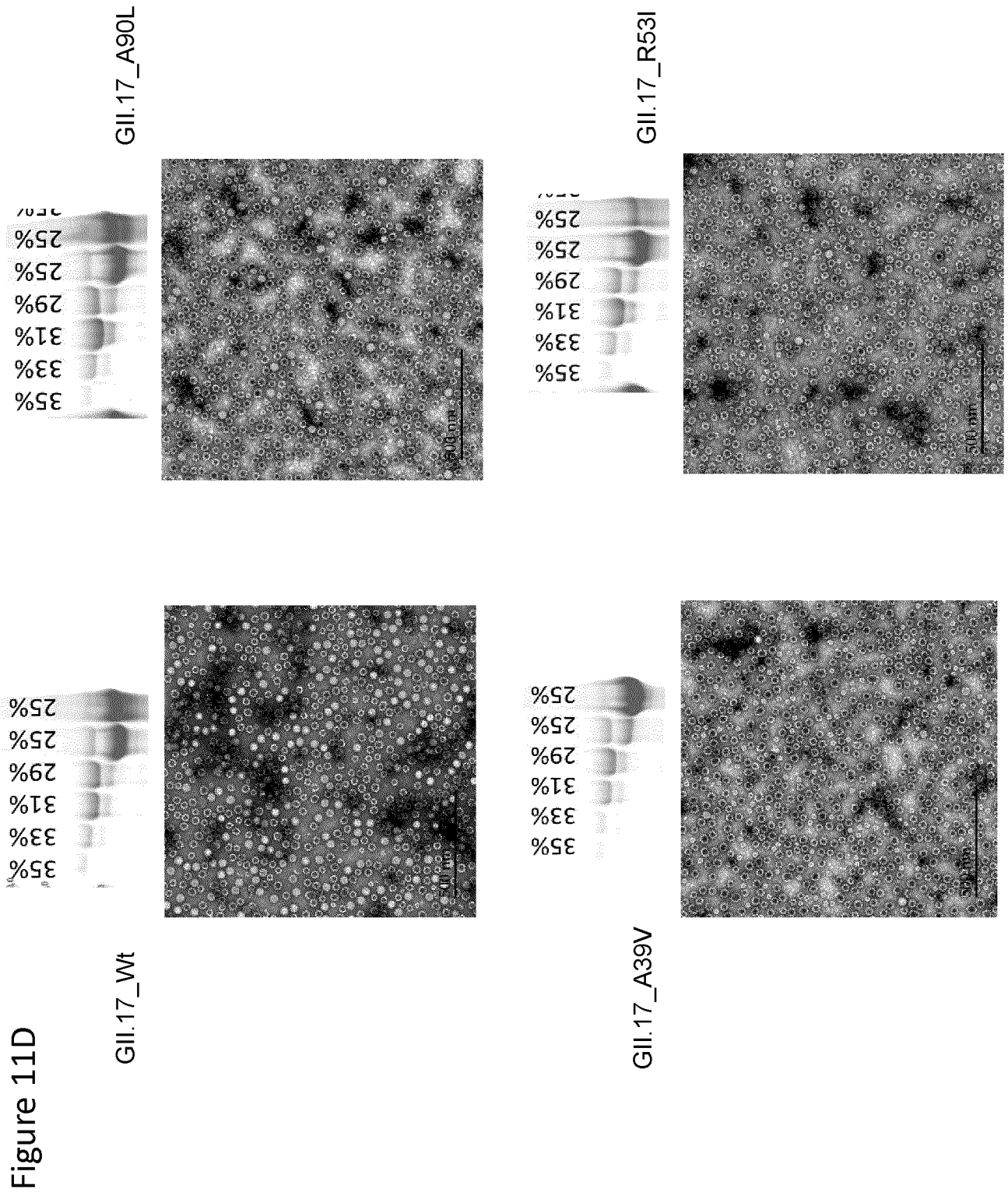


Figure 11B

Figure 11C



**Figure 12A**

Amino acid sequence of VP1 G1.1 (SEQ ID NO: 1)

MMMASKDATSSVDGASGAGQLVPEVNASDPLAMDPVAGSSTAVATAGQVNPIDPWIINNFVQAPQGEFTISPNNTP  
 GDVLFDSLGLPHLNPFLHLSQMYNGWVGNMRVRIMLAGNAFTAGKIIVSCIPPGFGSHNLIAQATLPHVIADVRTL  
 PIEVPLEDVNRNLFHNNDNRNQQTMRVLCMLYPLRTGGGTGDSFVVAGRVMTCPSPDFNFLVPPTVEQKTRPFTLPN  
 LPLSSLSNSRAPLPISSMGISPDNVQSVQFQNGRCTLGRLVGTTPVSLSHVAKIRGTSNGTVINLTDLGTPFHPFEGPAPI  
 GFDDLGGCDWHINMTQFGHSSQTQYDVTTPDTFVPHLGSIQANGIGSGNYVGVLSWISPPSPSGSQVDLWKIPNYG  
 SSITEATHLAPSVYPPGFGEVLVFFMSKMPGPGAYNLPCLLPQEYISHLASEQAPTVEAALLHYVDPDTGRNLGEFKAYP  
 DGFLTCVPNGASSGPQQLPINGVFVFSWVSRYQLKPVGTASSARGRLGLRR

**Figure 12B**

Nucleic acid sequence of wild-type VP1 G1.1 (SEQ ID NO: 2)

ATGATGATGGCGTCTAAGGACGCTACATCAAGCGTGGATGGCGCTAGTGGCGCTGGTCAGTTGGTACCGGAGGTTA  
 ATGCTTCTGACCTCTTGCAATGGATCCTGTAGCAGGTTCTTCGACAGCAGTCGCGACTGCTGGACAAGTTAATCCTA  
 TTGATCCCTGGATAATTAATAATTTGTGCAAGCCCCCAAGGTGAATTTACTATTTCCCCAAATAATACCCCGGTG  
 ATGTTTTGTTGATTTGAGTTTGGGTCCCATCTTAATCCTTTCTGCTCCATCTATCACAAATGTATAATGGTTGGGTT  
 GGTAACATGAGAGTCAGGATTATGCTAGCTGGTAATGCCTTTACTGCGGGGAAGATAATAGTTTCCTGCATACCCCC  
 TGGTTTTGGTTCACATAATCTTACTATAGCACAAGCAACTCTTTCCACATGTGATTGCTGATGTTAGGACTCTAGAC  
 CCCATTGAGGTGCCTTTGGAAGATGTTAGGAATGTTCTTTTCATAATAATGATAGAAATCAACAAACCATGCGCCTT  
 GTGTGCATGCTGTACACCCCTCCGCACTGGTGGTGGTACTGGTGATTCTTTGTAGTTGCAGGGCGAGTTATGAC  
 TTGCCCCAGTCCTGATTTAATTTCTTGTTTTAGTCCCTCCTACGGTGGAGCAGAAAACCAGGCCCTTCACACTCCCA  
 AATCTGCCATTGAGTTCTGTCTAACTCACGTGCCCTCTCCCAATCAGTAGTATGGGCATTTCCCAGACAATGTCC  
 AGAGTGTGCAGTTCAAAATGGTCGGTGTACTCTGGATGGCCGCTGGTTGGCACCAACCCAGTTTCATTGTCACAT  
 GTTGCCAAGATAAGAGGGACCTCCAATGGCACTGTAATCAACCTTACTGAATTGGATGGCACACCCCTTTCACCTTTT  
 GAGGGCCCTGCCCCATTGGGTTTCCAGACCTCGGTGGTTGTGATTGGCATATCAATATGACACAGTTTGGCCATTC  
 TAGCCAGACCCAGTATGATGTAGACACCAACCCCTGACACTTTTGTCCCCATCTTGTTCAATTAGGCAAAATGGCAT  
 TGGCAGTGGTAATTATGTTGGTGTCTTAGCTGGATTTCCCCCATCACACCCGTCTGGCTCCCAAGTTGACCTTTG  
 GAAGATCCCCAATTATGGGTCAAGTATTACGGAGGCAACACATCTAGCCCCTTCTGTATACCCCTGGTTTCGGAG  
 AGGTATTGGTCTTTTTCATGTCAAAAATGCCAGGTCCTGGTGCTTATAATTTGCCCTGTCTATTACCACAAGAGTACA  
 TTTCACATCTTGCTAGTGAACAAGCCCTACTGTAGGTGAGGCTGCCCTGCTCCACTATGTTGACCCTGATACCGGTC  
 GGAATCTTGGGGAATTCAAAGCATACCCTGATGGTTTCCTCACTTGTGTCCCAATGGGGCTAGCTCGGGTCCACAA  
 CAGCTGCCGATCAATGGGGTCTTTGTCTTTGTTTCATGGGTGTCCAGATTTTATCAATTAAGCCTGTGGGAACTGCC  
 AGCTCGCAAGAGGTAGGCTTGGTCTGCGCCGATAA

**Figure 12C**

Nucleic acid sequence of human codon-optimized VP1 G1.1 (SEQ ID NO: 3)

ATGATGATGGCTAGTAAAGATGCGACCTCCTCTGTGGATGGTGCCTCAGGGGCAGGACAACCTCGTACCCGAGGTAA  
 ACGCCAGCGACCCACTTGCCATGGACCCCGTTGCCGGAAGTTCCACAGCAGTGGCCACAGCCGGTCAAGTGAATCC  
 AATTGATCCGTGGATTATCAACAATTCGTCCAGGCACCCAGGGCGAGTTCACAATTCACCAAACAATACACCGG  
 GCGATGTGCTATTGATCTTTCCTTGGGTCTCACCTTAACCTTTTCTACTCCATCTCTCACAGATGTACAATGGTTG  
 GGTAGGAAACATGAGAGTCCGGATCATGCTGGCTGGCAATGCCTTTACCGCTGGCAAGATCATCGTCAGTTGTATTC  
 CTCCCGGATTTGGATCTCATAATCTGACCATTGCTCAAGCGACTCTCTTTCCCATGTCTCGCCGACGTTAGGACCT  
 GGACCCCATCGAGGTGCCCCTGGAGGACGTCCGGAATGTTTTGTTCCACAACAACGACAGAAACCAGCAGACGATG  
 AGACTTGTCTGTATGCTCTATACCCCACTGCGGACTGGAGGCGGGACTGGAGACTCCTTCGTTGTGGCAGGAAGAG  
 TGATGACATGCCCCCTCCCCGACTTCAACTTTCTTTTTCTGGTCCCAACCGTTGAGCAGAAGACGCGGCCCTTTA  
 CACTGCCCAATCTCCCGCTTTCAAGTCTGAGTAATCACGGGCCCCATTGCCGATCTCCTCAATGGGAATCTCCCCCG  
 ACAACGTCCAGTCTGTCCAATCCAAAATGGGAGATGCACACTGGACGGTCGCTGGTGGGAACAACCTCCGGTGTG  
 CCTCTACATGTCGCCAAAATCCGCGGCACATCAAATGGTACCGTAATCAATCTGACAGAAGTTGATGGCACGCCCTT  
 CCATCCCTTTGAAGGACCAGCCCCTATTGGATTTCTGATCTGGGAGGTTGCGACTGGCACATAAACATGACACAGT  
 TTGGCCACTCCAGCCAGACACAGTATGATGTCGATAACAACCCAGATACCTTCGTGCCACACCTGGGATCTATTCAA  
 GCTAACGGTATTGGATCCGGCAACTACGTGGGAGTCTTATCTTGGATCTCACCACCATCCACCCCTCAGGATCCCAG  
 GTTGACTTGTGGAAGATACCGAATTATGGATCCTCGATCACTGAAGCCACGCACCTCGCACCTCCGTCTACCCACCA  
 GGTGTTGGAGAAGTCTTGGTGTTCATGAGCAAAATGCCCGGCCCTGGAGCCTACAATCTCCCTTGCCTACTCCCT  
 CAAGAGTATATTAGTCACCTCGCATCTGAGCAGGCCCCGACCGTTGGCGAGGCAGCCCTGCTGCATTATGTGGATCC  
 GGACACCGGCAGGAACCTGGGTGAGTTCAAAGCTTATCCTGACGGTTTTCTAACATGTGTACCAAATGGCGCTTCCA  
 GCGGCCCTCAACAGCTCCAATCAATGGCGTGTTCGTTTTGTGAGCTGGGTAAAGCCGCTTCTACCAGCTGAAGCCC  
 GTGGGGACAGTCTTCTGCCCCGCGGACGCCTCGGTCTGCGGAGATAA

**Figure 13A**

Amino acid sequence of VP1 G1.2\_Leuven\_2003\_D2DEL3 (SEQ ID NO: 4)

MMMASKDAPQSADGASGAGQLVPEVNTADPLPMEPVAGPTTAVATAGQVNMIDPWIVNNFVQSPQGFTISPNT  
 PGDILFDLQLGPLNPFSLHLSQMYNGWVGNMVRILLAGNAFSAAGKIIVCCVPPGFTSSSLTIAQATLFPHVIADVRLTP  
 IEMPLDVRNVLYHTNDNQPTMRLVCMLYTPLRTGGGSGNSDSFVAGRVLTAPSSDFSFLFLVPPTIEQKTRAFTVPNIP  
 LQTLNSRFPSLIQGMILSPDASQVVFQNGRCLIDGQLLGTTPATSGQLFRVRGKINQGARTLNLTEVDGKPFMAFDSP  
 APVGFDPDFGKCDWHMRISKTPNNTSSGDPMRSVDVQTDVQGFVPHLSIQFDEVFNHPTGDYIGTIEWISQPSTPPGT  
 DINLWEIPDYGSSLSQAANLAPPVFPPGFGEALVYFVSFAFGPNNRSAPNDVPCLLPQEYVTHFVSEQAPTMGDAALLHY  
 VDPDTNRNLGEFKLYPGGYLTCVPNGVGAGPQQLPLNGVFLFVSWVSRFYQLKPVGTASTARGRLGVRI

**Figure 13B**

Nucleic acid sequence of human codon-optimized VP1 G1.2\_Leuven\_2003\_D2DEL3 (SEQ ID NO: 5)

ATGATGATGGCTTCAAAGGATGCTCCCCAAAGCGCGGACGGAGCTAGCGGCGCCGGACAGTTGGTTCCGGAAGTC  
 AACACTGCCGATCCACTGCCCATGGAACCCGTAGCTGGTCCAACAACCGCTGTTGCCACCGCCGGCCAGGTAAACAT  
 GATCGATCCATGGATTGTTAATAACTTTGTACAGAGCCCCCAGGGGGAGTTCACAATTTCTCCGAACAATACCCCTG  
 GGGACATTCTGTTGATCTGCAACTGGGCCCACACTTGAATCCTTTCTGAGCCATCTTTCACAGATGTACAACGGAT  
 GGGTTGGGAACATGCGTGTTGCGATCCTCCTTGCTGGCAACGCCTTCAGTGCTGGCAAGATTATCGTGTGCTGCGTA  
 CCACCAGGGTTTACCTCGAGTTCATTAACCATTGCTCAGGCCACCCCTTTCCCTCACGTGATCGCAGACGTGCGTACC  
 TTAGAACCAATCGAAATGCCCTGGAAGATGTACGGAACGTGCTGTACCATACTAATGATAACCAGCCAACGATGA  
 GATTAGTGTGCATGCTGTACACCCCCCTGAGAACTGGAGGAGGTTCTGGAAATCCGACAGTTTTGTGGTGGCTGG  
 CAGGGTCTGACCGCTCCCAGTAGCGACTTCAGCTTTTTGTTCTCGTTCCTCTACAATCGAACAAAAACAAGAGC  
 ATTCACAGTGCCCAACATTCCACTGCAGACTTTAAGCAATTCAGGTTTCCAGCTTGATCCAGGGTATGATCCTTTCT  
 CCCGACGCCTCCCAAGTTGTGCAGTTCAGAAATGGGAGATGTCTTATCGACGGTCAGCTTCTGGGAACAACCCCTGC  
 CACCTCCGGGCAACTCTCCGGGTGAGAGGCAAAATCAATCAGGGCGCCAGAACACTGAATCTGACAGAAGTGGAC  
 GGGAAACCCCTTTATGGCGTTCGATAGCCCCGCGCCGTTGGATTCCCTGACTTCGGCAAGTGTGATTGGCACATGCG  
 CATCAGTAAGACTCCCAACAACACTTCATCTGGAGACCCCATGAGGAGCGTGGATGTCCAGACCGACGTGCAGGGC  
 TTCGTGCCGCACTGGGATCTATCCAGTTCGATGAGGTGTTCAATCACCTACTGGCGACTACATAGGCACAATTGA  
 GTGGATAAGTCAACCATCTACACCTCCAGGGACCGACATAAACCTGTGGGAAATTCCTGATTACGGGTATCCCTGA  
 GTCAAGCTGCCAATCTTGACCCCCCTGTCTTTCCCCCGGCTTTGGTGAGGCTCTGTTTACTTCGTCTCTGCATTTCT  
 GGTCTAACAAACCGCTCCGCCCTAACGATGTTCCGTGTTTGTACCCAGGAATATGTGACTCATTTGTTTCCGAA  
 CAGGCACCCACCATGGGGGACGCTGCCCTGCTACACTATGTGGACCCGACACCAATAGAAACCTCGGCGAGTTCA  
 AACTCTACCCCGGGGGATACCTGACCTGTGTTCCAATGGAGTGGGAGCAGGCCCAACAGCTGCCCTGAATGG  
 GGTCTTCTGTTGTTTCTGGGTGTCACGCTTTTACCAGCTGAAGCCGTTGGCACAGCTTCTACGGCACGCGGCAG  
 GCTAGGGGTCCGCCGAATCTGA

**Figure 14A**

Amino acid sequence of VP1 G1.3\_LillaEdet\_2008\_H2DG70 (SEQ ID NO: 6)

MMMASKDAPTNMDGTSGAGQLVPEVSTAEPISMEPVAGAATAAATAGQVNMIDPWIMSNYVQAPQGEFTISPNNT  
 PGDILFDLQLGPLNPFSLHAQMYNGWVGNMKVRVLLAGNAFTAGKIIISCVPPGFAAQNVISIAQATMFPHVIADVRV  
 LEPIEVPLEDRVNLVFNNDSTPTMRILCMLYTPLRASGSSSGTDPFVIAGRVLTCPSPDFNLFVPPNVEQKTKPFSVPNL  
 PLNVLSNSRVPSLIKSMMSQDHGQMVQFQNGRVTLTGQLGTTPTSASQLCKIRGTVYHATGGQGLNLTEIDGTPYH  
 AFESPAPIGFPLGECDDWHINASPANAFTDGSIIHRIDVAQDSTFAPHLGTIHYTNADYNANVGLICSEWLSPSGGAPK  
 VNPWAIAPRYGSTLTEAAQLAPPIYPPGFGEAIVFFMSDFPIANGSDGLSVPCTIPQEFVTHFVNEQAPTRGEAALLHYVDP  
 DTHRNLGFEFLYPEGFMTCPVNSSGSGPQTLPIGVFTFISWVSRYQLKPVGTTGPVRRLGIRRS

**Figure 14B**

Nucleic acid sequence of human codon-optimized VP1 GI.3\_LillaEdet\_2008\_H2DG70 (SEQ ID NO: 7)

ATGATGATGGCTTCCAAGGATGCTCCACAAACATGGATGGAACAAGCGGCGCGGGGCAACTTGTGCCGGAGGTG  
TCCACGGCGGAACCCATTTCCATGGAACCTGTGGCCGGCGCAGCCACTGCTGCCGCCACCGCAGGACAGGTAAACA  
TGATCGACCCCTGGATCATGTCAAATTACGTTCAAGGCTCCACAGGGGAGTTTACCATAAGCCCAAACAACACCCCG  
GGTGACATCTTGTTTGACCTGCAGCTAGGACCACACTGAATCCGTTTCTGAGTCACTTGGCTCAGATGTATAATGGA  
TGGGTTGAAACATGAAGGTGCGCGTGCTCCTGGCGGGCAATGCATTCACAGCCGGGAAGATTATTATCTCTTGCG  
TGCCACCTGGATTTGCAGCCGAGAACGTGTCTATCGCACAGGCAACCATGTTTCCGCATGTGCATCGCAGATGTGCGC  
GTGCTAGAGCCCATCGAGGTGCCCCCTGAGGACGTGCGCAACGTCTATTCCATAACAATGATAGCACCCCCACCAT  
GCGCTTGATATGTATGTTATATACTCCCTCCGCGCCAGTGGGTCCAGCTCCGGGACCGATCCTTTTGTGATTGCTGG  
GCGGGTGTTGACTTGTCTAGCCCTGACTTCAACTTCCTTTTCTGGTGCCTCCAAATGTAGAACAGAAAAACAAAGCC  
ATTCAGCGTGCCAAACCTGCCCCCTAACGTGCTGTGCAATCCCGAGTGCCTTCCCTTATTAAGTCCATGATGGTATC  
TCAGGATCACGGTCAAATGGTGCAGTTTCAGAACGGCCGAGTGACGTTAGACGGGCAGCTGCAGGGCACAACCCC  
AACCAGTGCCAGTCAGCTGTGTAAGATCAGAGGCACCGTCTACCACGCAACTGGCGGACAGGGGCTGAATCTTACT  
GAGATCGATGGTACCCCCCTACCATGCATTGAGTCACCTGCACCTATTGGATTTCGGATCTTGGGGAGTGTGATTG  
GCATATCAATGCTTCACCTGCCAACGCTTTCACAGACGGGTCTATTATTCATCGCATTGACGTAGCACAGGATAGCAC  
ATTTGCCCGCACCTGGGTACCATCCACTATACGAACGCAGATTACAACGCAAACGTGGGTCTTATCTGTAGCCTAG  
AGTGGCTATCTCCGCCAAGCGGTGGGGCCCTAAAGTTAAGCCATGGGCTATTCTCGGTACGGGTCTACGCTGACT  
GAGGCCGCTCAGCTGGCACCCCCCATATATCCACCAGGATTCGGGGAAGCCATTGTTTTCTTTATGTCCGATTTCCG  
ATAGCCAACGGTTCAGATGGCCTTAGTGCCCTTGACGATTCCACAGGAATTTGTGACACACTTCGTAAACGAGCA  
GGCTCCTACTCGGGGCGAGGCTGCCTTGTTGCATTACGTAGACCCCGATACCCATAGAAACCTGGGCGAATTCAAAC  
TCTACCCTGAAGGTTTCATGACCTGCGTACCTAAGTCTCCGGCAGTGGCCCTCAAACCTTGCCGATCAACGGCGTGT  
TCACGTTTATCAGCTGGGTTTACGGTTTACCAACTCAAGCCCGTCGGAACAACTGGGCCAGTTCGGAGGCTCGGG  
ATCAGACGGAGCTAG

**Figure 15A**

Amino acid sequence of VP1 GI.5\_Siklos\_HUN5407\_2013\_HUN\_AHW99832 (SEQ ID NO: 12)

MMMASKDAPSSADGANGAGQLVPEVNNAEPLPLDPVAGASTALATAGQVNMIDPWIFNNFVQAPQGEFTISPNNTP  
GDILFDLQLGPHLNPFLAHLNQMYNGWVGNMVRVILAGNAFTAGKVIICVPPGFQSRSLIAQATLFPHIADVRTLEPI  
EIPLEDVRNTLYHTNDNQPTMRLLCMLYTPLRTGGSGGTDFAFVAGRVLTCPSSDFNFLVLPPTVEQKTRPFSVPNIPL  
QLLSNSRVPNLIQSMVLSPDQAQNVQFQNGRCTTDGQLLGTTPVSVSQILKFRGKVSAGSKVINLTLDGSPFLAFEAPAP  
TGFPDLGTSDFWHVEMSLNSNSQSSGNPILLRDIHPNSSEFVPHLGSVCVTAIEVAGDYGTIQWTSQPSNVTPVPDVNF  
WTIPHYGSNLAEASQLAPVVYPGFGAIVYFMSPIPGPNTAHKPNLVPCLLPQEFVTHFVSEQAPSMGEAALVHYVDPD  
TNRNLGEFKLYPEGFITCVPNGTGPQQLPLNGVFVFASWVSFRFYQLKPVGTASSARGRLGVRR

**Figure 15B**

Nucleic acid sequence of human codon-optimized VP1 GI.5\_Siklos\_HUN5407\_2013\_HUN  
AHW99832 (SEQ ID NO: 33)

ATGATGATGGCCTCCAAAGACGCTCCTAGCAGTGCTGATGGCGCTAACGGTGCCGGCCAGCTGGTCCCCGAGGTGA  
ATAACGCCGAGCCTCTCCCTTGGACCCAGTAGCCGAGCTTCAACGGCCCTAGCTACTGCCGGACAGGTTAATATG  
ATTGACCCCTGGATTTTCAATAATTCGTGCAGGCCCTCAAGGCGAGTTTACTATAAGCCCTAACACACACCAGGG  
GATATTCTGTTGACCTGCAGTTAGGCCCTCATCTCAACCCCTTCTTGCCACCTGAGCCAGATGTACAATGGCTGG  
GTGGGCAACATGCGAGTGAGAGTTATCCTCGCAGGGAACGCCTTTACCGCTGGTAAGGTGATCATTTGTTGCGTAC  
CACCTGGATTCCAGTCTAGGACATTAAGTATTGCGCAAGCTACCCTCTTCTCATATCATCGCCGACGTGCGGACAC  
TAGAGCCCATCGAGATCCCACTGGAGGATGTCCGGAATACCCTGTACCATACCAACGATAATCAGCCCACTATGAGG  
TACTGTGCATGCTGTACACGCCACTCCGACTGGTGGGGGCGAGTGGGGGGACCGATGCTTTCGTCTGTTGCCGGTA  
GGGTGCTCACTTGCCCGTCATCTGACTTTAACTTCCTATTCTTGTCGCCCAACGGTGGAACAGAAAACGAGACCTT  
TTCCGTACCTAACATCCCTTTACAGCTCCTAAGCAATAGCAGAGTACCTAACCTGATCCAATCCATGGTTCTTAGCCC  
TGATCAAGCGCAGAACGTACAGTTTCAGAACGGGCGGTGCACCACAGATGGCCAGCTGCTTGGTACAACCTCCCGTC  
TCCGTGTCTCAGATACTTAAGTTTCGCGGCAAGGTCTCCGCTGGATCCAAAGTAATCAACCTCACTGAGCTTGATGG  
CTCTCCCTTTCTGGCGTTCGAGGCGCCCGCCCAACAGGCTTTCAGACCTGGGAACATCCGATTGGCATGTGCGAGA  
TGAGTCTGAATAGCAACTCCAGTCTTCTGGCAATCCAATACTGCTCCGCGATATCCATCCTAATTCTAGCGAGTTCG  
TTCCACACCTGGGTCTGTGTGCGTGACGGTGCAATAGAGGTGGCTGGCGACTACACGGGTACCATTCAGTGGAC  
CTCTCAGCCAAGTAACGTGACCCCTGTGCCAGACGTAACTTTTGGACAATTCCACACTACGGCTCTAATTGGCCGA  
AGCATCCCAGCTTGCCCCGTTGTATATCCCCAGGCTTTGGCGAAGCAATAGTTTATTTATGTCCCAATCCCTGG  
ACCTAACACAGCACACAAGCCAAACCTCGTCCCATGCCTGCTGCCCCAGGAGTTCGTGACTCATTTGTTTCGGAACA  
AGCCCCATCAATGGGGGAGGCCGCCCTGGTCCACTACGTGGATCCAGATACCAATCGGAATCTGGGAGAATTCAAA  
CTCTACCCTGAAGGATTCATTACATGTGTGCCCAATGGAACAGGACCGCAGCAGCTCCCACTGAACGGTGTCTTTGT  
ATTCGCATCATGGGTTAGCCGTTCTATCAACTTAAACCCGTGGGGACAGCTTCATCTGCCGGGGGCGCCTTGCGC  
TGCGGCGCTGA

**Figure 16A**

Amino acid sequence of VP1\_GI.7 (SEQ ID NO:101)

MMMASKDAPSNMDGTSGAGQLVPEVNAAEPLPLEPVVGAATAVATAGQVNMIDPWIMNMFVQAPGEFTISPNT  
PGDILFDLRLGPLNPFLLHLSQMYNGWVGNMRVRVMLAGNAFSAGKIIICCVPPGFESQNISIGQATMFPVHIADVRVL  
EPIEVPLDDVRNVLFHTNENRPTMRLLCMLYTPLRAGGASSGTDPFVIAGRVLTCPAPDFNFLFLVPPSVEQKTRQLTIPNI  
PLNNLANSRVPAMINKMTVSADQNQVVQFQNGRCTLEGQLLGTTPVSANQVARIRGKVFTNSGTGLNLTEVDGTPYH  
AFESPAPLGFDPDIGNCDWHVYAFKVNQNTGDPMYRLDITQNSFAPHLGSIEFSSENHPSGDQLGLTLTWISPLNNASRV  
DPWKIPTYGSTLTESTNLAPPIFPFGGEAIVYFMSDFPIVSGNTAQIPCTLPQEFVSSFVEQQAPIRGEAALLHYVDPDTHR  
NLGEFKLYPDGFITCVPNTGGGPQNLPSNGVVFSSWVSRYQLKPVGTTGPVRRLGVRV

**Figure 16B**

Nucleic acid sequence of human codon-optimized VP1 GI.7/GA5043/USA/2014 VP1 (SEQ ID NO:175)

ATGATGATGGCCAGCAAGGACGCTCCGAGTAACATGGACGGCACTTCGGGCGCGGGGAGCTGGTGCC  
CGAGGTCAATGCCGAGAACCACTTCCTCTTGAGCCCGTCGTTGGCGCCGCCACAGCTGTCGCAACTGCA  
GGCCAAGTCAATATGATCGACCCGTGGATAATGAACAATTTCTGTTAGGCACCCAGGAAGGAGAATTCACC  
ATCTCCCCAATAACACCCCAGGGGATATTCTGTTTGACCTCAGGTTAGGACCCCACTTGAACCCCTTCT  
GCTTCATCTCTCACAAATGTATAATGGCTGGGTGCGGAATATGCGCGTGCGGGTGATGCTAGCCGGCAA  
TGCTTTTTCTGCAGGCAAGATTATCATTTGCTGCGTTCTCTGGATTGCAATCTCAAATATCAGCATTG  
GTCAAGCAACCATGTTTCCACATGTGATCGCTGATGTTGCGTCCTGGAACCCATTGAAGTTCCTCTCGAC  
GACGTGAGAAATGTTCTCTTCCACACCAACGAGAATAGGCCGACTATGAGACTTCTGTGTATGCTCTACA  
CCCCATTAAGAGCCGGGGGAGCATCCTCAGGTAAGTACCCATTTGTGATTGCCGGGCGGGTGCTCACAT  
GCCCCGCTCCAGACTTTAACTTCCTTTTCTTGGTGCCACCCAGTGTTGAACAGAAAACAGACAGCTCACC  
ATCCCAAATATCCCATTTGAACAATCTCGCCAACAGCAGGGTGCCAGCAATGATAAAACAAAATGACAGTCA  
GTGCTGACCAGAACCAGGTAGTCCAGTTTCAGAACGGCAGATGCACGCTTGAAGGCGCAACTGCTTGGGA  
CGACCCAGTCTCCGCGAACCAGGTGGCCCGAATCCGGGGTAAAGTCTTCAGTACAACTCCGGCACTG  
GCCTTAACCTCACAGAGGTTGACGGCACTCCCTATCATGCTTTTGAGTCTCCAGCCCCTCTTGGCTTTCCC  
GATATAGGCAACTGTGACTGGCAGCTTTATGCGTTTAAAGTAAACCAGAACACCGGCGATCCTATGTATA  
GGTTGGATATAACACAAGGTAATTCATTCGCCCCACACTTGGGTAGCATCGAGTTCAGTTCAGAGAACCA  
TCCGAGTGGTGATCAGCTAGGCACATTGACGTGGATCAGCCCTCTGAATAACGCATCAAGAGTGGATCC  
CTGGAAGATCCCTACCTATGGGTCCACTCTGACAGAGAGCACAAATTTGGCTCCGCCCATTTTCCCACCCG  
GATTCGGCGAGGCCATAGTGTACTTTATGTCTGACTTTCCTATCGTCAGCGGGAATACAGCCCAGATTCT  
TGCACACTGCCACAAGAATTCGTCTCATCTTTGTAGAGCAGCAGGCACCTATTCAGGTTGAGGCCGCC  
TCTTGCACTACGTGGACCCTGACACCCACCGCAATCTTGCGAGTTTAAGCTGTACCCTGACGGGTTTATT  
ACCTGTGTACCCAACACCGGCGGCGGCCACAAAATTTGCCAGCAATGGCGTGTTTGTCTTTTCTCTTG  
GGTGTCTCGATACTACCAGCTTAAACCTGTCGGAACCTACGGGCCCCGTGCGACGACTCGGCGTGAGGCG  
GGTGTGA

**Figure 16C**

Amino acid sequence of GII.1\_Ascension208\_2010\_USA\_AFA55174 native VP1 (SEQ ID NO: 13)

MKMASNDAAPSNDGAAGLVPEVNNETMALEPVAGASIAAPLTGQNNVIDPWIRNMNFVQAPNGEFTVSPRNSPGEVLL  
NLELGPELNPFLAHLRMYNGYAGGVEVQVLLAGNAFTAGKLVFAAIPPHFPLENLSPGQITMFPVHIIDVRTLEPVLLPLP  
DVRNNFFHYNQPEPRMRLVAMLYTPLRSNGSGDDVFTVSCRVLTRPSPDFDFNYLVPPTVESKTKPFTLPILTIGELSNS  
RFPVPIDELYTSPNEGVVQPNQGRSTLDGELLGTTQLVPSNICALRGRINAQVPDDHHQWNLQVTNANGTSFDPTEDEV  
PAPLGTPDFLANIYGVTSQRNPDNTRAHDGVLATWSPKFTPKLGSVVLGTWEESDLNLQPTRFTPVGLYDTHGFDQ  
WVLPNYSGRRLTLNMNLAPSVAPLFPGEQILFFRSHIPLKGGTSNGAIDCLLPQEWIQHFYQESAPSPTDVALIRYTNPDG  
RVLFEAKLHRQGFITVANSGRPIVPPNGYFRFDSWVNQFYS LAPMGTGNGRRRVQ

**Figure 17A**

Amino acid sequence of VP1 GII.2\_CGMH47\_2011\_TW\_AGT39206 (SEQ ID NO: 14)

MKMASNDAAPSTDGAAGLVPESNNEVMALEPVAGAALAAPVTGQTNIIDPWIRANFVQAPNGEFTVSPRNSPGEVLL  
 NLELGPELNPYLAHLARMYNGYAGGMEVQVMLAGNAFTAGKLVFAAVPPHFPVENLSPQQITMFPHVIIDVRTLEPVLL  
 PLPDVRNNFFHYNQKDDPKMRIVAMLYTPLRSNGSGDDVFTVSCRVLTRPSPDFDFTYLPPTVESKTKPFTLPILTLELS  
 NSRFPVSIDQMYTSPNEVISVQCQNGRCTLGDELQGTTLQVSGICAFKGEVTAHLHDNDHLYNVITITNLNGSPFDPSSED  
 IPAPLGVPDFQGRVFGVISQRDKHNTPGHNEPANRAHDAVPTYTAQYTPKLGQIQIGTWQTDLTVNQPVKFTPVGL  
 NDTDFHNQWVVPYAGALNLTNLAPSVAPVFPGERLLFFRSYIPLKGGYGTPAIDCLLPQEWVQHFYQEAAPSMSEVA  
 LVRYINPDTGRALFEAKLHRAGFMTVSSNTSAPVVVPANGYFRFDSWVNQFYS LAPMGTGNRRRIQ

**Figure 17B**

Nucleic acid sequence of human codon-optimized VP1 GII.2 CGMH47 2011 TW AGT39206 (SEQ ID NO: 40)

ATGAAGATGGCATCCAACGACGCCGACCCAGCACAGACGGAGCTGCCGGATTGGTACCCGAGTCTAATAACGAG  
 GTGATGGCCTTGAGCCTGTTGCAGGGGCTGCCCTGCAGCTCCTGTGACCGGGCAGACAAATATCATCGATCCTTG  
 GATTAGAGCTAATTTCTGCAAGCCCCAAATGGGGAGTTTACGGTCAGCCCTAGAAATAGCCCTGGGGAAGTGCTC  
 CTAATCTCGAGCTGGGACCAGAACTTAATCCGTACCTGGCTCACCTGGCCCGGATGTACAATGGATATGCAGGAG  
 GGATGGAGGTGCAGGTTATGCTGGCTGGCAATGCCTTTACAGCAGGCAAACTCGTTTTCGCAGCCGTCCCTCCCCAC  
 TTCCCAGTTGAAAATCTTTCCCTCAGCAGATTACCATGTTTCCCATGTCATCATCGATGTGCGTACCCTGGAACCTG  
 TGCTGTTGCCTTTACCAGACGTGCGGAATAATTTCTTTCACTATAATCAGAAGGATGACCCAAAAATGCGGATCGTTG  
 CGATGCTTTATACTCCCTGCGTAGCAATGGTAGTGGGGATGACGTTTTTACAGTGAGTTGTCGGGTACTAACTCGC  
 CCTTACCAGACTTCGACTTTACGTACTTGGTGCCTCCCACTGTCGAAAGCAAACTAAGCCATTCACTTCCCATCC  
 TCACCCTCGGAGAACTCTCGAACTCCCGCTTCCCTGTTCAATTGATCAGATGTACACGTCTCCAAATGAAGTCATTTT  
 TGTGCAGTGTGAGAACGGCAGGTGCACCTTAGACGGTGAAGTGCAGGGGACAACGCAGTTGCAGGTGAGTGAAT  
 TTGCGCCTTTAAGGGCGAAGTGACAGCTCACCTCCACGACAACGATCATCTCTACAATGTTACTATTACTAATCTCAA  
 TGGAAGTCCTTTGACCCCTCGGAAGATATTTCCGCTCCACTCGGAGTACCTGACTTTCAGGGACCGCTCTTCGGCG  
 TGATATCACAACGAGATAAGCATAACACACCCGGACATAATGAGCCAGCCAATAGAGCCACGACGCAGTCGTTCC  
 GACCTATACGGCTCAGTACACCCCAAAGCTCGGCCAGATACAAATCGGGACTTGGCAGACCGATGACCTCACTGTG  
 AATCAACCTGTGAAATCACTCCAGTAGGTCTGAATGATACAGACCACTTTAACCAGTGGGTGGTCCCTAGATACGC  
 CGGAGCCTTGAACCTAAACCTAACCCTTGCCCTTCCGTTGCACCTGTGTTTCCGGGGGAGCGGTTGCTCTTCTTTAG  
 AAGCTATATTCCTGTAAGGGCGGGTATGGTACTCCAGCAATCGACTGCCTGCTACCTCAGGAGTGGGTTCACATT  
 TCTATCAAGAGGCCGCACCTAGTATGAGCGAGGTGGCTTTGGTCAGATACATCAATCCAGACACAGGAAGAGCACT  
 GTTCGAGGCCAAGCTGCACAGAGCCGGCTTCATGACCGTCTCATCAATACATCCGACCCGTAGTAGTCCCCGCCA  
 ACGGGTACTTCAGATTGACAGTTGGGTGAATCAGTTTTACTCGTTGGCCCCCATGGGCACAGGGAACGGTCGCCG  
 ACGGATCCAGTAA

**Figure 18A**

Amino acid sequence of VP1 GII.3\_Jingzhou\_2013402\_CHN\_AGX01095 (SEQ ID NO: 15)

MKMASNDAAPSNDAAGLVPEISSEAMALEPVAGAAIAAPLTGQQNIIDPWIMNNFVQAPGGFTVSPRNSPGEVLLN  
LELGPEINPYLAHLARMYNGYAGGFVQVVLAGNAFTAGKIIFAAIPPNFIDNLSAAQITMCPHVIVDVRQLEPVNLPMP  
DVRNNFFHYNQGSDSLRLIAMLYTPLRANNSGDDVFTVSCRVLTRPSPDFSFNFLVPPTVESKTKPFSLPILTISEMSNSRF  
PVPIDSLHTSPTENIVVQCQNGRVTLDGELMGTQQLPSQICAFRGTLTRSTSRSASDQADTATPRLFNYYWHIQLDNLNG  
TPYDPAEDIPAPLGTPDFRGKVFVGASQRNPDATTRAHEAKIDTTSGRFTP KLSLEISTESGDFDQNPTRFTPVGIGVD  
HEPDFQQWALPDYAGQFTHNMNLAPAVAPNFPGEQLLFFRSQLPSSGGRSNGILDCLVPQEWVQHFYQESAPSQTQV  
ALVRYVNPDTGRVLFEAKLHLRFMTIAKSGDSPITVPPNGYFRFESWVNPFTLAPMGTGNRRRIQ

**Figure 18B**

Nucleic acid sequence of human codon-optimized VP1 GII.3\_Jingzhou\_2013402\_CHN AGX01095  
(SEQ ID NO: 45)

ATGAAAATGGCTTCCAACGATGCAGCACCTCTAATGATGGCGCTGCCGACTTGTGCCGGAGATTAGCTCTGAGG  
CTATGGCCCTAGAACCAGTAGCCGGGGCAGCCATAGCTGCCCCACTGACTGGCCAGCAGAATATCATTGACCCCTG  
GATAATGAACAATTTCTGTCAGGCACCGGGGGGAGAATTCACGGTCTCTCCTCGAAACTCCCCGGGGAGGTTCTCT  
TGAATTTGGAAGTGGGCCCTGAAATTAATCCTTATCTGGCCCATCTAGCCCGAATGTACAACGGCTACGCCGGAGGT  
TTCGAGGTCCAGGTGGTCTCGCTGGTAACGCCTTCACAGCTGGCAAGATCATTTTTGCAGCAATCCCTCCAACTTC  
CCTATCGATAATCTTAGTGCCGCCCAGATCACAATGTGCCCTCACGTTATCGTAGATGTGAGGCAGCTGGAACCTGT  
CAATCTCCCAATGCCCCAGCTGCGCAACAACCTCTTTCACTATAACCAGGGATCTGACTCCCGCCTTCGCCTTATCGCT  
ATGCTGTACACCCCTCTGAGGGCTAACAATCCGGAGATGACGTTTTCACTGTGAGTTGTCGAGTCTGACACGTCC  
ATCTCCTGACTTTAGCTTTAATTTCTCGTGCCCCCACAGTGGAATCCAAAATAAGCCATTCTCTCTGCCAATTCTT  
ACCATTAGCGAAATGTGAATAGTAGGTTCCCGGTGCCCATAGATTCACTGCATACCAGTCCAACAGAAAACATCGT  
CGTACAGTGTGAGAACGGACGCGTACTCTGACGGGGAGCTTATGGGCACTACCCAGCTGCTGCCAGCCAGATA  
TGCGCCTTCCGCGGCACACTGACTAGAAGCACTTCGCGTGCTTCTGACCAGGCAGATACAGCTACACCAAGGCTGT  
CAATTATTATTGGCATATACAACCTCGATAATCTGAATGGCACTCCTTATGACCCAGCCGAGGACATCCCCGCCCCACT  
TGGCACCCCGGACTTTAGAGGGAAGGTCTTTGGAGTGGCTTCTCAAAGAAATCCCGACGCAACCAACCCGGGCCAC  
GAGGCCAAAATCGATACTACATCAGGGCGTTTACCCCTAAGTTAGGCAGTCTGGAGATATCTACCGAAAGTGGAG  
ATTTGATCAGAACCAAGCAACCCGGTTTACCCCGTGGGAATCGGGGTTGACCACGAACCGGATTTCCAGCAGTG  
GGCTCTGCCTGATTACGCAGGCCAGTTCACACATAACATGAATCTTCCCCCGCTGTGGCCCCCACTTCCCGGGAG  
AACAACTTCTGTTTTTCAAGAGCCAATGCCTTCCAGCGGCGCGGATCTAACGGGATTTTGGACTGTCTCGTGCCCC  
AGGAATGGGTGCAGCATTTTTACCAGGAGTCCGCGCCCTCCAGACGCAGGTGGCTCTGGTTAGATATGTCAATCCC  
GACACCGGCAGGGTGCTATTTGAGGCAAAGCTGCACAAGCTTCGCTTTATGACTATCGCTAAGAGCGGTGATTCGCC  
TATTACAGTGCCCCCAACGGATACTTCAGATTTGAGAGTTGGGTGAACCCATTCTATACCCTGGCCCCCATGGGTAC  
AGGCAATGGCAGACGGCGGATCCAGTAA

**Figure 19A**

Amino acid sequence of VP1 GII.4\_Sydney\_2012\_K4LM89 (SEQ ID NO: 16)

MKMASSDANPSDGSAAANLVPEVNNEVMALEPVVGAAIAAPVAGQQNVIDPWIRNNFVQAPGGFTVSPRNAPGEIL  
WSAPLGPDLNPYLSHLARMYNGYAGGFVQVILAGNAFTAGKVIFAAPVPPNFTEGLSPSQVTMFPHIVVDVRQLEPVLI  
PLPDVRNNFYHYNQSNPTIKLIAMLYTPLRANNAGDDVFTVSCRVLTRPSPDFDFIFLVPPTVESRTKPFVSPVLTVEEMT  
NSRFPIPLEKLFTGPSSAFVVPQPNGRCTTDGVLLGTTQLSPVNICTFRGDVTHITGSRNYTMNLASQNWNDYDPTTEEIP  
APLGTPDFVGKIQGVLTQTTTRTDGSTRGHKATVYTGSAADFAPKLGRVQFETDTRDFEANQNTKFTPVGVIQDGGTTHR  
NEPQQWVLPYSYGRNTHNVHLAPAVPTFPGEQLLFFRSTMPGCSGYPNMDLDCLLPQEWVQYFYQEAPASDVAL  
LRFVNPDTGRVLFECKLHKSQYVTVAHGTGQHDLVIPNGYFRFDSWVNQFYTLAPMGNGTGRRAV

**Figure 19B**

Nucleic acid sequence of human codon-optimized VP1 GII.4\_Sydney\_2012\_K4LM89 (SEQ ID NO:52)

ATGAAAATGGCCTCGAGTGACGCTAACCTAGTGACGGCAGCGCCGCAATCTTGTGCCTGAGGTTAATAATGAGG  
TGATGGCCCTGGAGCCTGTGGTGGGCGCAGCCATAGCAGCGCCCGTGGCCGGTCAGCAGAATGTGATTGACCCGT  
GGATACGCAACAATTTTGTCCAAGCCCCTGGTGGGGAGTTCACCGTTAGCCCGAGAAATGCGCCAGGAGAAATCCT  
GTGGTGGCCCCATTGGGACCCGATCTGAACCCCTATTTGTCACATCTCGCTCGGATGTACAACGGGTATGCCGGCG  
GATTTGAAGTGCAGGTGATTCTGGCTGGGAACGCGTTCAGTCTGGCAAAGTGATCTTTGAGCGGTGCCTCCCAAC  
TTCCCCACTGAAGGACTGTCTCCAAGCCAGGTACAATGTTTCCACACATCGTGGTGGACGTACGGCAGCTAGAGCC  
TGTCTGATTCCCTCCCTGATGTACGCAATAATTTCTACCACTACAATCAATCCAATGATCCGACCATTAAACTCATC  
GCGATGTTGTACACCCCTCTGCGCGCTAACAAATGCTGGAGACGACGTATTCACCGTGTCTGAGAGTGCTCACCAG  
ACCTTCACCAGACTTTGACTTTATCTTCTTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTTAGTGTCCCGTA  
CTCACAGTCGAGGAGATGACAAATAGCCGCTTTCCAATCCCCCTTGAGAACTGTTACAGGACCTTCTCGGCATTC  
GTGGTTCAGCCACAGAACGGACGCTGCACAACTGACGGCGTGTCTCGGAACCAACCCAGCTTAGCCCTGTTAATAT  
CTGTACGTTTAGAGGCGACGTAACCTACATAACTGGCTCACGGAATATACCATGAATCTGGCATCACAGAATTGGA  
ATGACTACGACCCAACCGAAGAGATTTCCCGCACCTTTGGAACCCCCGACTTTGTGGGAAAAATACAGGGCGTCTG  
ACACAAACCACAGAACCGATGGCTCCACACGGGGACACAAGGCAACCGTCTACACTGGCTCTGCCGATTTTGCCCC  
GAACTGGGTAGAGTGACGTTTGAACCGACACTGACCGGGACTTTGAAGCCAATCAGAATACTAAGTTACACCT  
GTAGGAGTGATTACAGGACGGGGGCACCACTACCGGAACGAGCCGCAACAATGGGTCTGCCCTCTTATAGCGGG  
AGGAATACTCATAATGTGCATTTGGCTCTGAGTGGCTCCACGTTTCCCGGGGAACAATGCTCTTTTTTCGTTCA  
ACCATGCCTGGATGCTCCGGATATCCAATATGGATCTCGATTGCTGCTCCACAGGAATGGGTGCAGTATTTTAT  
CAAGAGGCCGACCAAGCCCAATCCGACGTCGCACTTCTGCGTTCTGTAATCCAGACAGGCCGCGTGTGTTTGA  
GTGCAAATTGCACAAATCAGGATACGTTACAGTGGCTCATACTGGACAGCATGACCTGGTGATCCCACCAACGGAT  
ATTTTAGGTTGACTCCTGGGTGAATCAGTTTTATACATTAGCCCCATGGGGAATGGGACTGGCAGACGCAGGGCT  
GTCTGA

**Figure 19C**

Amino acid sequence of VP1 US96: GII.4/Dresden174/1997/DE\_AY741811 (SEQ ID NO: 27)

MKMASNDANPSDGSTANLVPEVNNEVMALEPVVGAAIAAPVAGQQNVIDPWIRNNFVQAPGGEFTVSPRNAPGEIL  
 WSAPLGPDLNPYLSHLARMYNGYAGGFEVQVILAGNAFTAGKVIFAAPVPPNFPTEGLSPSQVTMFPHIIVDVRQLEPVLIP  
 LPDVRNNFYHYNQSNDSSTIKLIAMLYTPLKANNAGDDVFTVSCRVLTRPSPDFDFIFLVPPTVESRTKPFTVPILTVEEMSN  
 SRFPIPLEKLYTGPSSAFVVQPQNGRCTTDGVLLGTTQLSAVNICTFRGDVTHIAGSHDYTMNLSQNWNNYDPTTEEIPA  
 PLGTPDFVGKIQGMLTQTTRDGSTRAHKATVSTGSVHFTPKLGSVQYTTDTNNDFTGQNTKFTPVGVIQDGNHQN  
 EPQQWVLPNYSGRGTGHNHVLAPAVAPTFPGEQLLFFRSTMPGCSGYPNMNLDCLLPQEWVQHFYQEAAPAQSDVALL  
 RFVNPDTGRVLFECKLHKSGYVTVAHGTGPHDLVIPPNGYFRFDSWVNQFYTLAPMGNGAGRRRAL

**Figure 19D**

Amino acid sequence of VP1 FH02: GII.4/FarmingtonHills/2002/US\_AY502023 (SEQ ID NO: 28)

MKMASNDANPSDGSTANLVPEVNNEVMALEPVVGAAIAAPVAGQQNVIDPWIRNNFVQAPGGEFTVSPRNAPGEIL  
 WSAPLGPDLNPYLSHLARMYNGYAGGFEVQVILAGNAFTAGKIIFAAPVPPNFPTEGLSPSQVTMFPHIIVDVRQLEPVLIP  
 LPDVRNNFYHYNQLNDPTIKLIAMLYTPLRANNAGEDVFTVSCRVLTRPSPDFDFIFLVPPTVESRTKPFTVPILTVEEMTN  
 SRFPIPLEKLFTGPSGAFVVQPQNGRCTTDGVLLGTTQLSPVNICTFRGDVTHIAGTHNYTMNLSQNWNNYDPTTEEIPA  
 PLGTPDFVGRIQGMLTQTTRDGSTRGHKATVSTGVDVHFTPKLGSIQFNTDTNNDFTGQNTKFTPVGVVQDGNHGH  
 QNEPQQWVLPNYSGRGTGHNHVLAPAVAPTFPGEQLLFFRSTMPGCSGYPNMNLDCLLPQEWVQHFYQEAAPAQSDV  
 ALLRFVNPDTGRVLFECKLHKSGYVTVAHGTGQHDLVIPPNGYFRFDSWVNQFYTLAPMGNGTGRRRAL

**Figure 19E**

Amino acid sequence of VP1 Hnt04:GII.4/Hunter-NSW504D/2004/AU\_DQ078814 (SEQ ID NO: 29)

MKMASNDATPSDGSTANLVPEVNNEVMALEPVVGAAIAAPVAGQQNVIDPWIRNNFVQAPGGEFTVSPRNAPGEIL  
 WSAPLGPDLNPYLSHLARMYNGYAGGFEVQVILAGNAFTAGKIIFAAPVPPNFPTEVLSPSQVTMFPHIIVDVRQLEPVLIP  
 LPDVRNNLYHYNQSNDSPTIRLIAMLYTPLRANNAGDDVFTVSCRVLTRPSPDFDFIFLVPPTVESRTKPFVSPILTVEEMTN  
 SRFPIPLEKLFTGPSSAFVVQPQNGRCTTDGVLLGTTQLSPVNICTFRGDVTHIAGTQNYTMNLSQNWNNYDPTTEEIPA  
 PLGTPDFVGRIQGVLTQTTRRDGSTRGHKATVSTGSVHFTPKLGSVQFSTDTNDFETGQNTKFTPVGVVQDGSSTTHQN  
 EPQQWVLPDYSGRDSHNHVLAPAVAPTFPGEQLLFFRSTMPGCSGYPNMNLDCLLPQEWVQHFYQESAPAQSDVALL  
 RFVNPDTGRVLFECKLHKSGYVTVAHGTGQHDLVIPPNGYFRFDSWVNQFYTLAPMGNGAGRRRAL

**Figure 19F**

Amino acid sequence of VP1 2006b: GII.4/Shellharbour-NSW696T/2006/AU\_EF684915 (SEQ ID NO: 30)

MKMASNDANPSDGSAAANLVPEVNNEVMALEPVVGAAIAAPVAGQQNVIDPWIRNNFVQAPGGFTVSPRNAPGEIL  
WSAPLGPDLNPLYSLARMYNGYAGGFVQVILAGNAFTAGKIIFAAVPPNFPTEGLSPSQVTMFPHIIVDVRQLEPVLIP  
LPDVRNNFYHYNQSNDSITIKLIAMLYTPLRANNAGEDVFTVSCRVLTRPSPDFDFIFLVPPTVESRTKPFTVPILTVEEMTNS  
RFPIPLEKLTGPSTAFVVPQNGRCTTDGVLGTTQLSPVNICTFRGDVTHIAGSRNYTMNLASLKWNYDPTTEEIPAPL  
GTPDFVGKIQGVLTQTTKGDGSTRGHKATYTGSAFPTPKLGSVQFSTDTENDFETHQNTKFTPVGVTDGSGTTHRNEPQ  
QWVLPSSYGRNVHNVHLAPAVAPTFPGEQLLFFRSTMPGCSGYPNMDLCLLPQEWVQHFYQEAAPAQSDVALLRFV  
NPDTGRVLFECKLHKSGYVTVAGTGQHDLVIPPNGYFRFDSWVNQFYTLAPMGNGTGRRRAL

**Figure 19G**

Amino acid sequence of VP1 NO9: GII.4/Orange-NSW001P/2008/AU\_GQ845367 (SEQ ID NO: 31)

MKMASSDANPSDGSTANLVPEVNNEVMALEPVVGAAIAAPVAGQQNVIDPWIRNNFVQAPGGFTVSPRNAPGEIL  
WSAPLGPDMNPYLSHLARMYNGYAGGFVQVILAGNAFTAGKIIFAAVPPNFPTEGLSPSQVTMFPHIIVDVRQLEPVLIP  
PLPDVRNNFYHYNQSNDSITIKLIAMLYTPLRANNAGDDVFTVSCRVLTRPSPDFDFIFLVPPTVESRTKPFVSPILTVEEMT  
NSRFPIPLEKLTGPSSAFVVPQNGRCTTDGVLGTTQLSPVNICTFRGDVTHIAGSRNYTMNLASQNWNSYDPTTEEIPA  
PLGTPDFVGKIQGVLTQTRTDGSTRGHKATVYTGSAFSPKLGRVQFATDTDNDFDANQNTKFTPVGVTDGNTAHR  
NEPQQWVLPSSYGRNTHNVHLAPAVAPTFPGEQLLFFRSTMPGCSGYPNMDLCLLPQEWVQFYFYQEAAPAQSDVAL  
LRFVNPDTGRVLFECKLHKSGYVTVAGTGQHDLVIPPNGYFRFDSWVNQFYTLAPMGNGTGRRRAL

**Figure 20**

Amino acid sequence of VP1 GII.5\_Alberta\_2013\_CA\_ALT54485 (SEQ ID NO: 17)

MKMASNDATPSNDGAAGLVPESNNEAMALEPVVGASLAAPVTGQTNIIDPWIRTNFVQAPNGFTVSPRNSPGEILVN  
LELGPENPYLAHLARMYNGYAGGMEVQVLLAGNAFTAGKIIFAAVPPYFPVENLSPSQITMFPHVVIDVRTLEPVLPMMP  
DVRSTLFHFNQKDEPKMRLVAMLYTPRSNGSGDDVFTVSCRILTRPSPEFDFTYLPPTVESKTKPFTLPVLTGELSNSRF  
PLSIDEMVTPSNESIVVQPQNGRVTLTGELLGTTQLQACNICSIRGKVTGQVPNEQHMWNLEITNLNGTQFDPTDDVPA  
PLGVPDFAGEVFGVLSQRNRGESNPANRAHDAVVATYSKYTPKLGLVQIGTWNTNDVENQPTKFTPIGLNEVANGHR  
FEQWTLPRYSGALTNMNLAPAVAPLFPGERLLFFRSYVPLKGGFGNPAIDCLVPQEWVQHFYQESAPSLGDVALRVV  
NPDTGRVLFEAKLHKGGFLTVSSTSTGPVVVPANGYFRFDSWVNQFYS LAPMGNGTGRRRRFQ



**Figure 22**

Amino acid sequence of VP1 GII.7\_Musa\_2010\_AII73774 (SEQ ID NO: 18)

MKMASNDAAPSNDGAAGLVPEINNEVMPLPVAGASLATPVVGQQNIIDPWIRNNFVQAPAGEFTVSPRNSPGEILLD  
LELGPELNPLYLAHLARMYNGHAGGMEVQIVLAGNAFTAGKIIFAAIPPGFPYENLSPSQITMCPHVIIDVRQLEPVLLPMP  
DIRNNFFHYNQGNPKRLIAMLYTPLRANNSGDDVFTVSCRVLTKPSPDFEFTFLVPPTVESKTKQFTLPILKISEMTNSRF  
PVPVEMMYTARNENQVVQPQNGRVTLTGELLGTTPLAVNICKFKGEVIAKNGDVRSYRMDMEITNTDGTDPIDPTEDT  
PGPIGSPDFQILFGVASQRNKNEQNPATRAHEANINTGGDQYAPKLAQVKFFSESQDFEVHQPTVFTPVGVAGDTSHP  
FRQWVLPYRGHLLTNTHLAPAVAPLPGEQILFFRSQIPSSGGHELGYMDCLVPQEWVQHIFYQEATAQSEVALIRFIN  
PDTGRVLFKAKLHKQGFITVAHTGDNPIVMPPNGYFRFEAWVNQFYSLAPVGTGNGRRRIQ

**Figure 23A**

Amino acid sequence of VP1 GII.12\_HS206\_2010\_USA\_AEI29586 (SEQ ID NO: 19)

MKMASNDAAPSNDGAAGLVPEVNNETMALEPVAGASIAAPLTGQNNVIDPWIRLNFVQAPNGEFTVSPRNSPGEVLL  
NLELGPELNPLYLAHLARMYNGYAGGVEVQVLLAGNAFTAGKLVFAAVPPHPLENISPGQITMFPHVIIDVRTLEPVLLPLP  
DVRNNFFHYNQNEPRMRLVAMLYTPLRSNGSGDDVFTVSCRVLTRSPDFDFNYLVPPTVESKTKPFTLPILTIGELTNS  
RFPVPIDELYTSPNESLVVQPQNGRCALDGELQGTQLLPTAICSFGRINQKVS GENHVVNMQVTNIDGTPFDPTEDV  
PAPLGTPDFSGKLFGLVLSQRDHDNACRSHDAVIATNSAKFTPKLGAIQGTWEQDDVHINQPTKFTPVGLFESEGFNQW  
TLPNYSGALTINMGLAPPVAPTFPGEQILFFRSHIPLKGGVADPVIDCLLPQEWIQHLYQESAPSQTDVALIRFTNPDTGRV  
LFEAKLHRSYITVANTGSRPIVVPANGYFRFDSWVNQFYSLAPMGTGNGRRRVQ

**Figure 23B**

Human codon-optimized VP1 GII.12\_HS206\_2010\_USA\_AEI29586 (SEQ ID NO: 87)

ATGAAGATGGCGTCTAATGATGCTGCTCCTTCCAATGATGGCGCAGCCGGCCTGGTCCCTGAAGTGAATAACGAGA  
CTATGGCTCTCGAACCGTGCCCGGAGCCTCAATTGCCGCCCCCTCACTGGCCAGAACAACGTGATTGATCCCTGG  
ATCAGACTGAACTTCGTTAGGCTCCTAATGGGGAGTTCACCGTGCCCCGAGAACTCCCCGGCGAAGTGTTATT  
GAATTTGGAATTAGGACCAGAACTCAACCCCTATCTGGCACATCTGTCTCGGATGTACAACGGCTATGCGGGCGGA  
GTGGAGGTGCAAGTCTTCTCGCTGGTAATGCATTACAGCAGGAAAATTAGTATTTGCAGCGGTTCCACCCCATTTT  
CCACTTGAAAACATAAGCCCAGGCCAGATCACCATGTTCCCTCACGTGATAATCGACGTGCGGACATTAGAGCCCGT  
GCTGCTACCCCTGCCCGACGTGAGGAACAATTTCTTCACTACAATCAGCAAAATGAACCAAGATGCGCCTGGTCG  
CCATGCTCTATACTCCTTTAAGAAGTAATGGCAGTGGGGATGACGTGTTTACTGTTAGCTGTCGGGTGCTCACCCGA  
CCTTCCCAGATTTGACTTCAATTATCTGGTCCCCCAGGGTAGAGTCCAAAACAAAGCCTTCACTCTTCCAATCC  
TTACAATTGGCGAACTGACCAACTCACGCTTTCAGTGCCTATTGATGAGCTGTACACAAGTCCAATGAATCCCTTG  
TCGTTACGCCACAGAATGGGCGCTGCGCGCTTGACGGTGAGCTCCAGGGCACAACACAAGTGTGCAACCGCTAT  
ATGCTCTTTCAGGGGGCGTATTAATCAGAAGGTCTCCGGGGAGAACACGTGTGGAACATGCAAGTGACGAATATC  
GACGGGACACCTTTCGATCCAACAGAGGATGTCCAGCGCCTTAGGTACCCCTGACTTCTCAGGCAAGTTGTTCCG  
CGTCTTTCCAGCGCGACCATGATAATGCTTGCCGGAGCCACGATGCCGTCATTGCCACCAACTCAGCCAAATTCAC  
CCCCAAACTTGAGCGATACAGATCGGAAGTGGGAACAAGACGACGTCCATATCAACCAACCAACAAAGTTTACCC  
CTGTTGGCCTTTTCAAAAGCGAAGGCTTTAACCAGTGACACTTCCAATTACAGCGGGGCTCTCACTCTTAATATGG  
GACTCGCACCCACCGTCGCTCCAACGTTTCTGGTGAGCAGATTTTGTTCCTCCGAGTCATATCCACTGAAGGGTG  
GAGTTGCTGATCCCGTGATAGACTGCCTCCTCCCTCAGGAATGGATTACAGCACTTGATCAGGAGTCCGCTCCCTCGC  
AGACCGATGTGGCCCTGATACGCTTCAAAACCCGATACCGGAAGAGTGTTGTTGAAGCTAACTTCATCGCTCC

**Figure 23B (cont)**

GGTTACATCACAGTAGCCAACACGGGTTCCAGGCCAATCGTAGTTCGGCAAACGGATACTTTCGATTCGACAGTTG  
GGTCAATCAGTTCTACAGCCTGGCTCCAATGGGAACAGGAAATGGGAGGAGGCGTGTGCAGTAA

**Figure 24A**

Amino acid sequence of VP1 GII.13\_VA173\_2010\_H9AWU4 (SEQ ID NO: 22)

MKMASNDAAPSNDGAASLVPEAINETMPLEPVAGASIAAPVAGQTNIIDPWIRTNFVQAPNGEFTVSPRNS  
PGEILLNLELGPDLNPLYLAHLSRMYNGYAGGVEVQVLLAGNAFTAGKILFAAIPPNFVDMISPAQITMLPHLI  
VDVRTLEPIMIPDPVRNVFYHFNNQPQPRMRLVAMLYTPLRSNGSGDDVFTVSCRVLTRPTPDFEFIYLVPP  
SVESKTKPFTLPILTISELTNSRFPISIEQLYTAPNENNVVQCQNGRCTLGELQGTQQLSSAVCSYRGRTVANS  
GDNWDQNVQLTYPSGASYDPTDEVPAPLGTQDFSGILYGVLTQDNVRENTGEAKNAKGVIYSTSGKFTPK  
IGSIGLHSITEDVRPNQQSRFTPVGVAQNENTPFQQWVLPHYAGALALNTNLAPAVAPTFPGEQLLFFRSRVP  
CVQGLQGQDAFIDCLLPQEWVNHFYQEAAPSQADVALIRYVNPDTGRTLFEAKLHRSGFITVSHTGAYPLVV  
PPNGHFRFDSWVNQFYSLAPMGTGNRRRVQ

**Figure 24B**

Nucleic acid sequence of human codon-optimized VP1 GII.13\_VA173\_2010\_H9AWU4 (SEQ ID NO: 23)

ATGAAATGGCTTCTAATGATGCCGCGCCAGCAATGATGGTGCCGCCAGCCTTGTCGCCGAAGCAATTAACGAGA  
CAATGCCCTTGGAGCCAGTCGCCGGGGCTTCTATTGCGGCCCCAGTTGCTGGACAGACGAATATCATCGATCCTTGG  
ATACGGACTAATTTGTTCAGCTCCTAACGGAGAGTTCACTGTCTCCCCCGTAATAGTCCTGGCGAGATCCTGTTG  
AACCTCGAGTTGGGGCCAGATCTCAATCCTTACCTGGCTCATCTGTCGAGAATGTACAACGGGTACGCGGGGGGGG  
TTGAGGTGCAGGTCTTACTGGCAGGTAACGCATTACAGCAGGCAAGATTCTGTTTGCGCCATCCCTCCTAATTTTC  
CAGTGGATATGATATCTCCAGCACAGATTACAATGCTGCCCCATTTGATAGTGGATGTGCGGACACTTGAACCTATC  
ATGATCCCTTTGCCGATGTCCGAAATGTGTTTTATCATTTCAACAACCGCCGAGCCAAGAATGCGTCTCGTCGCG  
ATGCTGTACACCCGTTGCGGTCCAACGGCTCTGGCGATGATGTTTTACAGTGTCGTGTCGAGTGTTAACCCGCCCT  
ACCCAGATTTTGAAGTTATATCTAGTTCCCCCTTGTGGAAAGCAAGACTAAACCTTTACTCTTCCCATCTGA  
CTATATCCGAGCTTACCAACTCCCGGTTCCCATCTCAATCGAGCAACTGTACACTGCACCCAACGAGAACAAACGTAG  
TCCAGTGCCAGAACGGGAGATGTACCCTGGACGGGGAGCTCCAAGGGACCACGCAACTGTTAAGTTCAGCCGTTTG  
CAGTTACAGAGGCAGGACTGTGGCGAACTCTGGTGATAACTGGGATCAAAATGTGTTGCAGCTGACTTACCCATCC  
GGCGCAAGCTACGATCCAACAGATGAGGTGCCAGCGCCCCCTTGGCACACAGGATTTCTCAGGAATTCTATACGGGG  
TGCTTACTCAGGATAATGTGCGAGAAAATACTGGCGAGGCCAAGAATGCTAAAGGAGTGATATAAGCACGACAAG  
CGGTAAGTTTACCCCCAAAATTGGCAGTATTGGGCTCCACAGCATTACTGAGGACGTCCGCCCAAACCGACAGTCTC  
GTTTCACTCCCGTGGGGGTGGCACAGAACGAGAACACACCTTTCCAGCAGTGGGTCTTGCCCCATTATGCAGGTGCT  
TTGGCGCTCAATACAAATCTGGCACCCGCCGTAGCGCCGACATTTCTGGGGAGCAATTGCTGTTCTTTAGAAGCCG  
CGTCCCGTGTGTTCAAGGGCTTGCAAGGCCAGGACGCGTTTCATTGATTGCCTCTTGCCCCAGGAATGGGTCAACCACT  
TTTATCAGGAGGCAGCGCCCTCTCAAGCAGATGTGGCCCTGATAAGATATGTGAATCCCGACACAGGACGGACTTT  
GTTTGAGGCAAACTCCACCGGTCAGGATTCATTACTGTGAGTCACACAGGAGCCTATCCCCTTGTTGTTCCACCTAA  
TGGCCACTTCAGGTTCTGACTCTTGGGTCAATCAGTTTTATTGCTGGCACCAATGGGTACCGGGAATGGTGCCTGC  
GGGTGCAATGA

**Figure 25**

Amino acid sequence of VP1 GII.14\_Saga\_2008\_JPN\_ADE28701 (SEQ ID NO: 32)

MKMASNDATPSDDGAAGLVPEINNEVMALEPVAGASIAAPVVGQQNIIDPWIRNNFVQAPAGEFTVSPRNSPGELLLD  
LELGPENPYLAHLARMYNGHAGGMEVQIVLAGNAFTAGKILFAAIPPSFPYENLSPAQLTMCPHVIVDVRQLEPVLLPM  
PDIRNVFYHYNQNNSPKLRLVAMLYTPLRANNSGDDVFTVSCRVLTRPSPDFQFTFLVPPTVESKTKNFTLPVLRVSEMTN  
SRFPVVDQMYTSRNENIIVQPQNGRCTTDGELLGTTILQSVSICNFKGTMQAKLNEEPYQLQLTNLDGSPIDPTDDMP  
APLGTPDFQAMLYGVASQRSSIDNATRAHDAQIDTAGDTFAPKIGQVRFKSSSNDFDLHDPTKFTPIGVNVDDQHPRQ  
WSLPNYGGHLALNNHLAPAVTPLFPGEQILFFRSYIPSAGGHTDGAMDCLLPQEWVEHFYQEAAPSQSDIALVRFINPDT  
GRVLFEAKLHKQGLTIAASGDHPVIMPTNGYFRFEAWVNPFTLAPVGTGSGRRRIQ

**Figure 26A**

Amino acid sequence of VP1 GII.17\_Kawa\_2014\_A0A077KVU6 (SEQ ID NO: 24)

MKMASNDAAPSNDGAAGLVPEGNNETLPLEPVAGAAIAAPVTGQNNIIDPWIRTNFVQAPNGEFTVSPRNS  
PGEILLNLELGPDLNPYLAHLARMYNGYAGGVEVQVLLAGNAFTAGKILFAAVPPNFPVEFLSPAQITMLPHLI  
VDVRTLEPIMIPLDVRNTFFHYNNQPNRMRVLAMLYTPLRSNGSGDDVFTVSCRVLTRPTPDFEFTYLVPP  
SVESKTKPFSLPILTSELTSRFPVPIDSLFTAQNNVLQVQCQNGRCTLDGELQGTQQLPSGICAFRGRVTAE  
TDHRDKWHMQLQNLNGTTYDPTDDVPAPLGTPDFKGVVFVGASQRNVGNDAPGSTRAHEAVISTYSPQFV  
PKLGSVNFRSNDNDFQLQPTKFTPVGINDDGDHPFRQWELPDYSGLLTLMNMLAPPVAPNFPGEQLLFFRSF  
VPCSGGYNQGIVDCLIPQEWIQHFYQESAPSQSDVALIRYVNPDTGRTLFEAKLHRSGYITVAHSGDYPLVPA  
NGYFRFDSWVNQFYS LAPMGTGNRRRAQ

**Figure 26B**

Human codon-optimized VP1 GII.17\_Kawa\_2014\_A0A077KVU6 (SEQ ID NO: 25)

ATGAAAATGGCATCTAACGACGCAGCCCCCTCAAACGATGGCGCTGCTGGACTCGTGCCGGAGGGGAATAATGAG  
ACACTTCCACTAGAGCCGGTTGCAGGCGCCGCTATAGCTGCCCCAGTGACAGGGCAGAATAATATTATAGACCCTTG  
GATTCGGACAAACTTCGTGCAGGCACCCAACGCGCAGTTTACAGTATCCCCCGGAACCTCCAGGTGAGATACTCC  
TGAATCTTGAGCTCGGCCCTGACCTCAATCCATATCTGGCTCATCTGAGCCGCATGTACAATGGTTACGCTGGGGGG  
GTCGAAGTGCAAGTCCTCTGGCCGAAACGCCTTACCCTGGCAAAATTCTGTTGCCGCCGTTCACCAAACCTT  
CCAGTCGAATTCCTCTCTCCGCGCAAATAACCATGCTGCCACATTTGATCGTTGACGTGCGGACCTGGAGCCAATA  
ATGATTCCCCTGCCGATGTGCGTAACACCTTTTCCATTATAACAATCAGCCAACTCTCGGATGAGACTTGTTGCT  
ATGCTGTACACCCCTGCGGAGCAACGGCAGTGCGCATGATGTGTTACCCTGAGTTGCAGAGTCCTGACGCGCC  
CAACCCCGGACTTCGAGTTCACCTACCTGGTGGCCCTTCTGTGGAATCTAAGACCAAACCGTTTTCACTGCCAATCT  
TAACTCTCTCGAACTGACTAACAGCCGGTTTCCAGTACCCATAGATTCTCTTTTACCCTGCTCAAAACAACGTACTCCA  
AGTCCAGTGCCAGAACGGCCGCTGTACGCTTGATGGTGAGTTGCAGGGGACAACACAGCTACTCCCAAGTGGCATC  
TGTGCATTCCGGGGCCGCTGACCGCTGAGACAGACCATCGTGACAAATGGCACATGCAACTCCAAAACCTAAACG  
GGACCACCTACGACCAACCGACGACGTCCTGCTCCGCTAGGGACTCCTGACTTTAAGGGGGTGGTGTTCGGAGT  
GGCCTCTCAGCGGAATGTTGGGAATGACGCCCCGGCTCTACCCGAGCTCACGAGGCCGTATCTCAACATATAGCC  
CCCAATTTGTGCCAAGCTCGGATCCGTTAATTTTCGTAGTAACGACAACGACTTCCAACGCAACGAAGTTTA  
CGCCAGTGGGGATTAATGATGATGGAGACCATCTTTCCGCAATGGGAACCTACCAGATTATTCTGGGCTGCTCACC  
CTCAATATGAACCTCGCCCCACCGTGGCCCTAATTTCCCGGTGAGCAGCTGCTGTTTTTCGGAGCTTTGTGCCA  
TGCAAGTGGCGGATATAATCAAGGCATCGTAGACTGCTTGATTCCCAAGAGTGGATACAACATTTTACCAGGAAAG

**Figure 26B (cont)**

TGCGCCCTCCAGTCCGATGTGGCCCTGATACGGTACGTTAACCCCGATACCGGAAGAACATTATTCGAAGCGAAAT  
 TGCACAGATCAGGGTACATTACCGTTGCACATTCCGGCGATTATCCCCTGGTGGTCCCGCCAACGGTACTTTAGGT  
 TCGATAGTTGGGTCAACCAGTTCTATTCACTAGCCCCAATGGGCACCGGTAAACGGCAGACGCCGGGCTCAGTAG

**Figure 27**

Amino acid sequence of VP1 GII.21\_Sali\_2011\_USA\_AFC89665 (SEQ ID NO: 26)

MKMASNDAAPSNDGATGLVPEINTETLPLEPVAGAAIAAPVTGQNNIIDPWIRNNFVQAPNGEFTVSPRNSPGEILMNL  
 ELGPDNLNPLYLAHLRMYNGYAGGVEVQVLLAGNAFTAGKILFAAVPPNFPVDMLSPAQITMLPHLIVDVRTLEPIMIPLP  
 DVRNVFYHFNNQPAPRMRLVAMLYTPLRSNGSGDDVFTVSCRVLTRPTPDFEFTYLVPPSVESKTKPFTLPILTIGELTNSR  
 FPAPIDQLYTSPNADVVPQNGRCTLGDELQGTQLLTTAICSYRGMTSNPTS DYWDDHLLHLVHPNGATYDPTEDVP  
 APFGTQDFRGILYGMTQNPRTSGDEAANSHGIYISSTSEKFTPKLGTIGLHQVQGDIA SNQQSKFTPVGI AVNGNTPFRQ  
 WELPNYSGALTLNTNLAPAVGPNFPGEQILFFRSNVPSVQGGQPIEDCLIPQEWVSHFYQESAPSQSDVALVRYVNPDT  
 GRTIFEAKLHRQGFITIAATGSNPVVPPNGYFRFDSWVNQFYALAPMGTGNGRRRVQ

**Figure 28A**

Amino acid sequence of VP1\_GI.3\_Lil08\_Q84S (SEQ ID NO:98)

MMMASKDAPTNMDGTSGAGQLVPEVSTAEPISMEPVAGAATAAATAGQVNMIDPWIMSNYVQAPQGEFTISPNN  
 PGDILFDLSLGPLNPLFLSLAQMYNGWVGNMKVRVLLAGNAFTAGKIIISCVPPGFAAQNVISIAQATMFPHVIADVRV  
 LEPIEVPLEDVRNVLFHNNDSTPTMRICMLYTPLRASGSSSGTDPFVIAGRVLTCPSPDFNLFVPPNVEQKTKPFSVPNL  
 PLNVLSNSRVPSLIKSMMVSDHGMVQFQNGRVTLTGQLGTTPTSASQLCKIRGT VYHATGGQGLNLTEIDGTPYH  
 AFESPAPIGFDPDLGECDDWHINASPANAFTDGSIIHRIDVAQDSTFAPHLGTHYTNADYNANVGLICSEWLSPSGGAPK  
 VNPWAI PRYGSTL TEAAQLAPPIYPPGFGEAIVFFMSDFPIANGSDGLSVPCTIPQEFVTHFVNEQAPTRGEAALLHYVDP  
 DTHRNLGFEKLYPEGFMTCPVNSSSGSPQTLPI NGVFTFISWVS RFYQLKPVGTTGPVRRLGIRRS

**Figure 28B**

Nucleic acid sequence of human codon optimized VP1\_GI.3\_Lil08\_Q84S (SEQ ID NO:167)

ATGATGATGGCTTCCAAGGATGCTCCACAAACATGGATGGAACAAGCGGCGGGGCAACTTGTGCCGGAGGTG  
 TCCACGGCGGAACCCATTTCCATGGAACCTGTGGCCGGCGCAGCCACTGCTGCCGCCACCGCAGGACAGGTAAACA  
 TGATCGACCCCTGGATCATGTCAAATTACGTTCAAGGCTCCACAGGGGGAGTTTACCATAAGCCCAACAAACACCCCG  
 GGTGACATCTTGTGTTGACCTGAGCCTAGGACCACACTGAATCCGTTTCTGAGTCACTTGGCTCAGATGTATAATGGA  
 TGGGTTGAAAACATGAAGGTGCGCGTGCTCCTGGCGGGCAATGCATTACAGCCGGGAAGATTATTATCTCTTGCG  
 TGCCACCTGGATTGTCAGCCAGAACGTGTCTATCGACAGGCAACCATGTTTCCGCATGTCATCGCAGATGTGCGC  
 GTGCTAGAGCCCATCGAGGTGCCCTTGAGGACGTGCGCAACGTCTATTCCATAACAATGATAGCACCCCCACCAT  
 GCGCTTGATATGTATGTTATATACTCCCTCCGCGCCAGTGGGTCCAGCTCCGGGACCGATCCTTTTGTGATTGCTGG  
 GCGGGTGTTGACTTGCTAGCCCTGACTTCAACTTCCTTTTCTGGTGCCTCCAAATGTAGAACAGAAAAACAAAGCC  
 ATTCAGCGTGCCAAACCTGCCCCTAACGTGCTGTGCAATCCCGAGTGCCTTCCCTTATTAAGTCCATGATGGTATC  
 TCAGGATCACGGTCAAATGGTGCAGTTTCAGAACGGCCGAGTGACGTTAGACGGGCAGCTGCAGGGCACAACCCC  
 AACAGTGCCAGTCAGCTGTGAAGATCAGAGGCACCGTCTACCACGCAACTGGCGGACAGGGGCTGAATCTTACT  
 GAGATCGATGGTACCCCTACCATGCATTGAGTCACCTGCACCTATTGGATTTCCTGATCTTGGGGAGTGTGATTG  
 GCATATCAATGCTTCACCTGCCAACGCTTTCACAGACGGGTCTATTATTCATCGCATTGACGTAGCACAGGATAGCAC

**Figure 28B (cont)**

ATTTGCCCCGCACCTGGGTACCATCCACTATACGAACGCAGATTACAACGCAAACGTGGGTCTTATCTGTAGCCTAG  
 AGTGGCTATCTCCGCCAAGCGGTGGGGCCCCTAAAGTTAACCCATGGGCTATTCCTCGGTACGGGTCTACGCTGACT  
 GAGGCCGCTCAGCTGGCACCCTCATATATCCACCAGGATTCGGGGAAGCCATTGTTTTCTTATGTCCGATTTCCG  
 ATAGCCAACGGTTCAGATGGCCTTAGTGTCCCTTGACGATTCCACAGGAATTTGTGACACACTTCGTAAACGAGCA  
 GGCTCCTACTCGGGGCGAGGCTGCCTTGTTGCATTACGTAGACCCCGATACCCATAGAAACCTGGGCGAATTCAAAC  
 TCTACCCTGAAGGTTTCATGACCTGCGTACCTAACTCCTCCGGCAGTGGCCCTCAAACCTTGCCGATCAACGGCGTGT  
 TCACGTTTATCAGCTGGGTTTCACGGTTTACCAACTCAAGCCCCTCGGAACAACCTGGGCCAGTTCGGAGGCTCGGG  
 ATCAGACGGAGCTAG

**Figure 28C**

Amino acid sequence of VP1\_Gl.3\_Lil08\_S94L (SEQ ID NO:8)

MMMASKDAPTNMDGTSGAGQLVPEVSTAEPISMEPVAGAATAAATAGQVNMIDPWIMSNYVQAPQGEFTISPNT  
 PGDILFDLQLGPHLNPFLHLAQMYNGWVGNMKVRVLLAGNAFTAGKIIISCVPPGFAAQNVISIAQATMFPHVIADVRV  
 LEPIEVPLEDRVNLVFNNDSTPTMRLICMLYTPLRASGSSSGTDPFVIAGRVLTCPSPDFNLFVPPNVEQKTKPFVSPNL  
 PLNVLSNSRVPSLIKSMMVSDHGQMVQFQNGRVTLDGQLQGTTPTSASQLCKIRGTVYHATGGQGLNLTEIDGTPYH  
 AFESPAPIGFDPDLGECDDWHINASPANAFTDGSIIHRIDVAQDSTFAPHLGTIHYTNADYNANVGLICSLEWLSPSSGGAPK  
 VNPWAIIPRYGSTLTEAAQLAPPIYPPGFGEAIVFFMSDFPIANGSDGLSVPCTIPQEFVTHFVNEQAPTRGEAALLHYVDP  
 DTHRNLGFEKLYPEGFMTCPVNSSGSGPQTLPIINGVFTFISWVSRYQLKPVGTTGPVRRLGIRRS

**Figure 28D**

Nucleic acid sequence of human codon optimized VP1\_Gl.3\_Lil08\_S94L (SEQ ID NO:9)

ATGATGATGGCTTCCAAGGATGCTCCACAAACATGGATGGAACAAGCGGCGCGGGGCAACTTGTGCCGGAGGTG  
 TCCACGGCGGAACCCATTTCATGGAACCTGTGGCCGGCGCAGCCACTGCTGCCGCCACCGCAGGACAGGTAAACA  
 TGATCGACCCCTGGATCATGTCAAATTACGTTAGGCTCCACAGGGGGAGTTTACCATAAGCCCAAACAACACCCCG  
 GGTGACATCTTGTTTACCTGCAGCTAGGACCACACTTGAATCCGTTTCTGCTCCACTTGGCTCAGATGTATAATGGA  
 TGGGTTGAAAACATGAAGGTGCGCGTGCTCCTGGCGGGCAATGCATTACAGCCGGGAAGATTATTATCTCTTGCG  
 TGCCACCTGGATTGTCAGCCAGAACGTGTCTATCGCACAGGCAACCATGTTTCCGCATGTATCGCAGATGTGCGC  
 GTGCTAGAGCCCATCGAGGTGCCCTTGAGGACGTGCGCAACGTCCTATTCCATAACAATGATAGCACCCCCACCAT  
 GCGCTTGATATGTATGTTATATACTCCCTCCGCGCCAGTGGGTCCAGCTCCGGGACCGATCCTTTTGATTGCTGG  
 GCGGGTGTGACTTGTCTAGCCCTGACTTCAACTTCCTTTTCTGGTGCCTCAAATGTAGAACAGAAAAACAAGCC  
 ATTCAGCGTGCCAAACCTGCCCTTAACGTGCTGTGCAATTCCCGAGTGCCTTCCCTTATTAAGTCCATGATGGTATC  
 TCAGGATCACGGTCAAATGGTGCAAGTTTCAAGACGGCCGAGTGACGTTAGACGGGCAGCTGCAGGGCACAACCCC  
 AACAGTGCCAGTCAGCTGTGTAAGATCAGAGGCACCGTCTACCACGCAACTGGCGGACAGGGGCTGAATCTTACT  
 GAGATCGATGGTACCCCTACCATGCATTGAGTACCTGCACCTATTGGATTTCGGATCTTGGGGAGTGTGATTG  
 GCATATCAATGCTTACCTGCCAACGCTTTCACAGACGGGTCTATTATTCATCGCATTGACGTAGCACAGGATAGCAC  
 ATTTGCCCCGCACCTGGGTACCATCCACTATACGAACGCAGATTACAACGCAAACGTGGGTCTTATCTGTAGCCTAG  
 AGTGGCTATCTCCGCCAAGCGGTGGGGCCCCTAAAGTTAACCCATGGGCTATTCCTCGGTACGGGTCTACGCTGACT  
 GAGGCCGCTCAGCTGGCACCCTCATATATCCACCAGGATTCGGGGAAGCCATTGTTTTCTTATGTCCGATTTCCG  
 ATAGCCAACGGTTCAGATGGCCTTAGTGTCCCTTGACGATTCCACAGGAATTTGTGACACACTTCGTAAACGAGCA  
 GGCTCCTACTCGGGGCGAGGCTGCCTTGTTGCATTACGTAGACCCCGATACCCATAGAAACCTGGGCGAATTCAAAC  
 TCTACCCTGAAGGTTTCATGACCTGCGTACCTAACTCCTCCGGCAGTGGCCCTCAAACCTTGCCGATCAACGGCGTGT

**Figure 28D (cont)**

TCACGTTTATCAGCTGGGTTTACGGTTTACCAACTCAAGCCCCTCGGAACAACGGGCCAGTTCGGAGGCTCGGG  
ATCAGACGGAGCTAG

**Figure 28E**

Amino acid sequence of VP1\_Gl.3\_Lil08\_Q84S+S94L (SEQ ID NO:10)

MMMASKDAPTNMDGTSGAGQLVPEVSTAEPISMEPVAGAATAAATAGQVNMIDPWIMSNYVQAPQGEFTISPNT  
PGDILFDLSLGPLNPFLLHLAQMYNGWVGNMKVRVLLAGNAFTAGKIIISCVPPGFAAQNVISIAQATMFPHVIADVRVL  
EPIEVPLEDVRNVLFHNNDSTPTMRILCMLYTPLRASGSSSGTDPFVIAGRVLTCPSPDFNFLVPPNVEQKTKPFSVPLN  
PLNVLSNSRVPSLIKSMMVSQDHGQMVQFQNGRVTLGGQLQGTTPTSASQLCKIRGTVYHATGGQGLNLTEIDGTPYH  
AFESPAPIGFPDLGECDDWHINASPANAFTDGSIIHRIDVAQDSTFAPHLGTIHYTNADYNANVGLICSLEWLSPSGGAPK  
VNPWAIPRYGSTLTEAAQLAPPIYPPGFGEAIVFFMSDFPIANGSDGLSVPCTIPQEFVTHFVNEQAPTRGEAALLHYVDP  
DTHRNLGFEKLYPEGFMTCPVNSSGSGPQTLPIINGVFTFISWVSRYQLKPVGTTGPVRRLGIRRS

**Figure 28F**

Nucleic acid sequence of human codon optimized VP1\_Gl.3\_Lil08\_Q84S+S94L (SEQ ID NO:11)

ATGATGATGGCTTCCAAGGATGCTCCACAAACATGGATGGAACAAGCGGCGCGGGGCAACTTGTGCCGGAGGTG  
TCCACGGCGGAACCCATTCCATGGAACCTGTGGCGGCGCAGCCACTGCTGCCGCCACCGCAGGACAGGTAAACA  
TGATCGACCCCTGGATCATGTCAAATTACGTTAGGCTCCACAGGGGAGTTTACCATAAGCCCCAAACAACCCCCG  
GGTGACATCTTGTTGACCTGAGCCTAGGACCACACTGAATCCGTTTCTGCTCCACTTGGCTCAGATGTATAATGGA  
TGGGTTGGAACATGAAGGTGCGCGTGCTCCTGGCGGGCAATGCATTACAGCCGGGAAGATTATTATCTCTTGCG  
TGCCACCTGGATTTGCAGCCAGAACGTGTCTATCGCACAGGCAACCATGTTTCCGCATGTATCGCAGATGTGCGC  
GTGCTAGAGCCCATCGAGGTGCCCTTGAGGACGTGCGCAACGTCCTATTCCATAACAATGATAGCACCCCCACCAT  
GCGCTTGATATGTATGTTATATACTCCCTCCGCGCCAGTGGGTCCAGCTCCGGGACCGATCTTTTGTGATTGCTGG  
GCGGGTGTGACTTGCTAGCCCTGACTTCAACTTCTTTTCTGGTGCCTCAAATGTAGAACAGAAAAACAAGCC  
ATTCAGCGTGCCAAACCTGCCCTTAACGTGCTGTGCAATCCCGAGTGCCTTCCCTTATTAAGTCCATGATGGTATC  
TCAGGATCACGGTCAAATGGTGCAGTTTCAGAACGGCCGAGTGACGTTAGACGGGCAGCTGCAGGGCACAACCCC  
AACCAGTGCCAGTCAGCTGTGTAAGATCAGAGGCACCGTCTACCACGCAACTGGCGGACAGGGGCTGAATCTTACT  
GAGATCGATGGTACCCCTACCATGCATTGAGTCACCTGCACCTATTGGATTTCGGATCTTGGGGAGTGTGATTG  
GCATATCAATGCTTACCTGCCAACGCTTTCACAGACGGGTCTATTATTCATCGCATTGACGTAGCACAGGATAGCAC  
ATTTGCCCCGCACCTGGGTACCATCCACTATACGAACGCAGATTACAACGCAAACGTGGGTCTTATCTGTAGCCTAG  
AGTGGCTATCTCCGCAAGCGGTGGGGCCCTAAAGTTAACCCATGGGCTATTCTCGGTACGGGTCTACGCTGACT  
GAGGCCGCTCAGCTGGCACCCCCATATCCACCAGGATTCGGGGAAGCCATTGTTTCTTTATGTCCGATTTCCG  
ATAGCCAACGGTTCAGATGGCCTTAGTGCCCTTGACGATTCCACAGGAATTTGTGACACACTTCGTAAACGAGCA  
GGCTCTACTCGGGGCGAGGCTGCCTTGTGATTACGTAGACCCCGATACCCATAGAAACCTGGGCGAATTCAAAC  
TCTACCCTGAAGGTTTCATGACCTGCGTACCTAACTCCTCCGGCAGTGGCCCTCAAACCTTGCCGATCAACGGCGTGT  
TCACGTTTATCAGCTGGGTTTACGGTTTACCAACTCAAGCCCCTCGGAACAACGGGCCAGTTCGGAGGCTCGGG  
ATCAGACGGAGCTAG

**Figure 28G**

Amino acid sequence of VP1\_GI.3\_Lil08\_A43V+S94L (SEQ ID NO:170)

MMMASKDAPTNMDGTSAGQLVPEVSTAEPISMEPVAGAATAVATAGQVNMIDPWIMSNYVQAPQGE  
FTISPNNTPGDILFDLQLGPLNPFLLHLAQMYNGWVGNMKVRVLLAGNAFTAGKIIISCVPPGFAAQNVISA  
QATMFPHVIADVRLVLEIEVPLEDVNRNVLFNNDSTPTMRILCMLYTPLRASGSSSGTDPFVIAGRVLTCPSPD  
FNFLFLVPPNVEQKTKPFSVPLNPLNVLSNSRVPSLIKSMMSQDHGQMVQFQNGRVTLDGQLQGTTPTSA  
SQLCKIRGTVYHATGGQGLNLTEIDGTPYHAFESPAPIGFPDLGECDWHINASPANAFTDGSIIHRIDVAQDST  
FAPHLGTIHYTNADYNANVGLICSLEWLSPPSGGAPKVPNPWAIPRYGSTLTEAAQLAPPIYPPGFGEAIVFFMS  
DFPIANGSDGLSVPCTIPQEFVTHFVNEQAPTRGEAALLHYVDPDTHRNLGEFKLYPEGFMTCVPNSSSGSGPQ  
TLPINGVFTFISWVSRYQLKPVGTTGPVRRLGIRRS

**Figure 28H**

Nucleic acid sequence of human codon optimized VP1\_GI.3\_Lil08\_A43V+S94L (SEQ ID NO:169)

ATGATGATGGCTTCCAAGGATGCTCCCACAAACATGGATGGAACAAGCGGCGCGGGGCAACTTGTGCCG  
GAGGTGTCCACGGCGGAACCCATTTCCATGGAACCTGTGGCCGGCGCAGCCACTGCTGTGGCCACCGCA  
GGACAGGTAAACATGATCGACCCCTGGATCATGTCAAATTACGTTTCAGGCTCCACAGGGGGAGTTTACC  
ATAAGCCCAAACAACACCCCGGTGACATCTTGTGTTGACCTGCAGCTAGGACCACACTTGAATCCGTTTCT  
GCTCCACTTGGCTCAGATGTATAATGGATGGGTTGGAACATGAAGGTGCGCGTGCTCCTGGCGGGCAA  
TGCAATTCACAGCCGGGAAGATTATTATCTCTTGCCTGCCACCTGGATTGTCAGCCAGAACGTGTCTATC  
GCACAGGCAACCATGTTTCCGCATGTCATCGCAGATGTGCGCGTGCTAGAGCCCATCGAGGTGCCCTTG  
AGGACGTGCGCAACGTCCTATTCCATAACAATGATAGCACCCCAACCATGCGCTTGATATGTATGTTATAT  
ACTCCCCTCCGCGCCAGTGGGTCCAGCTCCGGGACCGATCCTTTTGTGATTGCTGGGCGGGTGTGACTT  
GTCCTAGCCCTGACTTCAACTTCCTTTTCTGGTGCCTCCAAATGTAGAACAGAAAACAAAGCCATTCAGC  
GTGCCAAACCTGCCCCTTAACGTGCTGTGCAATTCCCGAGTGCTTCCCTTATTAAGTCCATGATGGTATC  
TCAGGATCACGGTCAAATGGTGCAGTTTCAGAACGGCCGAGTGACGTTAGACGGGCAGCTGCAGGGCA  
CAACCCCAACCAAGTGCCAGTCAGCTGTGTAAGATCAGAGGCACCGTCTACCACGCAACTGGCGGACAGG  
GGCTGAATCTTACTGAGATCGATGGTACCCCTACCATGCATTCGAGTCACCTGCACCTATTGGATTCCC  
GATCTTGGGGAGTGTGATTGGCATATCAATGCTTACCTGCCAACGCTTTCACAGACGGGTCTATTATTCA  
TCGCATTGACGTAGCACAGGATAGCACATTTGCCCCGACCTGGGTACCATCCACTATACGAACGCAGAT  
TACAACGCAAACGTGGGTCTTATCTGTAGCCTAGAGTGGCTATCTCCGCCAAGCGGTGGGGCCCCCTAAA  
GTTAACCATGGGCTATTCTCGGTACGGGTCTACGCTGACTGAGGCCGCTCAGCTGGCACCCCCCATAT  
ATCCACCAGGATTCCGGGAAGCCATTGTTTTCTTATGTCCGATTTTCCGATAGCCAACGGTTCAGATGGC  
CTTAGTGTCCCTTGACGATTCCACAGGAATTTGTGACACACTTCGTAAACGAGCAGGCTCCTACTCGGG  
GCGAGGCTGCCTTGTTCATTACGTAGACCCCGATACCATAGAAACCTGGGCGAATTCAAACCTCTACCC  
TGAAGGTTTCATGACCTGCGTACCTAACTCCTCCGGCAGTGGCCCTCAAACCTTGCCGATCAACGGCGTG  
TTCACGTTTATCAGCTGGGTTTACAGGTTTACCAACTCAAGCCCGTCGGAACAACCTGGGCCAGTTCGGA  
GGCTCGGGATCAGACGGAGCTAG

**Figure 28I**

Amino acid sequence of VP1\_GI.3\_Lil08\_M57I+S94L (SEQ ID NO:172)

MMMASKDAPTNMDGTSAGQLVPEVSTAEPISMEPVAGAATAAATAGQVNMIDPWIISNYVQAPQGEFT  
ISPNNTPGDILFDLQLGPHLNPFLHLAQMYNGWVGNMKVRVLLAGNAFTAGKIIISCVPPGFAAQNVSIQAQ  
ATMFPHVIADVRLPEIEVPLEDVRNVLFHNNDSTPTMRLICMLYTPLRASGSSSGTDPFVIAGRVLTCPSPDF  
NFLFLVPPNVEQKTKPFSVPNLPLNVLSNSRVPSLIKSMMSVQDHGQMVQFQNGRVTLDGQLQGTTPTSAS  
QLCKIRGTVYHATGGQGLNLTEIDGTPYHAFESPAPIGFDPDGECDWHINASPANAFTDGSIIHRIDVAQDSTF  
APHLGTIHYTNADYNANVGLICSLEWLSPPSGGAPKVPNPWAIPRYGSTLTEAAQLAPPIYPPPGFEAIVFFMS  
DFPIANGSDGLSVPCTIPQEFVTHFVNEQAPTRGEAALLHYVDPDTHRNLGEFKLYPEGFMTCVPNSSSGSGPQ  
TLPINGVFTFISWVSRYQLKPVGTTGPVRRLGIRRS

**Figure 28J**

Nucleic acid sequence of human codon optimized VP1\_GI.3\_Lil08\_M57I+S94L (SEQ ID NO:171)

ATGATGATGGCTTCCAAGGATGCTCCCACAAACATGGATGGAACAAGCGGCGCGGGGCAACTTGTGCCG  
GAGGTGTCCACGGCGGAACCCATTTCCATGGAACCTGTGGCCGGCGCAGCCACTGCTGCCGCCACCGCA  
GGACAGGTAAACATGATCGACCCCTGGATCATCTCAAATTACGTTCAGGCTCCACAGGGGGAGTTTACCA  
TAAGCCCAAACAACACCCCGGGTGACATCTTGTTTGACCTGCAGCTAGGACCACACTTGAATCCGTTTCTG  
CTCCACTTGGCTCAGATGTATAATGGATGGGTGGAACATGAAGGTGCGCGTGCTCCTGGCGGGCAAT  
GCATTCACAGCCGGGAAGATTATTATCTCTTGCCTGCCACCTGGATTTGCAGCCCAGAACGTGTCTATCG  
CACAGGCAACCATGTTTCCGCATGTCATCGCAGATGTGCGCGTGCTAGAGCCCATCGAGGTGCCCTTGA  
GGACGTGCGCAACGTCCTATTCCATAACAATGATAGCACCCCAACCATGCGCTTGATATGTATGTTATATA  
CTCCCTCCGCGCCAGTGGGTCCAGCTCCGGGACCGATCCTTTTGTGATTGCTGGGCGGGTGTGACTTG  
TCCTAGCCCTGACTTCAACTTCCTTTTCTGGTGCCTCCAAATGTAGAACAGAAAACAAAGCCATTACGCG  
TGCCAAACCTGCCCTTAACGTGCTGTGAATTCCCGAGTGCCCTCCCTTATTAAGTCCATGATGGTATCT  
CAGGATCACGGTCAAATGGTGCAGTTTCAGAACGGCCGAGTGACGTTAGACGGGCAGCTGCAGGGCAC  
AACCCCAACAGTGCCAGTCAGCTGTGTAAGATCAGAGGCACCGTCTACCACGCAACTGGCGGACAGGG  
GCTGAATCTTACTGAGATCGATGGTACCCCTACCATGCATTCGAGTCACCTGCACCTATTGGATTTCCCG  
ATCTTGGGGAGTGTGATTGGCATATCAATGCTTCACCTGCCAACGCTTTCACAGACGGGTCTATTATTCAT  
CGCATTGACGTAGCACAGGATAGCACATTTGCCCCGACCTGGGTACCATCCACTATACGAACGCAGATT  
ACAACGCAAACGTGGGTCTTATCTGTAGCCTAGAGTGGCTATCTCCGCCAAGCGGTGGGGCCCCCTAAAG  
TTAACCCATGGGCTATTCTCGGTACGGGTCTACGCTGACTGAGGCCGCTCAGCTGGCACCCCCCATATA  
TCCACCAGGATTCGGGGAAGCCATTGTTTTCTTATGTCCGATTTTCCGATAGCCAACGGTTCAGATGGCC  
TTAGTGTCCCTTGACGATTCCACAGGAATTTGTGACACACTTCGTAAACGAGCAGGCTCCTACTCGGGG  
CGAGGCTGCCTTGTTGCATTACGTAGACCCCGATACCCATAGAAACCTGGGCGAATTCAAACCTTACCCT  
GAAGGTTTCATGACCTGCGTACCTAACTCCTCCGGCAGTGGCCCTCAAACCTTGCCGATCAACGGCGTGT  
TCACGTTTATCAGCTGGGTTCACGGTTTACCAACTCAAGCCCCTCGGAACAACCTGGGCCAGTTCGGAG  
GCTCGGGATCAGACGGAGCTAG

**Figure 28K**

Amino acid sequence of VP1\_Gl.3\_Lil08\_A43V+M57I+S94L (SEQ ID NO:174)

MMMASKDAPTNMDGTSAGQLVPEVSTAEPISMEPVAGAATAVATAGQVNMIDPWISNYVQAPQGEFT  
ISPNNTPGDILFDLQLGPLNPFLLHLAQMYNGWVGNMKVRVLLAGNAFTAGKIIISCVPPGFAAQNVISIAQ  
ATMFPHVIADVRLVLEPIEVPLEDVRNVLFHNNDSTPTMRICMLYTPLRASGSSSGTDPFVIAGRVLTCPSPDF  
NFLFLVPPNVEQKTKPFSVPNLPLNVLSNSRVPSLIKSMMSVQDHGQMVQFQNGRVTLDGQLQGTTPTSAS  
QLCKIRGTVYHATGGQGLNLTEIDGTPYHAFESPAPIGFDPDGECDWHINASPANAFTDGSIIHRIDVAQDSTF  
APHLGTIHYTNADYNANVGLICSLEWLSPPSGGAPKVPNPWAIPRYGSTLTEAAQLAPPIYPPPGFEAIVFFMS  
DFPIANGSDGLSVPCTIPQEFVTHFVNEQAPTRGEAALLHYVDPDTHRNLGEFKLYPEGFMTCVPNSSSGSGPQ  
TLPINGVFTFISWVSRYQLKPVGTTGPVRRLGIRRS

**Figure 28L**

Nucleic acid sequence of human codon optimized VP1\_Gl.3\_Lil08\_A43V+M57I+S94L (SEQ ID NO:173)

ATGATGATGGCTTCCAAGGATGCTCCCACAAACATGGATGGAACAAGCGGCGCGGGGCAACTTGTGCCG  
GAGGTGTCCACGGCGGAACCCATTTCCATGGAACCTGTGGCCGGCGCAGCCACTGCTGTGGCCACCGCA  
GGACAGGTAAACATGATCGACCCCTGGATCATCTCAAATTACGTTCAGGCTCCACAGGGGGAGTTTACCA  
TAAGCCCAAACAACACCCCGGGTGACATCTTGTGTTGACCTGCAGCTAGGACCACACTTGAATCCGTTTCTG  
CTCCACTTGGCTCAGATGTATAATGGATGGGTGGAAACATGAAGGTGCGCGTGCTCCTGGCGGGCAAT  
GCATTCACAGCCGGAAGATTATTATCTTTCGTGCCACCTGGATTTCAGCCCAGAACGTGTCTATCG  
CACAGGCAACCATGTTTCCGCATGTCATCGCAGATGTGCGCGTGCTAGAGCCCATCGAGGTGCCCCCTGA  
GGACGTGCGCAACGTCCTATTCCATAACAATGATAGCACCCCAACCATGCGCTTGATATGTATGTTATATA  
CTCCCTCCGCGCCAGTGGGTCCAGCTCCGGGACCGATCCTTTTGTGATTGCTGGGCGGGTGTGACTTG  
TCCTAGCCCTGACTTCAACTTCCTTTTCTGGTGCCTCCAAATGTAGAACAGAAAACAAAGCCATTCAGCG  
TGCCAAACCTGCCCCTTAACGTGCTGTGAATTCCCGAGTGCCCTCCCTTATTAAGTCCATGATGGTATCT  
CAGGATCACGGTCAAATGGTGCAGTTTCAGAACGGCCGAGTGACGTTAGACGGGCAGCTGCAGGGCAC  
AACCCCAACAGTGCCAGTCAGCTGTGTAAGATCAGAGGCACCGTCTACCACGCAACTGGCGGACAGGG  
GCTGAATCTTACTGAGATCGATGGTACCCCTACCATGCATTCGAGTCACCTGCACCTATTGGATTTCCTG  
ATCTTGGGGAGTGTGATTGGCATATCAATGCTTCACCTGCCAACGCTTTCACAGACGGGTCTATTATTCAT  
CGCATTGACGTAGCACAGGATAGCACATTTGCCCCGCACCTGGGTACCATCCACTATACGAACGCAGATT  
ACAACGCAAACGTGGGTCTTATCTGTAGCCTAGAGTGGCTATCTCCGCCAAGCGGTGGGGCCCCCTAAAG  
TTAACCCATGGGCTATTCTCGGTACGGGTCTACGCTGACTGAGGCCGCTCAGCTGGCACCCCCCATATA  
TCCACCAGGATTCGGGGAAGCCATTGTTTTCTTATGTCCGATTTTCCGATAGCCAACGGTTCAGATGGCC  
TTAGTGTCCCTTGACGATTCCACAGGAATTTGTGACACACTTCGTAAACGAGCAGGCTCCTACTCGGGG  
CGAGGCTGCCTTGTTGCATTACGTAGACCCCGATACCCATAGAAACCTGGGCGAATTCAACTCTACCT  
GAAGGTTTCATGACCTGCGTACCTAACTCCTCCGGCAGTGGCCCTCAAACCTTGCCGATCAACGGCGTGT  
TCACGTTTATCAGCTGGGTTTCACGGTTTACCAACTCAAGCCCGTCGGAACAACCTGGGCCAGTTCGGAG  
GCTCGGGATCAGACGGAGCTAG

**Figure 28M** (SEQ ID NO:292)

AA sequence of VP1\_Gl.3\_Lil08\_S94X; where X = V, I, M, T, E, D, N, Q, K, or H

MMMASKDAPTNMDGTSGAGQLVPEVSTAEPISMEPVAGAATAAATAGQVNMIDPWIMSNYVQAPQGE  
FTISPNNTPGDILFDLQLGPHLNPFLXHLAQMYNGWVGNMKVRVLLAGNAFTAGKIIISCVPPGFAAQNVISIA  
QATMFPHVIAADVRLVLEPIEVPLEDVNRNVLFFHNNDSTPTMRILCMLYTPLRASGSSSGTDPFVIAGRVLTCPSPD  
FNFLFLVPPNVEQKTKPFSVPLNPLNVLSNSRVPSLIKSMMSVQDHGQMVQFQNGRVTLDGQLQGTTPTSA  
SQLCKIRGTVYHATGGQGLNLTEIDGTPYHAFESPAPIGFPDLGECDDWHINASPANAFTDGSIIHRIDVAQDST  
FAPHLGTIHYTNADYNANVGLICSLEWLSPPSGGAPKVPNPWAIPRYGSTLTEAAQLAPPIYPPGFGEAIVFFMS  
DFPIANGSDGLSVPCTIPQEFVTHFVNEQAPTRGEAALLHYVDPDTHRNLGEFKLYPEGFMTCVPNSSSGSGPQ  
TLPINGVFTFISWVSRYQLKPVGTTGPVRRLGIRRS\*

**Figure 28N** (SEQ ID NO:293)

hCod optimized VP1\_Gl.3\_Lil08\_S94x; 'x' = V (XXX=GTG), I (XXX=ATC), M (XXX=ATG), T (XXX =  
ACC), E (XXX=GAG), D (XXX=GAC), N (XXX=AAC), Q (XXX=CAG), K (XXX=AAG), or H (XXX=CAC)

ATGATGATGGCTTCCAAGGATGCTCCCACAAACATGGATGGAACAAGCGGCGCGGGGCAACTTGTGCCG  
GAGGTGTCCACGGCGGAACCCATTTCCATGGAACCTGTGGCCGGCGCAGCCACTGCTGCCGCCACCGCA  
GGACAGGTAAACATGATCGACCCCTGGATCATGTCAAATTACGTTCAAGGCTCCACAGGGGGAGTTTACC  
ATAAGCCCAACAACACCCCCGGGTGACATCTTGTGACCTGCAGCTAGGACCACACTTGAATCCGTTTCT  
GXXXCACTTGGCTCAGATGTATAATGGATGGGTTGAAACATGAAGGTGCGCGTGCTCCTGGCGGGCAA  
TGCAATCACAGCCGGGAAGATTATTATCTCTTGCCTGCCACCTGGATTGTCAGCCAGAACGTGTCTATC  
GCACAGGCAACCATGTTTCCGCATGTCTCGCAGATGTGCGCGTGCTAGAGCCCATCGAGGTGCCCCCTTG  
AGGACGTGCGCAACGTCCTATTCCATAACAATGATAGCACCCCCACCATGCGCTTGATATGTATGTTATAT  
ACTCCCCTCCGCGCCAGTGGGTCCAGCTCCGGGACCGATCCTTTTGTGATTGCTGGGCGGGTGTGACTT  
GTCCTAGCCCTGACTTCAACTTCTTTTCTGGTGCTCCAAATGTAGAACAGAAAACAAAGCCATTGAGC  
GTGCCAAACCTGCCCCTTAACGTGCTGTGCAATTCCCGAGTGCCTTCCCTTATTAAGTCCATGATGGTATC  
TCAGGATCACGGTCAAATGGTGCAGTTTCAGAACGGCCGAGTGACGTTAGACGGGCAGCTGCAGGGCA  
CAACCCCAACAGTGCCAGTCAGCTGTGTAAGATCAGAGGCACCGTCTACCACGCAACTGGCGGACAGG  
GGCTGAATCTTACTGAGATCGATGGTACCCCTACCATGCATTCGAGTCACCTGCACCTATTGGATTCCC  
GATCTTGGGGAGTGTGATTGGCATATCAATGCTTACCTGCCAACGCTTTCACAGACGGGTCTATTATTCA  
TCGCATTGACGTAGCACAGGATAGCACATTTGCCCCGCACCTGGGTACCATCCACTATACGAACGCAGAT  
TACAACGCAAACGTGGGTCTTATCTGTAGCCTAGAGTGGCTATCTCCGCCAAGCGGTGGGGCCCCCTAAA  
GTTAACCCATGGGCTATTCTCGGTACGGGTCTACGCTGACTGAGGCCGCTCAGCTGGCACCCCCCATAT  
ATCCACCAGGATTCGGGGAAGCCATTGTTTCTTTATGTCCGATTTTCCGATAGCCAACGGTTCAGATGGC  
CTTAGTGTCCCTGCACGATTCCACAGGAATTTGTGACACACTTCGTAAACGAGCAGGCTCCTACTCGGG  
GCGAGGCTGCCTTGTTCATTACGTAGACCCCGATACCCATAGAAACCTGGGCGAATTCAACTCTACCC  
TGAAGGTTTCATGACCTGCGTACCTAACTCCTCCGGCAGTGGCCCTCAAACCTTGGCGATCAACGGCGTG  
TTCACGTTTATCAGCTGGGTTTACAGGTTTACCAACTCAAGCCCGTCGGAACAACCTGGGCCAGTTCCGA  
GGCTCGGGATCAGACGGAGCTAG

**Figure 29A**

Amino acid sequence of VP1\_GI.5\_Siklos\_Q84S (SEQ ID NO:34)

MMMASKDAPSSADGANGAGQLVPEVNNAEPLPLDPVAGASTALATAGQVNMIDPWIFNNFVQAPQGEFTISPNNTP  
 GDILFDLSLGPLNPLFLAHLSQLMYNGWVGNMVRVILAGNAFTAGKVIICCVPPGFQSRTLSIAQATLFPHIIADVRTLPI  
 EIPLEDVRNTLYHTNDNQPTMRLLCMLYTPLRTGGGSGGTDADFVVAGRVLTCPSSDFNFLFLVPPTVEQKTRPFSVPNIPL  
 QLLSNSRVPNLIQSMVLSPDQAQNVQFQNGRCTTDGQLLGTTPVSVSQILKFRGKVSAGSKVINLTELDGSPFLAFEAPAP  
 TGFPDLGTSWDHVMSLNSNSQSSGNPILLRDIHPNSSEFVPHLGSVCVTAAIEVAGDYGTIQWTSQPSNVTPVPDVNF  
 WTIPHYGSNLAEASQLAPVVYPGFGAIVYFMSPIGPNTAHKPNLVPCLLPQEFVTHFVSEQAPSMGEAALVHYVDPD  
 TNRNLGEFKLYPEGFITCVPNGTGPQQLPLNGVVFASWVSRFYQLKPVGTASSARGRLGVRR

**Figure 29B**

Nucleic acid sequence of human codon optimized VP1\_GI.5\_Siklos\_Q84S (SEQ ID NO:35)

ATGATGATGGCCTCCAAAGACGCTCCTAGCAGTGCTGATGGCGCTAACGGTGCCGGCCAGCTGGTCCCCGAGGTGA  
 ATAACGCCGAGCCTCTCCCTTGGACCCAGTAGCCGGAGCTTCAACGGCCCTAGCTACTGCCGGACAGGTAAATATG  
 ATTGACCCCTGGATTTTCAATAATTCGTGCAGGCCCTCAAGGCGAGTTTACTATAAGCCCTAACAACACACCAGGG  
 GATATTCTGTTCGACCTGAGCTTAGGCCCTCATCTCAACCCCTTCTTGCCCACTGAGCCAGATGTACAATGGCTGG  
 GTGGGCAACATGCGAGTGAGAGTTATCCTCGCAGGGAACGCCTTTACCGCTGGTAAGGTGATCATTTGTTGCGTAC  
 CACCTGGATTCCAGTCTAGGACATTAAGTATTGCGCAAGCTACCCTCTTCTCATATCATCGCCGACGTGCGGACAC  
 TAGAGCCCATCGAGATCCCACTGGAGGATGTCCGGAATACCCTGTACCATACCAACGATAATCAGCCCACTATGAGG  
 TTAAGTGTGATGCTGTACACGCCACTCCGACTGGTGGGGGCGAGTGGGGGGACCGATGCTTTCTGCTGTTGCCGGTA  
 GGGTGCTCACTTGCCCGTCATCTGACTTTAACTTCTATTCTTGTCGCCCAACGGTGGAACAGAAAACGAGACCTT  
 TTTCCGTACCTAACATCCCTTTACAGCTCCTAAGCAATAGCAGAGTACCTAACCTGATCCAATCCATGGTTCTTAGCCC  
 TGATCAAGCGCAGAACGTACAGTTTCAAGAACGGGCGGTGACCCACAGATGGCCAGCTGCTTGGTACAACCTCCCGTC  
 TCCGTGTCTCAGATACTTAAGTTTCGCGGCAAGGTCTCCGCTGGATCCAAAGTAATCAACCTCACTGAGCTTGATGG  
 CTCTCCCTTTCTGGCGTTCGAGGCGCCCGCCCAACAGGCTTCCAGACCTGGGAACATCCGATTGGCATGTCGAGA  
 TGAGTCTGAATAGCAACTCCAGTCTTCTGGCAATCCAATACTGCTCCGCGATATCCATCCTAATTCTAGCGAGTTCG  
 TTCCACACCTGGGTCTGTGTGCGTGACGGTGCAATAGAGGTGGCTGGCGACTACACGGGTACCATTCAGTGGAC  
 CTCTCAGCCAAGTAACGTGACCCCTGTGCCAGACGTAACTTTGGACAATTCCACACTACGGCTCTAATTGGCCGA  
 AGCATCCCAGCTTGCCCCGTTGTATATCCCCAGGCTTTGGCGAAGCAATAGTTTATTTATGTCCCCAATCCCTGG  
 ACCTAACACAGCACACAAGCCAAACCTCGTCCCATGCCTGCTGCCCCAGGAGTTCGTGACTCATTTCTTTTCGGAACA  
 AGCCCCATCAATGGGGGAGGCCGCCCTGGTCCACTACGTGGATCCAGATACCAATCGGAATCTGGGAGAATTCAAA  
 CTCTACCCTGAAGGATTCATTACATGTGTGCCCAATGGAACAGGACCGCAGCAGCTCCCACTGAACGGTGTCTTTGT  
 ATTCGCATCATGGGTAGCCGTTCTATCAACTTAAACCCGTGGGGACAGCTTCATCTGCCGGGGGCGCCTTGGCG  
 TCGGGCGCTGA

**Figure 29C**

Amino acid sequence of VP1\_GI.5\_Siklos\_A94L (SEQ ID NO:36)

MMMASKDAPSSADGANGAGQLVPEVNNAEPLPLDPVAGASTALATAGQVNMIDPWIFNNFVQAPQGEFTISPNNTP  
GDILFDLQLGPLNPFLLHLSQMYNGWVGNMVRVILAGNAFTAGKVIICCVPPGFQSRTLIAQATLFPHIIADVRLTLEPI  
EIPLEDVRNTLYHTNDNQPTMRLLCMLYTPLRTGGGSGGTDAFVVAGRVLTCPSSDFNFLFLVPPTVEQKTRPFSVPNIPL  
QLLSNSRVPNLIQSMVLSPDQAQNVQFQNGRCTTDGQLLGTTPVSVSQILKFRGKVSAGSKVINLTELDGSPFLAFEAPAP  
TGFPDLGTSWDHVEMLNSNSQSSGNPILLRDIHPNSSEFVPHLGSVCVTAAIEVAGDYGTIQWTSQPSNVTPVPDVNF  
WTIPHYGSNLAEASQLAPVVYPPGFGEAIVYFMSPIPGPNTAHKPNLVPCLLPQEFVTHFVSEQAPSMGEAALVHYVDPD  
TNRNLGEFKLYPEGFITCVPNGTGPQQLPLNGVVFASWVSRFYQLKPVGTASSARGRLGVRR

**Figure 29D**

Nucleic acid sequence of human codon optimized VP1\_GI.5\_siklos\_A94L (SEQ ID NO:37)

ATGATGATGGCCTCCAAAGACGCTCCTAGCAGTGCTGATGGCGCTAACGGTGCCGGCCAGCTGGTCCCCGAGGTGA  
ATAACGCCGAGCCTCTCCCTTGGACCCAGTAGCCGGAGCTTCAACGGCCCTAGCTACTGCCGGACAGGTAAATATG  
ATTGACCCCTGGATTTTCAATAATTCGTGCAGGCCCTCAAGGCGAGTTTACTATAAGCCCTAACACACACCAGGG  
GATATTCTGTTCGACCTGCAGTTAGGCCCTCATCTCAACCCCTTCTGCTCCACCTGAGCCAGATGTACAATGGCTGG  
GTGGGCAACATGCGAGTGAGAGTTATCCTCGCAGGGAACGCCTTTACCGCTGGTAAGGTGATCATTTGTTGCGTAC  
CACCTGGATTCCAGTCTAGGACATTAAGTATTGCGCAAGCTACCCTCTTCTCATATCATCGCCGACGTGCGGACAC  
TAGAGCCCATCGAGATCCCACTGGAGGATGTCCGGAATACCCTGTACCATACCAACGATAATCAGCCCACTATGAGG  
TACTGTGCATGCTGTACACGCCACTCCGACTGGTGGGGGCGAGTGGGGGGACCGATGCTTTCGTGCTTGCCGGTA  
GGGTGCTCACTTGCCCGTCATCTGACTTTAACTTCCTATTCTTGTCGCCCAACGGTGGAACAGAAAACGAGACCTT  
TTCCGTACCTAACATCCCTTACAGCTCCTAAGCAATAGCAGAGTACCTAACCTGATCCAATCCATGGTTCTTAGCCC  
TGATCAAGCGCAGAACGTACAGTTTCAGAACGGGCGGTGCACCACAGATGGCCAGCTGCTTGGTACAACCTCCCGTC  
TCCGTGTCTCAGATACTTAAGTTTCGCGGCAAGGTCTCCGCTGGATCCAAAGTAATCAACCTCACTGAGCTTGATGG  
CTCTCCCTTCTGGCGTTCGAGGCGCCCGCCCAACAGGCTTCCAGACCTGGGAACATCCGATTGGCATGTGCGAGA  
TGAGTCTGAATAGCAACTCCAGTCTTCTGGCAATCCAATACTGCTCCGCGATATCCATCCTAATTCTAGCGAGTTCG  
TTCCACACCTGGGTCTGTGTGCGTGACGGTGCAATAGAGGTGGCTGGCGACTACACGGGTACCATTCAGTGGAC  
CTCTCAGCCAAGTAACGTGACCCCTGTGCCAGACGTAACTTTGGACAATTCCACACTACGGCTCTAATTGGCCGA  
AGCATCCCAGCTTGCCCCGTTGTATATCCCCAGGCTTTGGCGAAGCAATAGTTTATTTATGTCCCAATCCCTGG  
ACCTAACACAGCACACAAGCCAAACCTCGTCCCATGCCTGCTGCCCCAGGAGTTCGTGACTCATTTGTTTCGGAACA  
AGCCCCATCAATGGGGGAGGCCGCCCTGGTCCACTACGTGGATCCAGATACCAATCGGAATCTGGGAGAATTCAA  
CTCTACCCTGAAGGATTCATTACATGTGTGCCCAATGGAACAGGACCGCAGCAGCTCCCACTGAACGGTGTCTTTGT  
ATTCGCATCATGGGTAGCCGTTCTATCACTTAAACCCGTGGGGACAGCTTCATCTGCCCGGGGGCGCCTTGGCG  
TGCGGCGCTGA

**Figure 29E**

Amino acid sequence of VP1\_GI.5\_siklos\_Q84S+A94L (SEQ ID NO:38)

MMMASKDAPSSADGANGAGQLVPEVNNAEPLPLDPVAGASTALATAGQVNMIDPWIFNNFVQAPQGEFTISPNNTP  
GDILFDLSLGPLNPFLLHLSQMYNGWVGNMVRVILAGNAFTAGKVIICCVPPGFQSRTLIAQATLFPHIIADVRLTLEPI  
EIPLEDVRNTLYHTNDNQPTMRLLCMLYTPLRTGGGSGGTDAFVVAGRVLTCPSSDFNFLFLVPPTVEQKTRPFSVPNIPL  
QLLSNSRVPNLIQSMVLSPDQAQNVQFQNGRCTTDGQLLGTTPVSVSQILKFRGKVSAGSKVINLTELDGSPFLAFEAPAP

**Figure 29E (cont)**

TGFPDLGTS DWHVEMSLNSNSQSSGNPILLRDIHPNSSEFVPHLGSVCVTAAIEVAGDYTG TIQWTSQPSNVTPVPDVNF  
WTIPHYGSNLAEASQLAPVVYPGFGGEAIVYFMSPIPGPNTAHKPNLVPCLLPQEFVTHFVSEQAPSMGEAALVHYVDPD  
TNRNLGEFKLYPEGFITCVPNGTGPQQLPLNGVFVFASWVSRFYQLKPVGTASSARGRLGVRR

**Figure 29F**

Nucleic acid sequence of human codon optimized VP1\_GI.5\_siklos\_Q84S+A94L (SEQ ID NO:39)

ATGATGATGGCCTCCAAAGACGCTCCTAGCAGTGCTGATGGCGCTAACGGTGCCGGCCAGCTGGTCCCCGAGGTGA  
ATAACGCCGAGCCTCTCCCTTGACCCAGTAGCCGAGCTTCAACGGCCCTAGCTACTGCCGGACAGGTAAATATG  
ATTGACCCCTGGATTTTCAATAATTCGTGCAGGCCCTCAAGGCGAGTTTACTATAAGCCCTAACACACACCAGGG  
GATATTCTGTTGACCTGAGCTTAGGCCCTCATCTCAACCCCTTCTGCTCCACCTGAGCCAGATGTACAATGGCTGG  
GTGGGCAACATGCGAGTGAGAGTTATCCTCGCAGGGAACGCCTTACCGCTGGTAAGGTGATCATTGTTGCGTAC  
CACCTGGATTCCAGTCTAGGACATTAAGTATTGCGCAAGCTACCCTCTTCTCATATCATCGCCGACGTGCGGACAC  
TAGAGCCCATCGAGATCCCCTGAGGATGTCCGGAATACCCTGTACCATACCAACGATAATCAGCCCACTATGAGG  
TTACTGTGCATGCTGTACACGCCACTCCGACTGGTGGGGGCGAGTGGGGGGACCGATGCTTTCGTCTGTTGCCGTA  
GGGTGCTCACTTGCCCGTCATCTGACTTTAATTCTTCTTGTGCCCCAACGGTGGAACAGAAAACGAGACCTT  
TTTCCGTACCTAACATCCCTTTACAGCTCCTAAGCAATAGCAGAGTACCTAACCTGATCCAATCCATGTTCTTAGCCC  
TGATCAAGCGCAGAACGTACAGTTTCAGAACGGGCGGTGCACCACAGATGGCCAGCTGCTTGGTACAACCTCCGTC  
TCCGTGTCTCAGATACTTAAGTTTCGCGGCAAGGTCTCCGCTGGATCCAAAGTAATCAACCTCACTGAGCTTGATGG  
CTCTCCCTTTCTGGCGTTCGAGGCGCCCGCCCCAACAGGCTTCCAGACCTGGGAACATCCGATTGGCATGTGAGAG  
TGAGTCTGAATAGCAACTCCAGTCTTCTGGCAATCCAATACTGCTCCGCGATATCCATCCTAATTCTAGCGAGTTCG  
TTCCACACCTGGGTCTGTGTGCGTGACGGCTGCAATAGAGGTGGCTGGCGACTACACGGGTACCATTCAAGTGGAC  
CTCTCAGCCAAGTAACGTGACCCCTGTGCCAGACGTTAACTTTTGACAATTCCACACTACGGCTCTAACTTGCCGA  
AGCATCCCAGCTTGCCCCGTTGTATATCCCCAGGCTTTGGCGAAGCAATAGTTTATTTTATGTCCCCAATCCCTGG  
ACCTAACACAGCACACAAGCCAAACCTCGTCCCATGCCTGCTGCCCCAGGAGTTCGTGACTCATTTCGTTTCGGAACA  
AGCCCCATCAATGGGGGAGGCCGCCCTGGTCCACTACGTGGATCCAGATACCAATCGGAATCTGGGAGAATTCAAA  
CTCTACCCTGAAGGATTCATTACATGTGTGCCCAATGGAACAGGACCGCAGCAGCTCCCACTGAACGGTGTCTTTGT  
ATTCGCATCATGGGTTAGCCGTTCTATCAACTAAACCCGTGGGGACAGCTTCATCTGCCCGGGGGCGCCTTGCGG  
TGCGGCGCTGA

**Figure 29G**

Amino acid sequence of VP1\_GI.7/GA5043/USA/2014\_R84S (SEQ ID NO:177)

MMMASKDAPSNMDGTSGAGQLVPEVNAAEPLPLEPVVGAATAVATAGQVNMIDPWIMNNFVQAPEGE  
FTISPNNTPGDILFDLSLGPLNLPFLHLSQMYNGWVGNMRVRVMLAGNAFSAGKIIICVPPGFESQNISIG  
QATMFPHVIA D V R V L E P I E V P L D D V R N V L F H T N E N R P T M R L L C M L Y T P L R A G G A S S G T D P F V I A G R V L T C P A P  
D F N F L F L V P P S V E Q K T R Q L T I P N I P L N N L A N S R V P A M I N K M T V S A D Q N Q V V Q F Q N G R C T L E G Q L L G T T P V S A  
N Q V A R I R G K V F S T N S G T G L N L T E V D G T P Y H A F E S P A P L G F P D I G N C D W H V Y A F K V N Q N T G D P M Y R L D I T Q G  
N S F A P H L G S I E F S S E N H P S G D Q L G T L T W I S P L N N A S R V D P W K I P T Y G S T L T E S T N L A P P I F P P G F G E A I V Y F M S D  
F P I V S G N T A Q I P C T L P Q E F V S S F V E Q Q A P I R G E A A L L H Y V D P D T H R N L G E F K L Y P D G F I T C V P N T G G G P Q N L P S  
N G V F V F S S W V S R Y Y Q L K P V G T T G P V R R L G V R R V

**Figure 29H**

Nucleic acid sequence of human codon optimized VP1\_ Gl.7/GA5043/USA/2014\_R84S (SEQ ID NO:176)

ATGATGATGGCCAGCAAGGACGCTCCGAGTAACATGGACGGCACTTCGGGCGCGGGGAGCTGGTGCC  
CGAGGTCAATGCCGCAGAACCACTTCCTCTTGAGCCCGTCGTTGGCGCCGCCACAGCTGTCGCAACTGCA  
GGCCAAGTCAATATGATCGACCCGTGGATAATGAACAATTTCTGTTAGGCACCCAGAAGGAGAATTCACC  
ATCTCCCCAATAACACCCCAGGGGATATTCTGTTTGACCTCAGCTTAGGACCCCACTTGAACCCCTTTCT  
GCTTCATCTCTCACAAATGTATAATGGCTGGGTGCGGAATATGCGCGTGCGGGTGATGCTAGCCGGCAA  
TGCTTTTTCTGCAGGCAAGATTATCATTTGCTGCGTTCTCTGGATTCTGAATCTCAAATATCAGCATTG  
GTCAAGCAACCATGTTTCCACATGTGATCGCTGATGTTGCGTCCTGGAACCCATTGAAGTTCCTCTCGAC  
GACGTGAGAAATGTTCTTCCACACCAACGAGAATAGGCCGACTATGAGACTTCTGTGTATGCTCTACA  
CCCCATTAAGAGCCGGGGGAGCATCCTCAGGTACTGACCCATTTGTGATTGCCGGGCGGGTGCTCACAT  
GCCCCGCTCCAGACTTTAACTTCCTTTTCTTGGTGCCACCCAGTGTTGAACAGAAAACAGACAGCTCACC  
ATCCCAAATATCCCATTGAACAATCTCGCCAACAGCAGGGTGCCAGCAATGATAAAACAAAATGACAGTCA  
GTGCTGACCAGAACCAGGTAGTCCAGTTTCAGAACGGCAGATGCACGCTTGAGGGCCAACTGCTTGGGA  
CGACCCAGTCTCCGCGAACCAGGTGGCCCGAATCCGGGGTAAAGTCTTCAGTACAACTCCGGCACTG  
GCCTTAACCTCACAGAGGTTGACGGCACTCCCTATCATGCTTTTGAGTCTCCAGCCCCTCTTGGCTTTCCC  
GATATAGGCAACTGTGACTGGCAGTTTTATGCGTTTAAAGTAAACCAGAACACCGGCGATCCTATGTATA  
GGTTGGATATAACACAAGGTAATTCATTCGCCCCACACTTGGGTAGCATCGAGTTCAGTTCAGAGAACCA  
TCCGAGTGGTGATCAGCTAGGCACATTGACGTGGATCAGCCCTCTGAATAACGCATCAAGAGTGGATCC  
CTGGAAGATCCCTACCTATGGGTCCACTCTGACAGAGAGCACAAATTTGGCTCCGCCCATTTTCCCACCCG  
GATTCGGCGAGGCCATAGTGTACTTTATGTCTGACTTTCCTATCGTCAGCGGGAATACAGCCCAGATTCT  
TGCACACTGCCACAAGAATTCGTCTCATCTTTGTAGAGCAGCAGGCACCTATTCGAGGTGAGGCCGCC  
TCTTGCACTACGTGGACCCTGACACCCACCGCAATCTTGCGAGTTTAAGCTGTACCCTGACGGGTTTATT  
ACCTGTGTACCCAACACCGGCGGCGGCCCAAAATTTGCCAGCAATGGCGTGTGTTGCTTTTCTCTTG  
GGTGTCTCGATACTACCAGCTTAAACCTGTCGGAACCTACGGGCCCCGTGCGACGACTCGGCGTGAGGCG  
GGTGTGA

**Figure 29I**

Amino acid sequence of VP1\_ Gl.7/GA5043/USA/2014\_M57I (SEQ ID NO:179)

MMMASKDAPSNMDGTSGAGQLVPEVNAAEPLPLEPVVGAATAVATAGQVNMIDPWIINNFEVQAPEGEFT  
ISPNNTPGDILFDLRLGPHLNPFLHLSQMYNGWVGNMRVRVMLAGNAFSAGKIIICVPPGFESQNI SIGQA  
TMFPHVIADVRLVLEPIEVPLDDVRNVLFHTNENRPTMRLLCMLYTPLRAGGASSGTDPFVIAGRVLTCPAPDF  
NFLFLVPPSVEQKTRQLTIPNIPLNNLANSRVPAMINKMTVSADQNQVVQFQNGRCTLEGQLLGTTTPVSANQ  
VARIRGKVFSTNSGTGLNLTEVDGTPYHAFESPAPLGFDPDIGNCDWHVYAFKVNQNTGDPMYRLDITQGN SF  
APHLGSIEFSSENHPSGDQLGTLTWISPLNNASRVDPWKIPTYGSTLTSTNLAPPIFPFGGEAIVYFMSDFPI  
VSGNTAQIPCTLPQEFVSSFVEQQAPIRGEAALLHYVDPDTHRNLFKLYPDGFITCVPNTGGGPQNLPSNG  
VVFSSWVSRYYQLKPVGTTGPVRRLGVRV

**Figure 29J**

human codon optimized VP1\_ GI.7/GA5043/USA/2014\_M57I (SEQ ID NO:178)

ATGATGATGGCCAGCAAGGACGCTCCGAGTAACATGGACGGCACTTCGGGCGCGGGGCAGCTGGTGCC  
CGAGGTCAATGCCGCAGAACCACTTCCTCTTGAGCCCGTCGTTGGCGCCGCCACAGCTGTCGCAACTGCA  
GGCCAAGTCAATATGATCGACCCGTGGATAATCAACAATTTCTGTCAGGCACCAGAAGGAGAATTCACCA  
TCTCCCCCAATAACACCCAGGGGATATTCTGTTTGACCTCAGGTTAGGACCCCACTTGAACCCCTTCTG  
CTTCATCTCTCACAAATGTATAATGGCTGGGTGCGGAATATGCGCGTGCGGGTGATGCTAGCCGGCAAT  
GCTTTTTCTGCAGGCAAGATTATCATTTGCTGCGTTCCTCTGGATTCTCAAAATATCAGCATTGG  
TCAAGCAACCATGTTTCCACATGTGATCGCTGATGTTGCGCTCCTGGAACCCATTGAAGTTCCTCTCGACG  
ACGTGAGAAATGTTCTCTTCCACACCAACGAGAATAGGCCGACTATGAGACTTCTGTGTATGCTCTACAC  
CCCATTAAGAGCCGGGGGAGCATCCTCAGGTACTGACCCATTTGTGATTGCCGGGCGGGTGCTCACATG  
CCCGGCTCCAGACTTTAACTTCCTTTCTTGGTGCCACCCAGTGTTGAACAGAAAACAGACAGCTCACCA  
TCCCAAATATCCCATGAACAATCTCGCCAACAGCAGGGTGCCAGCAATGATAAACAAAATGACAGTCAG  
TGCTGACCAGAACCAGGTAGTCCAGTTTCAGAACGGCAGATGCACGCTTGAGGGCCAACTGCTTGGGAC  
GACCCAGTCTCCGCGAACCAGGTGGCCCGAATCCGGGGTAAAGTCTTCAGTACAACTCCGGCACTGG  
CCTTAACCTCACAGAGGTTGACGGCACTCCCTATCATGCTTTTGAGTCTCCAGCCCCTCTTGGCTTTCCCGA  
TATAGGCAACTGTGACTGGCACGTTTATGCGTTTAAAGTAAACCAGAACACCGGCGATCCTATGTATAGG  
TTGGATATAACACAAGGTAATTCATTCGCCCCACACTTGGGTAGCATCGAGTTCAGTTCAGAGAACCATC  
CGAGTGGTGATCAGCTAGGCACATTGACGTGGATCAGCCCTCTGAATAACGCATCAAGAGTGGATCCCT  
GGAAGATCCCTACCTATGGGTCCACTCTGACAGAGAGCACAAATTTGGCTCCGCCCATTTTCCACCCGG  
ATTCGGCGAGGCCATAGTGTACTTTATGTCTGACTTTCCTATCGTCAGCGGGAATACAGCCAGATTCTT  
GCACACTGCCACAAGAATTCGTCTCATCTTTGTAGAGCAGCAGGCACCTATTCGAGGTGAGGCCGCCCT  
CTTGCACTACGTGGACCCTGACACCCACCGCAATCTTGCGGAGTTTAAGCTGTACCCTGACGGGTTTATTA  
CCTGTGTACCCAACACCGGCGGCGGCCCAAAAATTTGCCAGCAATGGCGTGTTTGTCTTTCTCTTGG  
GTGTCTCGATACTACCAGCTTAAACCTGTGCGAACTACGGGCCCCGTGCGACGACTCGGCGTGAGGCGG  
GTGTGA

**Figure 29K**

Amino acid sequence of VP1\_ GI.7/GA5043/USA/2014\_M57I+R84S (SEQ ID NO:181)

MMMASKDAPSNMDGTSGAGQLVPEVNAAEPLPLEPVVGAATAVATAGQVNMIDPWIINNFFVQAPEGEFT  
ISPNNTPGDILFDLSLGPLHNPFLHLSQMYNGWVGNMRVRVMLAGNAFSAGKIIICVPPGFESQNI SIGQA  
TMFPHVIADVRLVLEPIEVLDDVRNVLFHTNENRPTMRLLCMLYTPLRAGGASSGTDPFVIAGRVLTCPAPDF  
NFLFLVPPSVEQKTRQLTIPNIPLNNLANSRVPAMINKMTVSADQNQVVQFQNGRCTLEGQLLGTTTPVSANQ  
VARIRGKVFSTNSGTGLNLTEVDGTPYHAFESPAPLGFDPDIGNCDWHVYAFKVNQNTGDPMYRLDITQGN SF  
APHLGSIEFSSSENHPSGDQLGTLTWISPLNNASRVDPWKIPTYGSTLTESTNLAPPIFPFGFEAIVYFMSDFPI  
VSGNTAQIPCTLPQEFVSSFVEQQAPIRGEAALLHYVDPDTHRNLGEFKLYPDGFITCVPNTGGGPQNLPSNG  
VVFSSWVSRYYQLKPVGTTGPVRRLGVRV

**Figure 29L**

Human codon optimized VP1\_GI.7/GA5043/USA/2014\_M57I+R84S (SEQ ID NO:180)

ATGATGATGGCCAGCAAGGACGCTCCGAGTAACATGGACGGCACTTCGGGCGCGGGGCAGCTGGTGCCCGAGGTC  
 AATGCCGCGAGAACCACCTTCCTCTTGAGCCCGTCGTTGGCGCCGCCACAGCTGTCGCAACTGCAGGCCAAGTCAATAT  
 GATCGACCCCGTGGATAATCAACAATTTCTGTTAGGACACCAGAAGGAGAATTCACCATCTCCCCAATAACACCCAG  
 GGGATATTCTGTTTGACCTCAGCTTAGGACCCCACTTGAACCCCTTTCTGCTTCATCTCTCACAAATGTATAATGGCTG  
 GGTCCGGGAATATGCGCGTGCAGGTGATGCTAGCCGGAATGCTTTTTCTGCAGGCAAGATTATCATTTGCTGCGTTC  
 CTCCTGGATTGCAATCTCAAAATATCAGCATTGGTCAAGCAACCATGTTTCCACATGTGATCGCTGATGTTGCGCTCC  
 TGGAACCCATTGAAGTTCCTCTCGACGACGTGAGAAATGTTCTCTCCACACCAACGAGAATAGGCCGACTATGAGA  
 CTTCTGTGTATGCTCTACACCCATTAAGAGCCGGGGGAGCATCCTCAGGTAAGTACCCATTTGTGATTGCCGGGCG  
 GGTGCTCACATGCCCGGCTCCAGACTTAACTTCCTTTCTTGGTGCCACCCAGTGTTGAACAGAAAACCCAGACAGCT  
 CACCATCCCAAATATCCCATGAACAATCTCGCCAACAGCAGGGTGCCAGCAATGATAAACAAAATGACAGTCAGTG  
 CTGACCAGAACAGGTAGTCCAGTTTCAGAACGGCAGATGCACGCTTGAGGGCCAAGTCTTGGGACGACCCAGT  
 CTCCGCGAACAGGTGGCCGAATCCGGGGTAAAGTCTTCACTACAACTCCGGCACTGGCCTTAACCTCACAGAG  
 GTTGACGGCACTCCCTATCATGCTTTGAGTCTCCAGCCCTCTTGGCTTTCCGATATAGGCAACTGTGACTGGCAC  
 GTTTATGCGTTTAAAGTAAACAGAACACCGGCGATCCTATGTATAGGTTGGATATAACACAAGGTAATTCATTGCG  
 CCCACACTTGGGTAGCATCGAGTTCAGTTCAGAGAACCATCCGAGTGGTGATCAGCTAGGCACATTGACGTGGATC  
 AGCCCTCTGAATAACGCATCAAGAGTGGATCCCTGGAAGATCCCTACCTATGGGTCCACTCTGACAGAGAGCACAAA  
 TTTGGCTCCGCCATTTTCCACCCGATTGCGCGAGGCCATAGTGTACTTTATGTCTGACTTTCCTATCGTCAGCGG  
 GAATACAGCCAGATTCTTGCACTGCCACAAGAATTCGTCTCATCCTTTGTAGAGCAGCAGGCACCTATTCGAG  
 GTGAGGCCGCCCTCTTGCACTACGTGGACCCTGACACCCACCGCAATCTTGGCGAGTTTAAGCTGTACCCTGACGGG  
 TTTATTACCTGTGTACCAACACCGGCGGCGGCCACAAAATTTGCCAGCAATGGCGTGTTGTCTTTCTCTTGG  
 GTGTCTCGATACTACCAGCTTAAACCTGTCGGAACCTACGGGCCCGTGGCAGCACTCGGCGTGAGGCGGGTGTGA

**Figure 29M** (SEQ ID NO:290)

AA sequence of VP1\_GI.7/GA5043/USA/2014\_M57X; where X = L, G, S, T, N, Q, K, or H

MMMASKDAPSNMDGTSGAGQLVPEVNAAEPLPLEPVVGAATAVATAGQVNMIDPWIXNNFVQAPGEGF  
 TISPNNTPGDILFDLRLGPHLNPFLHLSQMYNGWVGNMRVRVMLAGNAFSAGKIIICVPPGFESQNI SIGQ  
 ATMFPHVIADVRVLEPIEVPLDDVRNVLFHTNENRPTMRLLCMLYTLRAGGASSGTDPFVIAGRVLTCAPD  
 FNFLFLVPPSVEQKTRQLTIPNIPLNNLANSRVPAMINKMTVSADQNQVVFQNGRCTLEGQLLGTTTPVSAN  
 QVARIRGKVFSTNSGTGLNLTEVDGTPYHAFESPAPLGFPDIGNCDWHVYAFKVNQNTGDPMYRLDITQGN  
 SFAPHLGSI EFSSENHPSGDQLGTLTWISPLNNASRVDPWKIPTYGSTLTESTNLAPPIFPFGFEAIVYFMSDF  
 PIVSGNTAQIPCTLPQEFVSSFEQQAPIRGEAALLHYVDPDTHRLGEFKLYPDGFITCVPNTGGGPQNLPSN  
 GVVFSSWVSRYQLKPVGTTGPVRRLGVRV\*

**Figure 29N** (SEQ ID NO:291)

Human codon optimized VP1\_GI.7/GA5043/USA/2014\_M57x; 'x' = L (XXX=CTG), G (XXX=GGC), S (XXX=AGC), T (XXX=ACC), N (XXX=AAC), Q (XXX=CAG), K (XXX=AAG), or H (XXX=CAC)

ATGATGATGGCCAGCAAGGACGCTCCGAGTAACATGGACGGCACTTCGGGCGCGGGGCAGCTGGTGCC  
CGAGGTCAATGCCGCGAGAACCCTTCTCTTGAGCCCGTCGTTGGCGCCGCCACAGCTGTCGCAACTGCA  
GGCCAAGTCAATATGATCGACCCGTGGATA~~XXXX~~AACAATTTCTGTTAGGCACCCAGAAAGGAGAATTCACC  
ATCTCCCCCAATAACACCCCAGGGGATATTCTGTTTGACCTCAGGTTAGGACCCCACTTGAACCCCTTCT  
GCTTCATCTCTCACAAATGTATAATGGCTGGGTGCGGAATATGCGCGTGCAGGTGATGCTAGCCGGCAA  
TGCTTTTTCTGCAGGCAAGATTATCATTTGCTGCGTTCTCTGGATTGCAATCTCAAATATCAGCATTG  
GTCAAGCAACCATGTTTCCACATGTGATCGCTGATGTTGCGTCTCTGGAACCCATTGAAGTTCCTCTCGAC  
GACGTGAGAAATGTTCTTCCACACCAACGAGAATAGGCCGACTATGAGACTTCTGTGTATGCTCTACA  
CCCCATTAAGAGCCGGGGGAGCATCCTCAGGTAAGTACCCATTTGTGATTGCCGGGCGGGTGCTCACAT  
GCCCCGCTCCAGACTTTAACTTCTTTTCTTGGTGCCACCCAGTGTTGAACAGAAAACCAGACAGCTCACC  
ATCCCAAATATCCATTGAACAATCTCGCCAACAGCAGGGTGCCAGCAATGATAAAACAAAATGACAGTCA  
GTGCTGACCAGAACCAGGTAGTCCAGTTTCAAGACGGCAGATGCACGCTTGAAGGCGCAACTGCTTGGGA  
CGACCCAGTCTCCGCGAACCAGGTGGCCCGAATCCGGGGTAAAGTCTTCACTACAACTCCGGCACTG  
GCCTTAACCTCACAGAGGTTGACGGCACTCCCTATCATGCTTTTGAAGTCTCCAGCCCCTCTTGGCTTTCCC  
GATATAGGCAACTGTGACTGGCAGCTTTATGCGTTTAAAGTAAACCAGAACACCGGCGATCCTATGTATA  
GGTTGGATATAACACAAGGTAATTCATTCGCCCCACACTTGGGTAGCATCGAGTTCAGTTCAGAGAACCA  
TCCGAGTGGTGATCAGCTAGGCACATTGACGTGGATCAGCCCTCTGAATAACGCATCAAGAGTGGATCC  
CTGGAAGATCCCTACCTATGGGTCCACTCTGACAGAGAGCACAAATTTGGCTCCGCCCATTTTCCCACCCG  
GATTCGGCGAGGCCATAGTGTACTTTATGTCTGACTTTCCTATCGTCAGCGGGAATACAGCCCAGATTCTT  
TGCACACTGCCACAAGAATTCGTCTCATCTTTGTAGAGCAGCAGGCACCTATTCAGAGTGAGGCCGCC  
TCTTGCACTACGTGGACCCTGACACCCACCGCAATCTTGGCGAGTTTAAAGTGTACCCTGACGGGTTTATT  
ACCTGTGTACCCAACACCGGCGGCGGCCCAAAATTTGCCAGCAATGGCGTGTGTTGCTTTTCTCTTG  
GGTGTCTCGATACTACCAGCTTAAACCTGTCGGAACCTACGGGCCCCGTGCGACGACTCGGCGTGAGGCG  
GGTGTGA

**Figure 30A**

Amino acid sequence of VP1\_GII.2\_CGMH47\_E80S (SEQ ID NO:85)

MKMASNDAA PSTDGAAGLVPE SNNEVMALEPVAGAALAAPVTGQTNIIDPWIRANFVQAPNGEFTVSPRNSPGEVLL  
NLSLGPELN PYLAHLARMYNGYAGGMEVQVMLAGNAFTAGKLVFAAVPPHFPVENLSPQQITMFPHVIIDVRTLEPVLL  
PLPDVRNFFHYNQKDDPKMRIVAMLYTPLRSNGSGDDVFTVSCRVLTRPSPDFDFTYLPPTVESKTKPFTLPILTLELS  
NSRFPVSIDQMYTSPNEVISVQCQNGRCTLGELQGTTLQVSGICAFKGEVTAHLHDNDHLYNVTITNLNGSPFDPS  
IPAPLGVPDFQGRVFGVISQRDKHNTPGHNEPANRAHDAVVPYTYAQYTPKLGQIQIGTWQTDLTVNQPVKFTPVGL  
NDTDHFNQWVVPYAGALNLNTNLAPSVAPVFPGERLLFFRSYIPLKGGYGTPAIDCLLPQEWVQHFYQEAAPSMSEVA  
LVRYINPDTGRALFEAKLHRAGFMTVSSNTSAPVVVPANGYFRFDSWVNQFYSLAPMGTGNRRRIQ

**Figure 30B**

Nucleic acid sequence of human codon optimized VP1\_GII.2\_CGMH47\_E80S\_ (SEQ ID NO:86)

ATGAAGATGGCATCCAACGACGCCGCACCCAGCACAGACGGAGCTGCCGGATTGGTACCCGAGTCTAATAACGAG  
GTGATGGCCTTGAGCCTGTTGCAGGGGCTGCCCTCGCAGCTCCTGTGACCGGGCAGACAAATATCATCGATCCTTG  
GATTAGAGCTAATTTTCGTGCAAGCCCCAAATGGGGAGTTTACGGTCAGCCCTAGAAATAGCCCTGGGGAAGTGCTC  
CTCAATCTCAGCCTGGGACCAGAACTTAATCCGTACCTGGCTCACCTGGCCCCGGATGTACAATGGATATGCAGGAGG  
GATGGAGGTGCAGGTTATGCTGGCTGGCAATGCCTTTACAGCAGGCAAACCTGTTTTCGCAGCCGTCCTCCCCACT  
TCCCAGTTGAAAATCTTTCCCCTCAGCAGATTACCATGTTTCCCCTATGTCATCATCGATGTGCGTACCCTGGAACCTGT  
GCTGTTGCCTTTACCAGACGTGCGGAATAATTTCTTTCACTATAATCAGAAGGATGACCCAAAAATGCGGATCGTTG  
CGATGCTTTATACTCCCCTGCGTAGCAATGGTAGTGGGGATGACGTTTTTACAGTGAGTTGTCGGGTACTAACTCGC  
CCTTACCAGACTTCGACTTTACGTACTTGGTGCCTCCCACTGTCGAAAGCAAACCTAAGCCATTACACTTCCCATCC  
TCACCCTCGGAGAAGTCTCGAACTCCCGCTTCCCTGTTTCAATTGATCAGATGTACACGTCTCCAAATGAAGTCATTTG  
TGTGAGTGTGAGAACGGCAGGTGCACCTTAGACGGTGAAGTGCAGGGGACAACGCAGTTGCAGGTCAGTGGAAT  
TTGCGCCTTTAAGGGCGAAGTGACAGCTCACCTCCACGACAACGATCATCTCTACAATGTTACTATTACTAATCTCAA  
TGGAAGTCCTTTGACCCCTCGGAAGATATCCCGCTCCACTCGGAGTACCTGACTTTCAGGGACGCGTCTTCGGCG  
TGATATCACAAACGAGATAAGCATAACACACCCGGACATAATGAGCCAGCCAATAGAGCCCACGACGAGTCGTTCC  
GACCTATACGGCTCAGTACACCCCAAAGCTCGGCCAGATACAAATCGGGACTTGGCAGACCGATGACCTCACTGTG  
AATCAACCTGTGAAATCACTCCAGTAGGTCTGAATGATACAGACCACTTTAACCAGTGGGTGGTCCCTAGATACGC  
CGGAGCCTTGAACCTAAACCTAACCTTGCCCTTCCGTTGCACCTGTGTTCCGGGGGAGCGGTTGCTCTTCTTAG  
AAGCTATATTCCTCTGAAGGGCGGGTATGGTACTCCAGCAATCGACTGCCTGCTACCTCAGGAGTGGGTCAACATT  
TCTATCAAGAGGCCGCACCTAGTATGAGCGAGGTGGCTTTGGTCAGATACATCAATCCAGACACAGGAAGAGCACT  
GTTGAGGCCAAGCTGCACAGAGCCGGCTTCATGACCGTCTCATCAATACATCCGCACCCGTAGTAGTCCCCGCCA  
ACGGGTACTTCAGATTGACAGTTGGGTGAATCAGTTTACTCGTTGGCCCCCATGGGCACAGGGAACGGTCGCCG  
ACGGATCCAGTAA

**Figure 30C**

Amino acid sequence of VP1\_GII.2\_CGMH47\_A90L (SEQ ID NO:41)

MKMASNDAAPSTDGAAGLVPESNNEVMALEPVAGAALAAPVTGQTNIIDPWIRANFVQAPNGEFTVSPRNSPGEVLL  
NLELGPENLPYLLHARMYNGYAGGMEVQVMLAGNAFTAGKLVAAPVPPHFPVENLSPQQITMFPVHIIDVRTLEPVLL  
PLPDVRNFFHYNQKDDPKMRIVAMLYTPLRSNGSGDDVFTVSCRVLTRPSPDFDFTYLPPTVESKTKPFTLPILTLGELS  
NSRFPVSIDQMYTSPNEVISVQCQNGRCTLDELQGTTLQVSGICAFKGEVTAHLHDNDHLYNVITNLNGSPDFPSED  
IPAPLGVPDFQGRVFGVISQRDKHNTPGHNEPANRAHDAVVPYTAQYTPKLGQIQIGTWQTDLTVNQPVKFTPVGL  
NDTDHFNQWVVPYAGALNLNTNLAPSVAPVFPGERLLFRSYIPLKGGYGTAPIDCLLPQEWVQHFYQEAAPSMSEVA  
LVRYINPDTGRALFEAKLHRAGFMTVSSNTSAPVVVPANGYFRFDSWVNQFYSLAPMGTGNGRRRIQ

**Figure 30D**

Nucleic acid sequence of human codon optimized VP1\_GII.2\_CGMH47\_A90L (SEQ ID NO:42)

ATGAAGATGGCATCCAACGACGCCGCACCCAGCACAGACGGAGCTGCCGGATTGGTACCCGAGTCTAATAACGAG  
GTGATGGCCTTGAGCCTGTTGCAGGGGCTGCCCTCGCAGCTCCTGTGACCGGGCAGACAAATATCATCGATCCTTG  
GATTAGAGCTAATTTTCGTGCAAGCCCCAAATGGGGAGTTTACGGTCAGCCCTAGAAATAGCCCTGGGGAAGTGCTC  
CTCAATCTCAGCTGGGACCAGAACTTAATCCGTACCTGCTCCACCTGGCCCCGGATGTACAATGGATATGCAGGAGG

**Figure 30D (cont)**

GATGGAGGTGCAGGTTATGCTGGCTGGCAATGCCTTTACAGCAGGCAAACCTCGTTTTTCGAGCCGTCCTCCCCACT  
 TCCCAGTTGAAAATCTTTCCCCTCAGCAGATTACCATGTTTCCCCATGTCATCATCGATGTGCGTACCCTGGAACCTGT  
 GCTGTTGCCTTTACCAGACGTGCGGAATAATTTCTTTCACTATAATCAGAAGGATGACCCAAAAATGCGGATCGTTG  
 CGATGCTTTATACTCCCCTGCGTAGCAATGGTAGTGGGGATGACGTTTTTACAGTGAGTTGTCGGGTACTAACTCGC  
 CCTTCACCAGACTTCGACTTTACGTACTTGGTGCCTCCCACTGTCGAAAGCAAACTAAGCCATTACACTTCCCATCC  
 TCACCCTCGGAGAACTCTGAACTCCCGCTTCCCTGTTTCAATTGATCAGATGTACACGTCTCCAAATGAAGTCATTTT  
 TGTGCAGTGTGAGAACGGCAGGTGCACCTTAGACGGTGAAGTGCAGGGGACAACGCAGTTGCAGGTGAGTGGAAT  
 TTGCGCCTTTAAGGGCGAAGTGACAGCTCACCTCCACGACAACGATCATCTCTACAATGTTACTATTACTAATCTCAA  
 TGGAAGTCCTTTGACCCCTCGGAAGATATCCCGCTCCACTCGGAGTACCTGACTTTTCAGGGACGCGTCTTCGGCG  
 TGATATCACAAACGAGATAAGCATAACACACCCGGACATAATGAGCCAGCCAATAGAGCCACGACGCAGTCGTTCC  
 GACCTATACGGCTCAGTACACCCCAAAGCTCGGCCAGATACAAATCGGGACTTGGCAGACCGATGACCTCACTGTG  
 AATCAACCTGTGAAATCACTCCAGTAGGTCTGAATGATACAGACCACTTTAACCAGTGGGTGGTCCCTAGATACGC  
 CGGAGCCTTGAACCTAAACCTAACCTTGCCCTTCCGTTGCACCTGTGTTTCCGGGGGAGCGTTGCTCTTCTTAG  
 AAGCTATATTCCTCTGAAGGGCGGGTATGGTACTCCAGCAATCGACTGCCTGCTACCTCAGGAGTGGGTCAACATT  
 TCTATCAAGAGGCCGCACCTAGTATGAGCGAGGTGGCTTGGTCAGATACATCAATCCAGACACAGGAAGAGCACT  
 GTTCGAGGCCAAGCTGCACAGAGCCGGCTCATGACCGTCTCATCAATACATCCGCACCCGTAGTAGTCCCCGCCA  
 ACGGGTACTTCAGATTGACAGTTGGGTGAATCAGTTTTACTCGTTGGCCCCCATGGGCACAGGGAACGGTCGCCG  
 ACGGATCCAGTAA

**Figure 30E**

Amino acid sequence of VP1\_GII.2\_CGMH47\_E80S+A90L (SEQ ID NO:43)

MKMASNDAAPSTDGAAGLVPESNNEVMALEPVAGAALAAPVTGQTNIIDPWIRANFVQAPNGEFTVSPRNSPGEVLL  
 NLSLGPENLPYLLHARMYNGYAGGMEVQVMLAGNAFTAGKLVFAAVPPHFPVENLSPQQITMFPVHIIDVRTLEPVLL  
 PLPDVRNNFFHYNQKDDPKMRIVAMLYTPLRSNGSGDDVFTVSCRVLTRPSPDFDFTYLPPTVESKTKPFTLPILTLELS  
 NSRFPVSIDQMYTSPNEVISVQCQNGRCTLDELQGTTLQVSGICAFKGEVTAHLHDNDHLYNVTITNLNGSPFDPSED  
 IPAPLGVPDFQGRVFGVISQRDKHNTPGHNEPANRAHDAVPTYTAQYTPKLGQIQIGTWQTDLTVNQPVKFTPVGL  
 NDTDFHNQWVVPYAGALNLTNLAPSVAPVFPGERLLFFRSYIPLKGGYGTPAIDCLLPQEWVQHFYQEAPSMSEVA  
 LVRYINPDTGRALFEAKLHRAGFMTVSSNTSAPVVVPANGYFRFDSWVNQFYSLAPMGTGNRRRIQ

**Figure 30F**

Nucleic acid sequence of human codon optimized VP1\_GII.2\_CGMH47\_E80S+A90L (SEQ ID NO:44)

ATGAAGATGGCATCCAACGACGCCGACCCAGCACAGACGGAGCTGCCGGATTGGTACCCGAGTCTAATAACGAG  
 GTGATGGCCTTGAGCCTGTTGCAGGGGCTGCCCTCGCAGCTCCTGTGACCGGGCAGACAAATATCATCGATCCTTG  
 GATTAGAGCTAATTTCTGCAAGCCCCAAATGGGGAGTTTACGGTCAGCCCTAGAAATAGCCCTGGGGAAGTGCTC  
 CTAATCTCAGCCTGGGACCAGAACTTAATCCGTACCTGCTCCACCTGGCCCGGATGTACAATGGATATGCAGGAGG  
 GATGGAGGTGCAGGTTATGCTGGCTGGCAATGCCTTTACAGCAGGCAAACCTCGTTTTTCGAGCCGTCCTCCCCACT  
 TCCCAGTTGAAAATCTTTCCCCTCAGCAGATTACCATGTTTCCCCATGTCATCATCGATGTGCGTACCCTGGAACCTGT  
 GCTGTTGCCTTTACCAGACGTGCGGAATAATTTCTTTCACTATAATCAGAAGGATGACCCAAAAATGCGGATCGTTG  
 CGATGCTTTATACTCCCCTGCGTAGCAATGGTAGTGGGGATGACGTTTTTACAGTGAGTTGTCGGGTACTAACTCGC  
 CCTTCACCAGACTTCGACTTTACGTACTTGGTGCCTCCCACTGTCGAAAGCAAACTAAGCCATTACACTTCCCATCC

**Figure 30F (cont)**

TCACCCTCGGAGAACTCTCGAACTCCCGCTTCCCTGTTTCAATTGATCAGATGTACACGTCTCCAAATGAAGTCATTTCTGTGAGTGTGAGAACGGCAGGTGCACCTTAGACGGTGAAGTGCAGGGGACAACGCAGTTGCAGGTGAGTGAATTTGCGCCTTTAAGGGCGAAGTGACAGCTCACCTCCACGACAACGATCATCTCTACAATGTTACTATTACTAATCTCAATGGAAGTCTTTGACCCCTCGGAAGATATTTCCCGCTCCACTCGGAGTACCTGACTTTTCAGGGACGCGTCTTCGGCGTGATATCACAACGAGATAAGCATAACACACCCGGACATAATGAGCCAGCCAATAGAGCCACGACGAGTCGTTCCGACCTATACGGCTCAGTACACCCCAAAGCTCGGCCAGATACAAATCGGGACTTGGCAGACCGATGACCTCACTGTGAATCAACCTGTGAAATCACTCCAGTAGGTCTGAATGATACAGACCACTTTAACCAGTGGGTGGTCCCTAGATACGCGGAGCCTTGAACCTAAACACTAACCTTGCCCTTCCGTTGCACCTGTGTTTCCGGGGGAGCGGTTGCTCTCTTTAGAAGCTATATTCTCTGAAGGGCGGGTATGGTACTCCAGCAATCGACTGCCTGCTACCTCAGGAGTGGGTCAACATTCTATCAAGAGGCCGACCTAGTATGAGCGAGGTGGCTTTGGTCAGATACATCAATCCAGACACAGGAAGAGCACTGTCGAGGCCAAGCTGCACAGAGCCGGCTTCATGACCGTCTCATCAATACATCCGCACCCGTAGTAGTCCCCGCCAACGGGTACTTCAGATTGACAGTTGGGTGAATCAGTTTTACTCGTTGGCCCCCATGGGCACAGGGAACGGTCGCCGACGGATCCAGTAA

**FIGURE 30G**

Amino acid sequence of VP1\_GII.2\_CGMH47\_A39V+E80S+A90L (SEQ ID NO:182)

MKMASNDAAPSTDGAAGLVPESNNEVMALEPVAGAALAVPVTGQTNIIDPWIRANFVQAPNGEFTVSPRNSPGEVLLNLSLGPENLPYLLHLARMYNGYAGGMEVQVMLAGNAFTAGKLVFAAVPPHFPVENLSPQQITMFPVHIIDVRTLEPVLLPLPDVRNNFFHYNQKDDPKMRIVAMLYTPLRSNGSGDDVFTVSCRVLTRPSPDFDFTYLPPTVESKTKPFTLPILTLELSNSRFPVSIDQMYTSPNEVISVQCQNGRCTLDELQGTTLQVSGICAFKGEVTAHLHDNDHLYNVTITNLNGSPFDPSEDIPAPLGVPDFQGRVFGVISQRDKHNTPGHNEPANRAHDAVPTYTAQYTPKLGQIQIGTWQTDLTVNQPVKFTPVGLNDTDHFNQWVVPYAGALNLTNLAPSVAPVFPGERLLFFRSYIPLKGGYGTPAIDCLLPQEWVQHFYQEAAPSMSEVALVRYINPDTGRALFEAKLHRAGFMTVSSNTSAPVVVPANGYFRFDSWVNQFYS LAPMGTGNRRRIQ

**FIGURE 30H**

Nucleic acid sequence of human codon optimized VP1\_GII.2\_CGMH47\_A39V+E80S+A90L (SEQ ID NO:183)

ATGAAGATGGCATCCAACGACGCCGACCCAGCACAGACGGAGCTGCCGGATTGGTACCCGAGTCTAATAACGAGGTGATGGCCTTGGAGCCTGTTGCAGGGGCTGCCCTCGCAGTGCCTGTGACCGGGCAGACAAATATCATCGATCCTTGGATTAGAGCTAATTTCTGCAAGCCCCAAATGGGGAGTTACGGTCAGCCCTAGAAATAGCCCTGGGGAAGTGCTCCTCAATCTCAGCCTGGGACCAGAACTTAATCCGTACCTGCTCCACCTGGCCCGGATGTACAATGGATATGCAGGAGGGATGGAGGTGCAGGTTATGCTGGCTGGCAATGCCTTTACAGCAGGCAAACCTCGTTTTCGCAGCCGTCCCTCCCCAC TTCCCAGTTGAAAATCTTTCCCTCAGCAGATTACCATGTTTCCCATGTCATCATCGATGTGCGTACCCTGGAACCTGTGCTGTTGCCTTTACCAGACGTGCGGAATAATTTCTTCACTATAATCAGAAGGATGACCCAAAAATGCGGATCGTTGCGATGCTTTATACTCCCTGCGTAGCAATGGTAGTGGGGATGACGTTTTTACAGTGAGTTGTCGGGTACTAACTCGCCCTTACCAGACTTCGACTTTACGTACTTGGTGCCTCCCACTGTCGAAAGCAAACTAAGCCATTCACTTCCCATCC TCACCCTCGGAGAACTCTCGAACTCCCGCTTCCCTGTTTCAATTGATCAGATGTACACGTCTCCAAATGAAGTCATTTCTGTGAGTGTGAGAACGGCAGGTGCACCTTAGACGGTGAAGTGCAGGGGACAACGCAGTTGCAGGTGAGTGAATTTGCGCCTTTAAGGGCGAAGTGACAGCTCACCTCCACGACAACGATCATCTCTACAATGTTACTATTACTAATCTCAATGGAAGTCTTTGACCCCTCGGAAGATATTTCCCGCTCCACTCGGAGTACCTGACTTTTCAGGGACGCGTCTTCGGCGTGATATCACAACGAGATAAGCATAACACACCCGGACATAATGAGCCAGCCAATAGAGCCACGACGAGTCGTTCCGACCTATACGGCTCAGTACACCCCAAAGCTCGGCCAGATACAAATCGGGACTTGGCAGACCGATGACCTCACTGTGAATCAACCTGTGAAATCACTCCAGTAGGTCTGAATGATACAGACCACTTTAACCAGTGGGTGGTCCCTAGATACGCG

**Figure 30H (cont)**

CGGAGCCTTGAACCTAAACCTAACCTTGCCCTTCCGTTGCACCTGTGTTTCCGGGGGAGCGGTTGCTCTCTTTAG  
 AAGCTATATTCCTCTGAAGGGCGGGTATGGTACTCCAGCAATCGACTGCCTGCTACCTCAGGAGTGGGTTCACATT  
 TCTATCAAGAGGCCGCACCTAGTATGAGCGAGGTGGCTTTGGTCAGATACATCAATCCAGACACAGGAAGAGCACT  
 GTTCGAGGCCAAGCTGCACAGAGCCGGCTTCATGACCGTCTCATCCAATACATCCGCACCCGTAGTAGTCCCCGCCA  
 ACGGGTACTTCAGATTGACAGTTGGGTGAATCAGTTTTACTCGTTGGCCCCCATGGGCACAGGGAACGGTCGCCG  
 ACGGATCCAGTAA

**FIGURE 30I**

Amino acid sequence of VP1\_GII.2\_CGMH47\_ R53I+E80S+A90L (SEQ ID NO:184)

MKMASNDAAPSTDGAAGLVPEsnNEVMALEPVAGAALAAPVTGQTNIIDPWIIANFVQAPNGEFTVSPRNSPGEVLLN  
 LSLGPELNPYLLHLARMYNGYAGGMEVQVMLAGNAFTAGKLVFAAVPPHFPVENLSPQQITMFPHVIIDVRTLEPVLLPL  
 PDVRNFFHYNQKDDPKMRIVAMLYTPLRSNGSGDDVFTVSCRVLTRPSPDFDFTYLPPTVESKTKPFTLPILTLGELSNS  
 RFPVSIDQMYTSPNEVISVQCQNGRCTLDELQGTTLQVSGICAFKGEVTAHLHDNDHLYNVITNLNGSPFDPSDIP  
 APLGVPDFQGRVFGVISQRDKHNTPGHNEPANRAHDVVPYTYAQYTPKLGQIQIGTWQTDLLTVNQPVKFTPVGLND  
 TDHFNQWVVPYAGALNLTNLAPSVAPVFPGERLLFFRSYIPLKGGYGTPAIDCLLPQEWVQHFYQEAAPSMSEVALV  
 RYINPDTGRALFEAKLHRAGFMTVSSNTSAPVVVPANGYFRFDSWVNQFYS LAPMGTGNRRRIQ

**FIGURE 30J**

Nucleic acid sequence of human codon optimized VP1\_GII.2\_CGMH47\_ R53I+E80S+A90L (SEQ ID NO:185)

ATGAAGATGGCATCCAACGACGCCGCACCCAGCACAGACGGAGCTGCCGGATTGGTACCCGAGTCTAATAACGAG  
 GTGATGGCCTTGGAGCCTGTTGCAGGGGCTGCCCTCGCAGCTCCTGTGACCGGGCAGACAAATATCATCGATCCTTG  
 GATTATCGCTAATTCGTGCAAGCCCCAAATGGGGAGTTTACGGTCAGCCCTAGAAATAGCCCTGGGGAAGTGCTCC  
 TCAATCTCAGCCTGGGACCAGAACTTAATCCGTACCTGCTCCACCTGGCCCGGATGTACAATGGATATGCAGGAGGG  
 ATGGAGGTGCAGGTTATGCTGGCTGGCAATGCCTTTACAGCAGGCAAACTCGTTTTCGAGCCGTCCCTCCCCACTT  
 CCCAGTTGAAAATCTTTCCCTCAGCAGATTACCATGTTTCCCATGTCATCATCGATGTGCGTACCCTGGAACCTGT  
 GCTGTTGCCTTTACCAGACGTGCGGAATAATTTCTTTCACTATAATCAGAAGGATGACCCAAAAATGCGGATCGTTG  
 CGATGCTTTATACTCCCCTGCGTAGCAATGGTAGTGGGGATGACGTTTTTACAGTGAGTTGTCGGGTACTAACTCGC  
 CCTTACCAGACTTCGACTTTACGTACTTGGTGCCTCCCACTGTCGAAAGCAAACTAAGCCATTACACTTCCCATCC  
 TCACCCTCGGAGAAGTCTCGAACTCCCGCTTCCCTGTTTCAATTGATCAGATGTACACGTCTCCAAATGAAGTCATTC  
 TGTGCAGTGTGAGAACGGCAGGTGCACCTTAGACGGTGAAGTGCAGGGGACAACGCAGTTGCAGGTGAGTGAAT  
 TTGCGCCTTTAAGGGCGAAGTGACAGCTCACCTCCACGACAACGATCATCTCTACAATGTTACTATTACTAATCTCAA  
 TGGAAGTCTTTGACCCCTCGGAAGATATCCCGCTCCACTCGGAGTACCTGACTTTCAGGGACGCGTCTTCGGCG  
 TGATATCACAAACGAGATAAGCATAACACACCCGGACATAATGAGCCAGCCAATAGAGCCCACGACGAGTCGTTCC  
 GACCTATACGGCTCAGTACACCCCAAAGCTCGGCCAGATACAAATCGGGACTTGGCAGACCGATGACCTCACTGTG  
 AATCAACCTGTGAAATCACTCCAGTAGGTCTGAATGATACAGACCACTTTAACCAGTGGGTGGTCCCTAGATACGC  
 CGGAGCCTTGAACCTAAACCTAACCTTGCCCTTCCGTTGCACCTGTGTTTCCGGGGGAGCGGTTGCTCTTCTTTAG  
 AAGCTATATTCCTCTGAAGGGCGGGTATGGTACTCCAGCAATCGACTGCCTGCTACCTCAGGAGTGGGTTCACATT  
 TCTATCAAGAGGCCGCACCTAGTATGAGCGAGGTGGCTTTGGTCAGATACATCAATCCAGACACAGGAAGAGCACT  
 GTTCGAGGCCAAGCTGCACAGAGCCGGCTTCATGACCGTCTCATCCAATACATCCGCACCCGTAGTAGTCCCCGCCA  
 ACGGGTACTTCAGATTGACAGTTGGGTGAATCAGTTTTACTCGTTGGCCCCCATGGGCACAGGGAACGGTCGCCG  
 ACGGATCCAGTAA

**FIGURE 30K**

Amino acid sequence of VP1\_GII.2\_CGMH47\_A39V+ R53I+E80S+A90L (SEQ ID NO:186)

MKMASNDAAPSTDGAAGLVPESNNEVMALEPVAGAALAVPTGQTNIIDPWIIANFVQAPNGEFTVSPRNSPGEVLLN  
LSLGPENPYLLHLARMYNGYAGGMEVQVMLAGNAFTAGKLVFAAVPPHFPVENLSPQQITMFPHVIIDVRTLEPVLLPL  
PDVRNFFHYNQKDDPKMRIVAMLYTPLRSNGSGDDVFTVSCRVLTRSPDFDFTYLPPTVESKTKPFTLPILTLGELSNS  
RFPVSIDQMYTSPNEVISVQCQNGRCTLGDELQGTTLQVSGICAFKGEVTAHLHDNDHLYNVTITNLNGSPFDPSEDIP  
APLGVPDFQGRVFGVISQRDKHNTPGHNEPANRAHDVAVPTYTAQYTPKLGQIQIGTWQTDLLTVNQPVKFTPVGLND  
TDHFNQWVVPYAGALNLTNLAPSVAPVFPGERLLFFRSYIPLKGGYGTPAIDCLLPQEWVQHFYQEAAPSMSEVALV  
RYINPDTGRALFEAKLHRAGFMTVSSNTSAPVVVPANGYFRFDSWVNQFYS LAPMGTGNRRRIQ

**FIGURE 30L (SEQ ID NO:187)**

Nucleic acid sequence of human codon optimized VP1\_GII.2\_CGMH47\_A39V+ R53I+E80S+A90L

ATGAAGATGGCATCCAACGACGCCGACCCAGCACAGACGGAGCTGCCGGATTGGTACCCGAGTCTAATAACGAG  
GTGATGGCCTTGAGCCTGTTGCAGGGGCTGCCCTCGCAGTGCCTGTGACCGGGCAGACAAATATCATCGATCCTT  
GGATTATCGCTAATTCGTGCAAGCCCCAAATGGGGAGTTACGGTCAGCCCTAGAAATAGCCCTGGGGAAGTGCT  
CCTCAATCTCAGCCTGGGACCAGAACTTAATCCGTACCTGCTCCACCTGGCCCGGATGTACAATGGATATGCAGGAG  
GGATGGAGGTGCAGGTTATGCTGGCTGGCAATGCCTTTACAGCAGGCAAACCTGTTTTGCAGCCGTCCTCCCCAC  
TTCCCAGTTGAAAATCTTTCCCCTCAGCAGATTACCATGTTTCCCATGTCATCATCGATGTGCGTACCCTGGAACCTG  
TGCTGTTGCCTTTACCAGACGTGCGGAATAATTTCTTCACTATAATCAGAAGGATGACCCAAAAATGCGGATCGTTG  
CGATGCTTTATACTCCCCTGCGTAGCAATGGTAGTGGGGATGACGTTTTTACAGTGAGTTGTCGGGTAATACTCGC  
CCTTACCAGACTTCGACTTTACGTACTTGGTGCCTCCCACTGTCGAAAGCAAACCTAAGCCATTCACTTCCCATCC  
TCACCCTCGGAGAAGCTCTCGAACTCCCGCTTCCCTGTTCAATTGATCAGATGTACACGTCTCCAAATGAAGTCATTT  
TGTGCAGTGTGAGAACGGCAGGTGCACCTTAGACGGTGAAGTGCAGGGGACAACGCAGTTGCAGGTGAGTGAAT  
TTGCGCCTTTAAGGGCGAAGTGACAGCTCACCTCCACGACAACGATCATCTACAATGTTACTATTACTAATCTCAA  
TGGAAGTCCTTTGACCCCTCGGAAGATATCCCGCTCCACTCGGAGTACCTGACTTTCAGGGACGCGTCTTCGGCG  
TGATATCACAAACGAGATAAGCATAACACACCCGGACATAATGAGCCAGCCAATAGAGCCACGACGAGTCGTTCC  
GACCTATACGGCTCAGTACACCCCAAAGCTCGGCCAGATACAAATCGGGACTTGGCAGACCGATGACCTCACTGTG  
AATCAACCTGTGAAATCACTCCAGTAGGTCTGAATGATACAGACCACTTTAACCAGTGGGTGGTCCCTAGATACGC  
CGGAGCCTTGAACCTAAACCTAACCTTGCCCTTCCGTTGCACCTGTGTTTCCGGGGGAGCGGTTGCTCTTCTTAG  
AAGCTATATTCCTCTGAAGGGCGGGTATGGTACTCCAGCAATCGACTGCCTGCTACCTCAGGAGTGGGTTCACATT  
TCTATCAAGAGGCCGCACCTAGTATGAGCGAGGTGGCTTTGGTCAGATACATCAATCCAGACACAGGAAGAGCACT  
GTTGAGGCCAAGCTGCACAGAGCCGGCTTCATGACCGTCTCATCAATACATCCGACCCGTAGTAGTCCCCGCCA  
ACGGGTACTTCAGATTGACAGTTGGGTGAATCAGTTTTACTCGTTGGCCCCCATGGGCACAGGGAACGGTCGCCG  
ACGGATCCAGTAA

**Figure 31A**

Amino acid sequence of VP1\_GII.3\_Jing\_E80S (SEQ ID NO:46)

MKMASNDAAPSNDGAAGLVPEISSEAMALEPVAGAAIAAPLTGQQNIIDPWIMNMFVQAPGGEFTVSPRNSPGEVLLN  
LSLGPENPYLAHLARMYNGYAGGFEVQVVLAGNAFTAGKIIFAAIPPNFIDNLSAAQITMCPHVIVDVRQLEPVNLMP  
DVRNFFHYNQGSDSRLRLIAMLYTPLRANNSGDDVFTVSCRVLTRSPDFSFNFLVPPTVESKTKPFSLPILTISEMSNSRF  
PVPIDSLHTSPTEINIVVQCQNGRVTLGELMGTTQLLPSQICAFRGTLTRSTSRASDQADTAPRLFNYYWHIQLDNLNG  
TPYDPAEDIPAPLGTDFGRKVFVGASQRNPDATTRAHEAKIDTSSGRFTPKLSLEISTESGDFDQNPTRFTPVGIGVD

**Figure 31A (cont)**

HEPDFQQWALPDYAGQFTHNMNLAPAVAPNFPGEQLLFFRSQLPSSGGRSNGILDCLVPQEWVQHFYQESAPSQTQV  
ALVRYVNPDTGRVLFEAKLHKLRFMIAKSGDSPITVPPNGYFRFESWVNPFTLAPMGTGNGRRRIQ

**Figure 31B**

Nucleic acid sequence of human codon optimized VP1\_GII.3\_Jing\_E80S (SEQ ID NO:47)

ATGAAAATGGCTTCCAACGATGCAGCACCTCTAATGATGGCGCTGCCGGACTTGTGCCGGAGATTAGCTCTGAGG  
CTATGGCCCTAGAACCAGTAGCCGGGGCAGCCATAGCTGCCCCACTGACTGGCCAGCAGAATATCATTGACCCCTG  
GATAATGAACAATTTCTGTCAGGCACCGGGGGGAGAATTACGGTCTCTCCTCGAACTCCCCGGGGAGGTTCTCT  
TGAATTTGAGCCTGGGCCCTGAAATTAATCCTTATCTGGCCATCTAGCCCGAATGTACAACGGCTACGCCGGAGGT  
TTCGAGGTCCAGGTGGTGTCTGCTGGTAACGCCTTCACAGCTGGCAAGATCATTTTTGCAGCAATCCCTCCAACTTC  
CCTATCGATAATCTTAGTGCCGCCCAGATCACAATGTGCCCTCACGTTATCGTAGATGTGAGGCAGCTGGAACCTGT  
CAATCTCCCAATGCCCCGAGCTGCGCAACAACCTCTTTCACTATAACCAGGGATCTGACTCCCGCCTTCGCCTTATCGCT  
ATGCTGTACACCCCTCTGAGGGCTAACAATCCGGAGATGACGTTTTCTACTGTGAGTTGTGAGTCTGACACGTCC  
ATCTCTGACTTTAGCTTTAATTTCTCGTGCCCCCACAGTGGAATCCAAACTAAGCCATTCTCTTGCCAATTCTT  
ACCATTAGCGAAATGTGAATAGTAGGTTCCCGGTGCCCATAGATTCACTGCATACCAGTCCAACAGAAAACATCGT  
CGTACAGTGTGAGAACGGACGCGTGAATCTCGACGGGGAGCTTATGGGCACTACCCAGCTGCTGCCAGCCAGATA  
TGCGCCTTCGCGGCACACTGACTAGAAGCACTTCGCGTGCTTCTGACCAGGCAGATACAGCTACACCAAGGCTGT  
CAATTATTATTGGCATATACAACCTGATAATCTGAATGGCACTCCTTATGACCCAGCCGAGGACATCCCCGGCCCACT  
TGGCACCCCGGACTTTAGAGGGAAGGTCTTTGGAGTGGCTTCTCAAAGAAATCCCGACGCAACCAACCCGGGCCCCAC  
GAGGCCAAAATCGATACTACATCAGGGCGTTTCAACCCTAAGTTAGGCAGTCTGGAGATATCTACCGAAAGTGGAG  
ATTTGATCAGAACCAAGCAACCCGGTTTACCCCGTGGGAATCGGGGTTGACCACGAACCGGATTTCCAGCAGTG  
GGCTCTGCCTGATTACGCAGGCCAGTTCACACATAACATGAATCTTGCCCCGCTGTGGCCCCCACTTCCCGGGAG  
AACAACTTCTGTTTTTCAGGAGCCAACTGCCTTCCAGCGGCGGCCGATCTAACGGGATTTTGACTGTCTCGTGCCCC  
AGGAATGGGTGCAGCATTTTTACCAGGAGTCCGCGCCCTCCAGACGCAGGTGGCTCTGGTTAGATATGTCAATCCC  
GACACCGGCAGGGTGCTATTTGAGGCAAAGCTGCACAAGCTTCGCTTATGACTATCGCTAAGAGCGGTGATTCGCC  
TATTACAGTGCCCCCAACGGATACTTCAGATTTGAGAGTTGGGTGAACCCATTCTATACCCTGGCCCCCATGGGTAC  
AGGCAATGGCAGACGGCGGATCCAGTAA

**Figure 31C**

Amino acid sequence of VP1\_GII.3\_Jing\_A90L (SEQ ID NO:48)

MKMASNDAAPSNDGAAGLVPEISSEAMALEPVAGAAIAAPLTGQQNIIDPWIMNNFVQAPGGFTVSPRNSPGEVLLN  
LELGPEINPYLLHARMYNGYAGGFVQVVLAGNAFTAGKIIFAAIPNFPIDNLSAAQITMCPHVIVDVRQLEPVNLPMP  
DVRNNFFHYNQGSDSLRLIAMLYTPLRANNSGDDVFTVSCRVLTRPSPDFSNFLVPPTVESKTKPFSLPILTISEMSNSRF  
PVPIDSLHTSPTEINIVVQCQNGRVTLDELMGTTQLPSQICAFRGTLTRSTSRASDAQDTATPRLFNYYWHIQLDNLNG  
TPYDPAEDIPAPLGTDFRGKVFVGASQRNPDATTRAHEAKIDTTSGRFTPKLGSLEISTESGDFDQNPTRFTPVGIGVD  
HEPDFQQWALPDYAGQFTHNMNLAPAVAPNFPGEQLLFFRSQLPSSGGRSNGILDCLVPQEWVQHFYQESAPSQTQV  
ALVRYVNPDTGRVLFEAKLHKLRFMIAKSGDSPITVPPNGYFRFESWVNPFTLAPMGTGNGRRRIQ

**Figure 31D**

Nucleic acid sequence of human codon optimized VP1\_GII.3\_Jing\_A90L (SEQ ID NO:49)

ATGAAATGGCTTCCAACGATGCAGCACCTCTAATGATGGCGCTGCCGGACTTGTGCCGGAGATTAGCTCTGAGG  
CTATGGCCCTAGAACCAGTAGCCGGGGCAGCCATAGCTGCCCCACTGACTGGCCAGCAGAATATCATTGACCCCTG  
GATAATGAACAATTCGTGCAGGCACCGGGGGGAGAATTCACGGTCTCTCCTCGAACTCCCCGGGGAGGTTCTCT  
TGAATTTGGAAGTGGGCCCTGAAATTAATCCTTATCTGCTCCATCTAGCCCGAATGTACAACGGCTACGCCGGAGGT  
TTCGAGGTCCAGGTGGTCTGCTGGTAACGCCTTACAGCTGGCAAGATCATTTTTGCAGCAATCCCTCCAACTTC  
CCTATCGATAATCTTAGTGCCGCCCAGATCACAATGTGCCCTCACGTTATCGTAGATGTGAGGCAGCTGGAACCTGT  
CAATCTCCCAATGCCCCGACGTGCGCAACAACCTCTTTCACTATAACCAGGGATCTGACTCCCGCCTTCGCCTTATCGCT  
ATGCTGTACACCCCTCTGAGGGCTAACAATCCGGAGATGACGTTTTCACTGTGAGTTGTCGAGTCTGACACGTCC  
ATCTCCTGACTTTAGCTTTAATTTCTCGTGCCCCCACAGTGGAATCCAAAATAAGCCATTCTCTCTGCCAATTCTT  
ACCATTAGCGAAATGTGAATAGTAGGTTCCCGGTGCCCATAGATTCACTGCATACCAGTCCAACAGAAAACATCGT  
CGTACAGTGTGAGAACGGACGCGTACTCTGACGGGGAGCTTATGGGCACTACCCAGCTGCTGCCAGCCAGATA  
TGCGCCTTCCGCGGCACACTGACTAGAAGCACTTCGCGTGCTTCTGACCAGGCAGATACAGCTACACCAAGGCTGTT  
CAATTATTATTGGCATATACAACCTCGATAATCTGAATGGCACTCCTTATGACCCAGCCGAGGACATCCCCGCCCCACT  
TGGCACCCCGGACTTTAGAGGGAAGGTCTTTGGAGTGGCTTCTCAAAGAAATCCCGACGCAACCAACCCGGGCCAC  
GAGGCCAAAATCGATACTACATCAGGGCGTTTACCCCTAAGTTAGGCAGTCTGGAGATATCTACCGAAAGTGGAG  
ATTTGATCAGAACCAAGCAACCCGGTTTACCCCGTGGAATCGGGGTTGACCACGAACCGGATTTCCAGCAGTG  
GGCTCTGCCTGATTACGACGGCCAGTTCACACATAACATGAATCTTCCCCCGCTGTGGCCCCCACTTCCCGGGAG  
AACAACCTTCTGTTTTTCAGGAGCCAACCTGCCTTCCAGCGGCGCGGATCTAACGGGATTTTGGACTGTCTCGTCCCC  
AGGAATGGGTGCAGCATTTTTACCAGGAGTCCGCGCCCTCCAGACGCAGGTGGCTCTGGTTAGATATGTCAATCCC  
GACACCGGCAGGGTGCTATTTGAGGCAAAGCTGCACAAGCTTCGCTTTATGACTATCGCTAAGAGCGGTGATTGCC  
TATTACAGTGCCCCCAACGGATACTTCAGATTTGAGAGTTGGGTGAACCCATTCTATACCTGGCCCCCATGGGTAC  
AGGCAATGGCAGACGGCGGATCCAGTAA

**Figure 31E**

Amino acid sequence of VP1\_GII.3\_Jing\_E80S+A90L (SEQ ID NO:50)

MKMASNDAAPSNDGAAGLVPEISSEAMALEPVAGAAIAAPLTGQQNIIDPWIMNMFVQAPGGFTVSPRNSPGEVLLN  
LSLGPINPYLLHARMYNGYAGGFVQVVLAGNAFTAGKIIFAAIPPNFIDNLSAAQITMCPHVIVDVRQLEPVNLMP  
DVRNNFFHYNQSDSRLRLIAMLYTPLRANNSGDDVFTVSCRVLTRPSDFSNFLVPPTVESKTKPFSLPILTISEMSNSRF  
PVPIDSLHTSPTEINIVVQCQNGRVTLDGELMGTTQLLPSQICAFRGTLTRSTSRASDQADTAPRLFNYYWHIQLDNLNG  
TPYDPAEDIPAPLGTPDFRGKVFVGASQRNPDATTRAHEAKIDTTSGRFTPKLSLEISTESGDFDQNPTRFTPVGIGVD  
HEPDFQQWALPDYAGQFTHNMNLAPAVAPNFPGEQLLFFRSQPLSSGGRSNGILDCLVPQEWVQHVFYQESAPSQTQV  
ALVRYVNPDTGRVLFEAKLHLRFMTIAKSGDSPITVPPNGYFRFESWV/NPFYTLAPMGTGNRRRIQ

**Figure 31F**

Nucleic acid sequence of human codon optimized VP1\_GII.3\_Jing\_E80S+A90L (SEQ ID NO:51)

ATGAAATGGCTTCCAACGATGCAGCACCTCTAATGATGGCGCTGCCGGACTTGTGCCGGAGATTAGCTCTGAGG  
CTATGGCCCTAGAACCAGTAGCCGGGGCAGCCATAGCTGCCCCACTGACTGGCCAGCAGAATATCATTGACCCCTG  
GATAATGAACAATTCGTGCAGGCACCGGGGGGAGAATTCACGGTCTCTCCTCGAACTCCCCGGGGAGGTTCTCT  
TGAATTTGAGCCTGGGCCCTGAAATTAATCCTTATCTGCTCCATCTAGCCCGAATGTACAACGGCTACGCCGGAGGT

**Figure 31F (cont)**

TTCGAGGTCCAGGTGGTCTGCTGGTAACGCCTTCACAGCTGGCAAGATCATTTTTGCAGCAATCCCTCCAACTTC  
 CCTATCGATAATCTTAGTGCCGCCCAGATCACAATGTGCCCTCACGTTATCGTAGATGTGAGGCAGCTGGAACCTGT  
 CAATCTCCCAATGCCCCGACGTGCGCAACAACCTCTTTCACTATAACCAGGGATCTGACTCCCGCCTTCGCCTTATCGCT  
 ATGCTGTACACCCCTCTGAGGGCTAACAATCCGGAGATGACGTTTTCACTGTGAGTTGTGAGTCTCTGACACGTCC  
 ATCTCCTGACTTTAGCTTTAATTTCTCGTGCCCCCACAGTGGAATCCAAAATAAGCCATTCTCTCTGCCAATTCTT  
 ACCATTAGCGAAATGTCGAATAGTAGGTTCCCGGTGCCCATAGATTCACTGCATACCAGTCCAACAGAAAAACATCGT  
 CGTACAGTGTCAGAACGGACGCGTGACTCTCGACGGGGAGCTTATGGGCACTACCCAGCTGCTGCCAGCCAGATA  
 TGCGCCTTCCGCGGCACACTGACTAGAAGCACTTCGCGTGCTTCTGACCAGGCAGATACAGCTACACCAAGGCTGTT  
 CAATTATTATTGGCATATACAACCTCGATAATCTGAATGGCACTCCTTATGACCCAGCCGAGGACATCCCCGCCCCACT  
 TGGCACCCCGGACTTTAGAGGGAAGGTCTTTGGAGTGGCTTCTCAAAGAAATCCCGACGCAACCAACCCGGGCCAC  
 GAGGCCAAAATCGATACTACATCAGGGCGTTTCACCCCTAAGTTAGGCAGTCTGGAGATATCTACCGAAAGTGGAG  
 ATTTTCATCAGAACCAAGCCAAACCCGGTTTACCCCGTGGAATCGGGGTTGACCACGAACCGGATTTCCAGCAGTG  
 GGCTCTGCCTGATTACGCAGGCCAGTTCACACATAACATGAATCTTCCCCCGCTGTGGCCCCAACTTCCCGGGAG  
 ACAAATTTCTGTTTTTCAGGAGCCAACTGCCTTCCAGCGGCGGCCGATCTAACGGGATTTTGGACTGTCTCGTGCCCC  
 AGGAATGGGTGCAGCATTTTTACCAGGAGTCCGCGCCCTCCAGACGCAGGTGGCTCTGGTTAGATATGTCAATCCC  
 GACACCGGCAGGGTGCTATTTGAGGCAAAGCTGCACAAGCTTCGCTTATGACTATCGCTAAGAGCGGTGATTCCGCC  
 TATTACAGTGCCCCCAACGGATACTTCAGATTTGAGAGTTGGGTGAACCCATTCTATACCCTGGCCCCCATGGGTAC  
 AGGCAATGGCAGACGGCGGATCCAGTAA

**Figure 32A**

Amino acid sequence of VP1\_GII.4\_Syd12\_A39V (SEQ ID NO:53)

MKMASSDANPSDGSAAANLVPEVNNEVMALEPVVGAAIAPVAGQQNVIDPWIRNNFVQAPGGEFTVSPRNAPGEIL  
 WSAPLGPDLNPYLSHLARMYNGYAGGFEVQVILAGNAFTAGKVIFAAPPNFPTEGLSPSQVTMFPHIVVDVRQLEPVL  
 PLPDVRNNFYHYNQSNPTIKLIAMLYTPLRANNAGDDVFTVSCRVLTRPSPDFDFIFLVPPTVESRTKPFVSPVLTVEEMT  
 NSRFPIPLEKLTGPSSAFVVQPQNGRCTTDGVLGTTQLSPVNICTFRGDTVHITGSRNYTMNLASQNWNDYDPTTEEIP  
 APLGTPDFVGKIQGVLTQTTRTDGSTRGHKATVYTGSAADFAPKLGRVQFETDTRDFEANQNTKFTPVGVIQDGGTTHR  
 NEPQQWVLPYSYGRNTHNVHLAPAVAPTFPGEQLLFFRSTMPGCSGYPNMDLDCLLPQEWVQYFYQEAPAQSDVAL  
 LRFVNPDTGRVLFECKLHKSGYVTVAHGTGQHDLVIPNGYFRFDSWVNQFYTLAPMGNGTGRRRAV

**Figure 32B**

Nucleic acid sequence of human codon optimized VP1\_GII.4\_Syd12\_A39V (SEQ ID NO:54)

ATGAAAATGGCCTCGAGTGACGCTAACCTAGTGACGGCAGCGCCGCAATCTTGTGCCTGAGGTTAATAATGAGG  
 TGATGGCCCTGGAGCCTGTGGTGGGCGCAGCCATAGCAGTCCCGTGGCCGGTCAGCAGAATGTGATTGACCCGTG  
 GATACGCAACAATTTGTCCAAGCCCCTGGTGGGGAGTTCACCGTTAGCCCGAGAAATGCGCCAGGAGAAATCCTG  
 TGGTCGGCCCCATTGGGACCCGATCTGAACCCCTATTTGTACATCTCGCTCGGATGTACAACGGGTATGCCGGCGG  
 ATTTGAAGTGCAGGTGATTCTGGCTGGGAACGCGTTCAGTCTGGCAAAGTGATCTTTGCAGCGGTGCCTCCCACT  
 TCCCCACTGAAGGACTGTCTCCAAGCCAGGTACAATGTTTCCACACATCGTGGTGGACGTACGGCAGCTAGAGCCT  
 GTCCTGATTCCCCTCCCTGATGTACGCAATAATTTCACTACCAATCAATCCAATGATCCGACCATTAACATCATCG  
 CGATGTTGTACACCCCTCTGCGCGCTAACAATGCTGGAGACGACGTATTCACCGTGTCATGCAGAGTGCTCACCAGA  
 CCTTACCAGACTTTGACTTTATCTTCTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTATGTGCCCCGTAC  
 TCACAGTCGAGGAGATGACAAATAGCCGCTTCCAATCCCCCTTGAGAACTGTTACAGGACCTTCTCGGCATTCT

**Figure 32B (cont)**

GTGGTTCAGCCACAGAACGGACGCTGCACAACGACGGCGTGCTGCTCGGAACCAACCAGCTTAGCCCTGTTAATAT  
 CTGTACGTTTAGAGGGCGACGTAACCTACATAACTGGCTCACGGAACCTATACCATGAATCTGGCATCACAGAATTGGA  
 ATGACTACGACCCAACCGAAGAGATTCCCGCACCTCTTGGAACCCCGACTTTGTGGGAAAAATACAGGGCGTCCTG  
 ACACAAACCACCAGAACCGATGGCTCCACACGGGGACACAAGGCAACCGTCTACACTGGCTCTGCCGATTTTGCCCC  
 GAAACTGGGTAGAGTGCAGTTTGAGACCGACACTGACCGGGGACTTTGAAGCCAATCAGAATACTAAGTTCACACCT  
 GTAGGAGTGATTACAGGACGGGGGCACCACTACCGGAACGAGCCGCAACAATGGGTCTGCCCTCTTATAGCGGG  
 AGGAATACTCATAATGTGCATTTGGCTCCTGCAGTGGCTCCACGTTTCCCGGGGAACAACCTGCTTTTTTCGTTCA  
 ACCATGCCTGGATGCTCCGATATCCCAATATGGATCTCGATTGCCTGCTCCACAGGAATGGGTGCAGTATTTTTAT  
 CAAGAGGCCGACCCAGCCCAATCCGACGTCGCACTTCTGCGGTTCTGTGAATCCAGACACAGGCCGCGTGTGTTTGA  
 GTGCAAATTGCACAAATCAGGATACGTTACAGTGGCTCATACTGGACAGCATGACCTGGTGATCCCAACCAACGGAT  
 ATTTTAGGTTGCACTCCTGGGTGAATCAGTTTATACATTAGCCCCCATGGGGAATGGGACTGGCAGACGCAGGGCT  
 GTCTGA

**Figure 32C**

Amino acid sequence of VP1\_GII.4\_Syd12\_V47P (SEQ ID NO:55)

MKMASSDANPSDGSAAANLVPEVNNEVMALEPVVGAAIAAPVAGQQNPIDPWIRNNFVQAPGGEFTVSPRNAPGEIL  
 WSAPLGPDLNPYLSHLARMYNGYAGGFVQVILAGNAFTAGKVIFAAVPPNFPTEGLSPSQVTMFPHIVDVRQLEPVL  
 PLPDVRNNFYHYNQSNPTIKLIAMLYTPLRANNAGDDVFTVSCRVLTRPSPDFDFIFLVPPTVESRTKPFVSPVLTVEEMT  
 NSRFPIPLEKLTGPSSAFVVPQPNGRCTTDGVLGTTQLSPVNICTFRGDTVHITGSRNYTMNLASQNWNDYDPTTEIP  
 APLGTPDFVGKIQGVLTQTTTRTDGSTRGHKATVYTGSAFAPKLGRVQFETDTRDFEANQNTKFTPVGVIQDGGTTHR  
 NEPQQWVLPYSYGRNTHNVHLAPAVPTFPGEQLLFRSTMPGCSGYPNMDLDCLLPQEWVQYFYQEAAPAQSDVAL  
 LRFVNPDTGRVLFECKLHKSgyvtVAHTGQHDLVIPNGYFRFDSWVNQFYTLAPMNGTGRRAV

**Figure 32D**

Nucleic acid sequence of human codon optimized VP1\_GII.4\_Syd12\_V47P (SEQ ID NO:56)

ATGAAAATGGCCTCGAGTGACGCTAACCTAGTGACGGCAGCGCCCAATCTTGTGCCTGAGGTTAATAATGAGG  
 TGATGGCCCTGGAGCCTGTGGTGGGCGCAGCCATAGCAGCGCCCGTGGCCGGTCAGCAGAATCCCATTGACCCGTG  
 GATACGCAACAATTTGTCCAAGCCCCTGGTGGGGAGTTCACCGTTAGCCCGAGAAATGCGCCAGGAGAAATCCTG  
 TGGTCGGCCCCATTGGGACCCGATCTGAACCCCTATTTGTCACATCTCGCTCGGATGTACAACGGGTATGCCGGCGG  
 ATTTGAAGTGCAGGTGATTCTGGCTGGGAACGCGTTCAGTCTGGCAAAGTGATCTTGCAGCGGTGCCTCCCAACT  
 TCCCCACTGAAGGACTGTCTCAAGCCAGGTACAATGTTTCCACACATCGTGGTGGACGTACGGCAGCTAGAGCCT  
 GTCCTGATTCCCCTCCCTGATGTACGCAATAATTCTACCACTACAATCAATCCAATGATCCGACCATTAACCTCATCG  
 CGATGTTGTACACCCCTCTGCGCGCTAACAATGCTGGAGACGACGTATTCACCGTGTGATGCAGAGTGCTCACCAGA  
 CCTTCACCAGACTTTGACTTTATCTTCTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTATGTGCCCCGTAC  
 TCACAGTCGAGGAGATGACAAATAGCCGCTTCCAATCCCCCTTGAGAACTGTTACAGGACCTTCCTCGGCATT  
 GTGGTTCAGCCACAGAACGGACGCTGCACAACGACGGCGTGCTGCTCGGAACCAACCAGCTTAGCCCTGTTAATAT  
 CTGTACGTTTAGAGGGCGACGTAACCTACATAACTGGCTCACGGAACCTATACCATGAATCTGGCATCACAGAATTGGA  
 ATGACTACGACCCAACCGAAGAGATTCCCGCACCTCTTGGAACCCCGACTTTGTGGGAAAAATACAGGGCGTCCTG  
 ACACAAACCACCAGAACCGATGGCTCCACACGGGGACACAAGGCAACCGTCTACACTGGCTCTGCCGATTTTGCCCC  
 GAAACTGGGTAGAGTGCAGTTTGAGACCGACACTGACCGGGGACTTTGAAGCCAATCAGAATACTAAGTTCACACCT  
 GTAGGAGTGATTACAGGACGGGGGCACCACTACCGGAACGAGCCGCAACAATGGGTCTGCCCTCTTATAGCGGG

**Figure 32D (cont)**

AGGAATACTCATAATGTGCATTTGGCTCCTGCAGTGGCTCCACGTTTCCCGGGGAACAACCTGCTCTTTTTTCGTTCA  
 ACCATGCCTGGATGCTCCGATATCCCAATATGGATCTCGATTGCCTGCTCCACAGGAATGGGTGCAGTATTTTTAT  
 CAAGAGGCCGACCCAGCCCAATCCGACGTCGCACTTCTGCGGTTCTGTGAATCCAGACACAGGCCGCGTGTGTTTGA  
 GTGCAAATTGCACAAATCAGGATACGTTACAGTGGCTCATACTGGACAGCATGACCTGGTGATCCCACCAACGGAT  
 ATTTTAGGTTGCACTCCTGGGTGAATCAGTTTTATACATTAGCCCCATGGGGAATGGGACTGGCAGACGCAGGGCT  
 GTCTGA

**Figure 32E**

Amino acid sequence of VP1\_GII.4\_Syd12\_R53I (SEQ ID NO:57)

MKMASSDANPSDGSAAANLVPEVNNEVMALEPVVGAAIAAPVAGQQNVIDPWIIINNFVQAPGGEFTVSPRNAPGEILW  
 SAPLGPDLNPLYSHLARMYNGYAGGFVQVILAGNAFTAGKVIFAAVPPNFPTEGLSPSQVTMFPHIVVDVRQLEPVLIPL  
 PDVRNNFYHYNQSNPTIKLIAMLYTPLRANNAGDDVFTVSCRVLTRPSPDFDFILVPPTVESRTKPFVSPVLTVEEMTN  
 SRFPIPLEKLTGPFSSAFVVQPQNGRCTTDGVLGTTQLSPVNICTFRGDVTHITGSRNYTMNLASQNWNDYDPTTEIPAP  
 LGTPDFVGKIQGLTQTTRTDGSTRGHKATVYTGSAADFAPKLRVQFETDTRDFEANQNTKFTPVGVQIDGGTTHRNE  
 PQQWVLPSSYGRNTHNVHLAPAVAPTFPGEQLLFRSTMPGCSGYPNMDLCLLPQEWVQYFYQEAAPAQSDVALLR  
 FVNPDTRVLFECKLHKSGYVTVAHGTQHDLVIPPNGYFRFDSWVNQFYTLAPMGNGTGRRRAV

**Figure 32F**

Nucleic acid sequence of human codon optimized VP1\_GII.4\_Syd12\_R53I (SEQ ID NO:58)

ATGAAAATGGCCTCGAGTGACGCTAACCTAGTGACGGCAGCGCCCAATCTTGTGCCTGAGGTTAATAATGAGG  
 TGATGGCCCTGGAGCCTGTGGTGGGCGCAGCCATAGCAGCGCCCGTGGCCGGTCAGCAGAATGTGATTGACCCGT  
 GGATAATCAACAATTTTGTCCAAGCCCCTGGTGGGGAGTTCACCGTTAGCCCGAGAAATGCGCCAGGAGAAATCCT  
 GTGGTCGGCCCCATTGGGACCCGATCTGAACCCCTATTTGTACATCTCGCTCGGATGTACAACGGGTATGCCGGCG  
 GATTTGAAGTGCAAGTGATTCTGGCTGGGAACGCGTTCCTGCTGGCAAAGTGATCTTTGAGCGGTGCTCCCAAC  
 TTCCCCACTGAAGGACTGTCTCAAGCCAGGTACAATGTTTCCACACATCGTGGTGGACGTACGGCAGCTAGAGCC  
 TGTCCTGATTCCCCTCCCTGATGTACGCAATAATTTCTACCACTACAATCAATCCAATGATCCGACCATTAAACTCATC  
 GCGATGTTGTACACCCCTCTGCGCGCTAACAATGCTGGAGACGACGTATTCACCGTGTCATGCAGAGTGCTCACCAG  
 ACCTTCACCAGACTTTGACTTTATCTTCTTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTATGTGCCCCGTA  
 CTCACAGTCGAGGAGATGACAAATAGCCGCTTCCAATCCCCCTTGAGAACTGTTACAGGACCTTCTCGGCATTC  
 GTGGTTCAGCCACAGAACGGACGCTGCACAACTGACGGCGTGCTGCTCGGAACCAACCCAGCTTAGCCCTGTAAATAT  
 CTGTACGTTTAGAGGGCGACGTAACCTACATAACTGGCTCACGGAACCTATACCATGAATCTGGCATCACAGAATTGGA  
 ATGACTACGACCAACCGAAGAGATCCCGCACCTTGGAAACCCCGACTTTGTGGGAAAATACAGGGCGTCCTG  
 ACACAAACCACCAAGACCGATGGCTCCACACGGGGACACAAGGCAACCGTCTACACTGGCTCTGCCGATTTTCCCC  
 GAAACTGGGTAGAGTGACGTTTGAAGCCGACACTGACCGGGACTTTGAAGCCAATCAGAATACTAAGTTCACACCT  
 GTAGGAGTGATTACAGGACGGGGGACCACTACCGGAACGAGCCGCAACAATGGGTCTGCCCTCTTATAGCGGG  
 AGGAATACTCATAATGTGCATTTGGCTCCTGCAGTGGCTCCACGTTTCCCGGGGAACAACCTGCTCTTTTTTCGTTCA  
 ACCATGCCTGGATGCTCCGATATCCCAATATGGATCTCGATTGCCTGCTCCACAGGAATGGGTGCAGTATTTTTAT  
 CAAGAGGCCGACCCAGCCCAATCCGACGTCGCACTTCTGCGGTTCTGTGAATCCAGACACAGGCCGCGTGTGTTTGA  
 GTGCAAATTGCACAAATCAGGATACGTTACAGTGGCTCATACTGGACAGCATGACCTGGTGATCCCACCAACGGAT  
 ATTTTAGGTTGCACTCCTGGGTGAATCAGTTTTATACATTAGCCCCATGGGGAATGGGACTGGCAGACGCAGGGCT  
 GTCTGA

**Figure 32G**

Amino acid sequence of VP1\_GII.4\_Syd12\_P80S (SEQ ID NO:59)

MKMASSDANPSDGSAAANLVPEVNNEVMALEPVVGAAIAAPVAGQQNVIDPWIRNNFVQAPGGEFTVSPRNAPGEIL  
WSASLGPDLNPYLHLARMYNGYAGGFVQVILAGNAFTAGKVIFAAVPPNFPTEGLSPSQVTMFPHIVVDVRQLEPVLI  
PLPDVRNNFYHYNQSNPTIKLIAMLYTLRANNAGDDVFTVSCRVLTRPSPDFDFIFLVPPTVESRTKPFVSPVLTVEEMT  
NSRFPIPLEKLFTGPSSAFVVQPQNGRCTTDGVLLGTTQLSPVNICTFRGDTVHITGSRNYTMNLASQNWNDYDPTTEEIP  
APLGTPDFVGKIQGVLTQTTTRTDGSTRGHKATVYTGSAFAPKLGRVQFETDTRDFEANQNTKFTPVGVIQDGGTTHR  
NEPQQWVLPSSYGRNTHNVHLAPAVPTFPGEQLLFRSTMPGCSGYPNMDLDCLLPQEWVQYFYQEAPASQSDVAL  
LRFVNPDTGRVLFECKLHKSQYVTVAHGTGQHDLVIPPNQYFRFDSWVNQFYTLAPMGNGTGRRAV

**Figure 32H**

Nucleic acid sequence of human codon optimized VP1\_GII.4\_Syd12\_P80S (SEQ IDNO:60)

ATGAAAATGGCCTCGAGTGACGCTAACCTAGTGACGGCAGCGCCGCAATCTTGTGCCTGAGGTTAATAATGAGG  
TGATGGCCCTGGAGCCTGTGGTGGGCGCAGCCATAGCAGCGCCCGTGGCCGGTCAGCAGAATGTGATTGACCCGT  
GGATACGCAACAATTTTGTCCAAGCCCCTGGTGGGGAGTTCACCGTTAGCCCGAGAAATGCGCCAGGAGAAATCCT  
GTGGTCGGCCAGCTTGGGACCCGATCTGAACCCCTATTTGTACATCTCGCTCGGATGTACAACGGGTATGCCGGCG  
GATTTGAAGTGAGGTGATTCTGGCTGGGAACGCGTTCCTGCTGGCAAAGTGATCTTTGACGCGGTGCCTCCCAAC  
TTCCCCACTGAAGGACTGTCTCAAGCCAGGTCACAATGTTTCCACACATCGTGGTGGACGTACGGCAGCTAGAGCC  
TGTCTGATTCCCTCCCTGATGTACGCAATAATTTCTACCACTACAATCAATCCAATGATCCGACCATTAAACTCATC  
GCGATGTTGTACACCCCTCTGCGCGCTAACAAATGCTGGAGACGACGTATTACCGTGTCATGCAGAGTGCTCACCAG  
ACCTTCACCAGACTTTGACTTTATCTTCTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTATGTGCCCCGTA  
CTCACAGTCGAGGAGATGACAAATAGCCGCTTCCAATCCCCCTTGAGAACTGTTACAGGACCTTCTCGGCATTC  
GTGGTTCAGCCACAGAACGGACGCTGCACAATGACGGCGTGCTGCTCGGAACCAACCAGCTTAGCCCTGTTAATAT  
CTGTACGTTTAGAGGCGACGTAACCTACATAACTGGCTCACGGAATATACCATGAATCTGGCATCACAGAATTGGA  
ATGACTACGACCAACCGAAGAGATTCCCGCACCTTGGAAACCCCGACTTTGTGGGAAAATACAGGGCGTCCTG  
ACACAAACCACCAGAACCGATGGCTCCACACGGGGACACAAGGCAACCGTCTACACTGGCTCTGCCGATTTTGCCCC  
GAACTGGGTAGAGTGACGTTTGGAGCCGACACTGACCGGGACTTTGAAGCCAATCAGAATACTAAGTTCACACCT  
GTAGGAGTGATTACAGACGGGGGACCACTACCCGGAACGAGCCGCAACAATGGGTCTGCCCTCTTATAGCGGG  
AGGAATACTCATAATGTGCATTTGGCTCCTGCAGTGGCTCCACGTTTCCCGGGGAACAAGTCTTTTTTCGTTCA  
ACCATGCCTGGATGCTCCGATATCCAATATGGATCTCGATTGCCTGCTCCACAGGAATGGGTGCAGTATTTTAT  
CAAGAGGCCGACCAAGCCCAATCCGACGTCGCACTTCTGCGGTTCTGTGAATCCAGACACAGGCCGCGTGTGTTGA  
GTGCAAATTGCACAAATCAGGATACGTTACAGTGGCTCATACTGGACAGCATGACCTGGTGATCCCACCAACGGAT  
ATTTTAGGTTGACTCCTGGGTGAATCAGTTTTATACATTAGCCCCATGGGGAATGGGACTGGCAGACGCAGGGCT  
GTCTGA

**Figure 32I**

Amino acid sequence of VP1\_GII.4\_Syd12\_S90L (SEQ ID NO:61)

MKMASSDANPSDGSAAANLVPEVNNEVMALEPVVGAAIAAPVAGQQNVIDPWIRNNFVQAPGGEFTVSPRNAPGEIL  
WSAPLGPDLNPYLLHLARMYNGYAGGFVQVILAGNAFTAGKVIFAAVPPNFPTEGLSPSQVTMFPHIVVDVRQLEPVLI  
PLPDVRNNFYHYNQSNPTIKLIAMLYTLRANNAGDDVFTVSCRVLTRPSPDFDFIFLVPPTVESRTKPFVSPVLTVEEMT  
NSRFPIPLEKLFTGPSSAFVVQPQNGRCTTDGVLLGTTQLSPVNICTFRGDTVHITGSRNYTMNLASQNWNDYDPTTEEIP

**Figure 32I (cont)**

APLGTPDFVGKIQGVLTQTTTRTDGSTRGHKATVYTGSADFAPKLGRVQFETDTRDFEANQNTKFTPVGVQDGGTTHR  
NEPQQWVLPYSYGRNTHNVHLAPAVAPTFPGEQLLFFRSTMPGCSGYPNMDLCLLPQEWVQYFYQEAAAPAQSDVAL  
LRFVNPDTGRVLFECKLHKSGYVTVAHGTGQHDLVIPPNGYFRFDSWVNQFYTLAPMGNGTGRRRAV

**Figure 32J**

Nucleic acid sequence of human codon optimized VP1\_GII.4\_Syd12\_S90L (SEQ IDNO:62)

ATGAAAATGGCCTCGAGTGACGCTAACCCCTAGTGACGGCAGCGCCGCAATCTTGTGCCTGAGGTTAATAATGAGG  
TGATGGCCCTGGAGCCTGTGGTGGGCGCAGCCATAGCAGCGCCCGTGGCCGGTCAGCAGAATGTGATTGACCCGT  
GGATACGCAACAATTTTGTCCAAGCCCCTGGTGGGGAGTTCACCGTTAGCCCGAGAAATGCGCCAGGAGAAATCCT  
GTGGTCGGCCCCATTGGGACCCGATCTGAACCCCTATTTGCTGCATCTCGCTCGGATGTACAACGGGTATGCCGGCG  
GATTTGAAGTGCAGGTGATTCTGGCTGGGAACGCGTTCACTGCTGGCAAAGTGATCTTTGCAGCGGTGCCTCCCAAC  
TTCCCCACTGAAGGACTGTCTCCAAGCCAGGTCACAATGTTTCCACACATCGTGGTGGACGTACGGCAGCTAGAGCC  
TGTCTGATTCCCTCCCTGATGTACGCAATAATTTCTACCACTACAATCAATCCAATGATCCGACCATTAAACTCATC  
GCGATGTTGTACCCCTCTGCGCGCTAACAAATGCTGGAGACGACGTATTCACCGTGTATGCAGAGTGCTCACCAG  
ACCTTCACCAGACTTTGACTTTATCTTCTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTTAGTGTCCCGTA  
CTCACAGTCGAGGAGATGACAAATAGCCGCTTTCCAATCCCCCTTGAGAAACTGTTACAGGACCTTCTCGGCATTC  
GTGGTTCAGCCACAGAACGGACGCTGCACAATGACGGCGTGCTGCTCGGAACCAACCAGCTTAGCCCTGTTAATAT  
CTGTACGTTTAGAGGCGACGTAACCTACATAACTGGCTCACGGAATATACCATGAATCTGGCATCACAGAATTGGA  
ATGACTACGACCCAACCGAAGAGATTCCCGCACCTCTTGAACCCCCGACTTTGTGGGAAAAATACAGGGCGTCTG  
ACACAAACCACAGAACCGATGGCTCCACACGGGGACACAAGGCAACCGTCTACACTGGCTCTGCCGATTTTGCCCC  
GAAACTGGGTAGAGTGCAGTTTGAGACCGACACTGACCGGGACTTTGAAGCCAATCAGAATACTAAGTTCACACCT  
GTAGGAGTGATTACAGGACGGGGGCACCACTACCGGAACGAGCCGCAACAATGGGTCTGCCCTCTTATAGCGGG  
AGGAATACTCATAATGTGCATTTGGCTCCTGCAGTGGCTCCACGTTTCCCGGGGAACAACCTGCTCTTTTTTCGTTCA  
ACCATGCCTGGATGCTCCGGATATCCCAATATGGATCTCGATTGCTGCTCCACAGGAATGGGTGCAGTATTTTAT  
CAAGAGGCCGACCAAGCCCAATCCGACGTCGCACTTCTGCGGTTCTGTAATCCAGACACAGGCCGCGTGTGTTTGA  
GTGCAAATTGCACAAATCAGGATACGTTACAGTGGCTCATACTGGACAGCATGACCTGGTGATCCCACCAACGGAT  
ATTTTAGGTTGACTCCTGGGTGAATCAGTTTTATACATTAGCCCCATGGGGAATGGGACTGGCAGACGCAGGGCT  
GTCTGA

**Figure 32K**

Amino acid sequence of VP1\_GII.4\_Syd12\_Δ35-42 (SEQ ID NO:63)

MKMASSDANPSDGSAAANLVPEVNNEVMALEPVVGGQQNVIDPWIRNNFVQAPGGFTVSPRNAPGEILWSAPLGPD  
LNPLYSLHARMYNGYAGGFVQVILAGNAFTAGKVIFAAPPNFPTEGLSPSQVTMPHIVVDVRQLEPVLIPDVRNN  
FYHYNQSDPTIKLIAMLYTPLRANNAGDDVFTVSCRVLTRPSPDFDFIFLVPPTVESRTKPFVSPVLTVEEMTNSRFPIPLE  
KLFTGPSSAFVVPQNGRCTTDGVLLGTTQLSPVNICTFRGDVTHITGSRNYTMNLASQNWNDYDPTTEEIPAPLGTPDFV  
GKIQGVLTQTTTRTDGSTRGHKATVYTGSADFAPKLGRVQFETDTRDFEANQNTKFTPVGVQDGGTTHRNEPQQWVLP  
YSYGRNTHNVHLAPAVAPTFPGEQLLFFRSTMPGCSGYPNMDLCLLPQEWVQYFYQEAAAPAQSDVALLRFVNPDTG  
RVLFECKLHKSGYVTVAHGTGQHDLVIPPNGYFRFDSWVNQFYTLAPMGNGTGRRRAV

**Figure 32L**

Nucleic acid sequence of human codon optimized VP1\_GII.4\_Syd12\_Δ35-42 (SEQ IDNO:64)

ATGAAAATGGCCTCGAGTGACGCTAACCTAGTGACGGCAGCGCCGCAATCTTGTGCCTGAGGTTAATAATGAGG  
TGATGGCCCTGGAGCCTGTGGTGGGCGGTGAGCAGAATGTGATTGACCCGTGGATACGCAACAATTTGTCCAAGC  
CCCTGGTGGGGAGTTCACCGTTAGCCCGAGAAATGCGCCAGGAGAAATCCTGTGGTCGGCCCCATTGGGACCCGAT  
CTGAACCCCTATTTGTCACATCTCGCTCGGATGTACAACGGGTATGCCGGCGGATTTGAAGTGCAGGTGATTCTGGC  
TGGGAACGCGTTCACTGCTGGCAAAGTGATCTTTGCAGCGGTGCCTCCCACTTCCCACTGAAGGACTGTCTCAA  
GCCAGGTCACAATGTTTCCACATCGTGGTGGACGTACGGCAGCTAGAGCCTGTCCTGATTCCCTCCCTGATGTA  
CGCAATAATTTCTACCACTACAATCAATCCAATGATCCGACCATTAACCTCATCGCGATGTTGTACACCCCTCTGCGC  
GCTAACAATGCTGGAGACGACGTATTCACCGTGTGATGCAGAGTGCTCACCAGACCTTCACCAGACTTTGACTTTATC  
TTCTTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTAGTGTCCTGACTCAGAGTGCAGGAGATGACAAA  
TAGCCGCTTTCCAATCCCCCTTGAGAACTGTTACAGGACCTTCTCGGCATTCTGTTGAGCCACAGAACGGACG  
CTGCACAATGACGGCGTGTGCTCGGAACCAACCCAGCTTAGCCCTGTTAATATCTGTACGTTTAGAGGCGACGTAA  
CTCACATAACTGGCTCACGGAATATACCATGAATCTGGCATCACAGAATTGGAATGACTACGACCAACCGAAGAG  
ATTCCCGCACCTCTTGAACCCCGACTTTGTGGGAAAAATACAGGGCGTCTGACACAAACCACAGAACCGATGG  
CTCCACACGGGGACACAAGGCAACCGTCTACACTGGCTCTGCCGATTTTGGCCGAACTGGGTAGAGTGCAGTTTG  
AGACCGACACTGACCGGGACTTTGAAGCCAATCAGAATACTAAGTTCACACCTGTAGGAGTGATTGAGGACGGGGG  
CACCCTCACCAGAACGAGCCGCAACAATGGGTCTGCCCTCTTAGCGGGAGGAATACTCATAATGTGCATTTGG  
CTCCTGCAGTGGCTCCCACGTTTCCCGGGGAACAAGTCTCTTTTTCGTTCAACCATGCCTGGATGCTCCGGATATC  
CCAATATGGATCTCGATTGCTGCTCCACAGGAATGGGTGCAGTATTTTATCAAGAGGCCGCCAGCCCAATCC  
GACGTGCACTTCTGCGGTTCTGTAATCCAGACACAGGCCGCGTGTGTTGAGTGCAAATTGCACAAATCAGGATA  
CGTTACAGTGGCTCATACTGGACAGCATGACCTGGTGATCCCAACCGGATATTTAGGTTGACTCCTGGGTGA  
ATCAGTTTTATACATTAGCCCCCATGGGGAATGGGACTGGCAGACGCAGGGCTGTCTGA

**Figure 32M**

Amino acid sequence of VP1\_GII.4\_Syd12\_SSTAVATA (SEQ ID NO:65)

MKMASSDANPSDGSAAANLVPEVNNEVMALEPVVGSSTAVATAGQQNVIDPWIRNNFVQAPGGEFTVSPRNAPGEIL  
WSAPLGPDLNPLYSHLARMYNGYAGGFVQVILAGNAFTAGKVIFAAVPPNFPTEGLSPSQVTMFPHIVVDVRQLEPVL  
PLPDVRNNFYHYNQSDPTIKLIAMLYTPLRANNAGDDVFTVSCRVLTRPSPDFDFIFLVPPTVESRTKPFVSVPLTVEEMT  
NSRFPIPLEKLFTGPSSAFVVPQNGRCTTDGVLGTTQLSPVNICFRGDVTHITGSRNYTMNLASQNWNDYDPTTEIP  
APLGPDPFVGKIQGVLTQTRTDGSTRGHKATVYTGSAFAPKLGRVQFETDTRDFEANTKFTPVGVIQDGGTTHR  
NEPQQWVLPSSYGRNTHNVHLAPAVAPTFPGEQLLFRSTMPGCSGYPNMDLCLLPQEWVQYFYQEAAPAQSDVAL  
LRFVNPDTGRVLFECKLHKSGYVTVAHGTGQHDLVIPPNYFRFDSWVNQFYTLAPMNGTGRRRAV

**Figure 32N**

Nucleic acid sequence of human codon optimized VP1\_GII.4\_Syd12\_SSTAVATA (SEQ ID NO:66)

ATGAAAATGGCCTCGAGTGACGCTAACCTAGTGACGGCAGCGCCGCAATCTTGTGCCTGAGGTTAATAATGAGG  
TGATGGCCCTGGAGCCTGTGGTGGGCGAGCTCCACCGCCGTCGCTACAGCCGGTCAGCAGAATGTGATTGACCCGTG  
GATACGCAACAATTTGTCCAAGCCCTGGTGGGGAGTTCACCGTTAGCCCGAGAAATGCGCCAGGAGAAATCCTG  
TGGTCGGCCCCATTGGGACCCGATCTGAACCCCTATTTGTCACATCTCGCTCGGATGTACAACGGGTATGCCGGCGG  
ATTTGAAGTGCAGGTGATTCTGGCTGGGAACGCGTTCACTGCTGGCAAAGTGATCTTTGCAGCGGTGCCTCCCACT

**Figure 32N (cont)**

TCCCCACTGAAGGACTGTCTCCAAGCCAGGTACAATGTTTCCACACATCGTGGTGGACGTACGGCAGCTAGAGCCT  
 GTCCTGATTCCCCTCCCTGATGTACGCAATAATTTCTACCACTACAATCAATCCAATGATCCGACCATTAACTCATCG  
 CGATGTTGTACACCCCTCTGCGCGCTAACAATGCTGGAGACGACGTATTCACCGTGTATGCAGAGTGCTCACCAGA  
 CCTTACCAGACTTTGACTTTATCTTCTTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTTAGTGTCCCCGTAC  
 TCACAGTCGAGGAGATGACAAATAGCCGCTTTCCAATCCCCCTTGAGAACTGTTACAGGACCTTCCTCGGCATT  
 GTGGTTCAGCCACAGAACGGACGCTGCACAACGACGCGTGCTGCTCGGAACCAACCCAGCTTAGCCCTGTTAATAT  
 CTGTACGTTTAGAGGCGACGTAACACATAACTGGCTCACGGAACATACCATGAATCTGGCATCACAGAATTGGA  
 ATGACTACGACCCAACCGAAGAGATTCCCGCACCTCTTGAACCCCCGACTTTGTGGGAAAAATACAGGGCGTCCTG  
 ACACAAACCACAGAACCGATGGCTCCACACGGGGACACAAGGCAACCGTCTACACTGGCTCTGCCGATTTGCCCC  
 GAACTGGGTAGAGTGACGTTTGAAGCCAACTCAGAATACTAAGTTCACACCT  
 GTAGGAGTGATTACAGGACGGGGGACCACTACCCGGAACGAGCCGAACAATGGGTCTGCCCTCTTATAGCGGG  
 AGGAATACTCATAATGTGCATTGGCTCCTGCAGTGGCTCCACGTTTCCCGGGGAACAACGCTCTTTTTTCGTTCA  
 ACCATGCCTGGATGCTCCGGATATCCAATATGGATCTCGATTGCTGCTCCACAGGAATGGGTGCAGTATTTTTAT  
 CAAGAGGCCGACCCAGCCCAATCCGACGTCGCACTTCTGCGGTTCTGAATCCAGACACAGGCCGCGTGTTGTTGA  
 GTGCAAAATGCACAAATCAGGATACGTTACAGTGGCTCATACTGGACAGCATGACCTGGTGATCCACCCAACGGAT  
 ATTTAGGTTGACTCCTGGGTGAATCAGTTTTATACATTAGCCCCCATGGGGAATGGGACTGGCAGACGCAGGGCT  
 GTCTGA

**Figure 32O**

Amino acid sequence of VP1\_GII.4\_Syd12\_P80S+A39V (SEQ ID NO:67)

MKMASSDANPSDGSAAANLVPEVNNEVMALEPVVGAAIAPVAGQQNVIDPWIRNNFVQAPGGEFTVSPRNAPGEIL  
 WSASLGPLNLYSLHARMYNGYAGGFEVQVILAGNAFTAGKVIFAAVPPNFPTEGLSPSQVTMFPHIVDVRQLEPVL  
 PLPDVRNNFYHYNQSNPTIKLIAMLYTPLRANNAGDDVFTVSCRVLTRPSPDFDFILVPPTVESRTKPFVSVPLTVEEMT  
 NSRFPIPLEKLTGPSSAFVVPQNGRCTTDGVLLGTTQLSPVNICTFRGDTVHITGSRNYTMNLASQNWNDYDPTTEIP  
 APLGTPDFVGKIQGVLTQTTRTDGSTRGHKATVYTGSAFAPKLGRVQFETDTRDFEANTQNTKFTPVGVIQDGGTTHR  
 NEPQQWVLPSSGRNTHNVHLAPAVPTFPGEQLLFRSTMPGCSGYPNMDLDCLLPQEWVQYFYQEAPASDVAL  
 LRFVNPDTGRVLFECKLHKSgyvtVAHTGQHDVIPNGYFRFDSWVNQFYTLAPMGNGTGRRRAV

**Figure 32P**

Nucleic acid sequence of human codon optimized VP1\_GII.4\_Syd12\_P80S+A39V (SEQ ID NO:68)

ATGAAAATGGCCTCGAGTGACGCTAACCTAGTGACGGCAGCGCCGCAATCTTGTGCCTGAGGTTAATAATGAGG  
 TGATGGCCCTGGAGCCTGTGGTGGGCGCAGCCATAGCAGTCCCCGTGGCCGGTCAGCAGAATGTGATTGACCCGTG  
 GATACGCAACAATTTGTCCAAGCCCCTGGTGGGGAGTTCACCGTTAGCCCGAGAAATGCGCCAGGAGAAATCCTG  
 TGGTCGCGCCAGCTTGGGACCCGATCTGAACCCCTATTTGTACATCTCGCTCGGATGTACAACGGGTATGCCGGCGG  
 ATTTGAAGTGCAGGTGATTCTGGCTGGGAACGCGTTCAGTCTGGCAAAGTGATCTTGCAGCGGTGCCTCCCACT  
 TCCCCACTGAAGGACTGTCTCCAAGCCAGGTACAATGTTTCCACACATCGTGGTGGACGTACGGCAGCTAGAGCCT  
 GTCCTGATTCCCCTCCCTGATGTACGCAATAATTTCTACCACTACAATCAATCCAATGATCCGACCATTAACTCATCG  
 CGATGTTGTACACCCCTCTGCGCGCTAACAATGCTGGAGACGACGTATTCACCGTGTATGCAGAGTGCTCACCAGA  
 CCTTACCAGACTTTGACTTTATCTTCTTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTTAGTGTCCCCGTAC  
 TCACAGTCGAGGAGATGACAAATAGCCGCTTTCCAATCCCCCTTGAGAACTGTTACAGGACCTTCCTCGGCATT  
 GTGGTTCAGCCACAGAACGGACGCTGCACAACGACGCGTGCTGCTCGGAACCAACCCAGCTTAGCCCTGTTAATAT

**Figure 32P (cont)**

CTGTACGTTTAGAGGCGACGTAACCTACATAACTGGCTCACGGAACCTATACCATGAATCTGGCATCACAGAATTGGA  
 ATGACTACGACCCAACCGAAGAGATTCCCGCACCTCTTGAACCCCCGACTTTGTGGGAAAAATACAGGGCGTCCTG  
 ACACAAACCACCGAACCAGATGGCTCCACACGGGGACACAAGGCAACCGTCTACACTGGCTCTGCCGATTTGCCCC  
 GAAACTGGGTAGAGTGACAGTTTGAGACCGACACTGACCGGGACTTTGAAGCCAATCAGAATACTAAGTTCACACCT  
 GTAGGAGTGATTACAGGACGGGGGCACCACTACCGGAACGAGCCGCAACAATGGGTCCTGCCCTCTTATAGCGGG  
 AGGAATACTCATAATGTGCATTTGGCTCCTGCAGTGGCTCCACGTTTCCCGGGGAACAACCTGCTCTTTTTTCGTTCA  
 ACCATGCCTGGATGCTCCGGATATCCAATATGGATCTCGATTGCCCTGCTCCACAGGAATGGGTGCAGTATTTTTAT  
 CAAGAGGCCGACCCAGCCCAATCCGACGTCGCACTTCTGCGGTTCTGTAATCCAGACACAGGCCGCGTGTTGTTTGA  
 GTGCAAATTGCACAAATCAGGATACGTTACAGTGGCTCATACTGGACAGCATGACCTGGTGATCCCACCAACGGAT  
 ATTTTAGGTTGACTCCTGGGTGAATCAGTTTTATACATTAGCCCCCATGGGGAATGGGACTGGCAGACGCAGGGCT  
 GTCTGA

**Figure 32Q**

Amino acid sequence of VP1\_GII.4\_Syd12\_P80S+V47P (SEQ ID NO:69)

MKMASSDANPSDGSAAANLVPEVNNEVMALEPVVGAAIAAPVAGQQNPIDPWIRNNFVQAPGGEFTVSPRNAPGEIL  
 WSASLGPLDNLNLYSLARMYNGYAGGFEVQVILAGNAFTAGKVIFAAVPPNFPTEGLSPSQVTMFPHIVDVRQLEPVL  
 PLPDVRNNFYHYNQSNPTIKLIAMLYTPLRANNAGDDVFTVSCRVLTRPSPDFDFILVPPTVESRTKPFVSVPLTVEEMT  
 NSRFPIPLEKLTGPSSAFVVPQNGRCTTDGVLGTTQLSPVNICTFRGDTVHITGSRNYTMNLASQNWNDYDPTTEIP  
 APLGTPDFVGKIQGVLTQTTRTDGSTRGHKATVYTGSAFAPKLGRVQFETDTRDFEANQNTKFTPVGVIQDGGTTHR  
 NEPQQWVLPYSYGRNTHNVHLAPAVPTFPGEQLLFRSTMPGCSGYPNMDLCLLPQEWVQYFYQEAAQAQSDVAL  
 LRFVNPDTGRVLFECKLHSGYVTVHTGQHDLVIPPNGYFRFDSWVNQFYTLAPMGNGTGRRRAV

**Figure 32R**

Nucleic acid sequence of human codon optimized VP1\_GII.4\_Syd12\_P80S+V47P (SEQ ID NO:70)

ATGAAAATGGCCTCGAGTGACGCTAACCTAGTGACGGCAGCGCCGCAATCTTGTGCCTGAGGTTAATAATGAGG  
 TGATGGCCCTGGAGCCTGTGGTGGGCGCAGCCATAGCAGCGCCCGTGGCCGGTCAGCAGAATCCCATTGACCCGTG  
 GATACGCAACAATTTTGTCCAAGCCCCTGGTGGGGAGTTCACCGTTAGCCCGAGAAATGCGCCAGGAGAAATCCTG  
 TGGTCGGCCAGCTTGGGACCCGATCTGAACCCCTATTTGTACATCTCGCTCGGATGTACAACGGGTATGCCGGCGG  
 ATTTGAAGTGCAGGTGATTCTGGCTGGGAACGCGTTCAGTCTGGCAAAGTGATCTTGCAGCGGTGCCTCCCACT  
 TCCCCACTGAAGGACTGTCTCAAGCCAGGTACAATGTTTCCACACATCGTGGTGGACGTACGGCAGCTAGAGCCT  
 GTCCTGATTCCCCTCCCTGATGTACGCAATAATTTCTACCACTACAATCAATCCAATGATCCGACCATTAACCTCATCG  
 CGATGTTGTACACCCCTCTGCGCGCTAACAATGCTGGAGACGACGTATTCACCGTGTATGCAGAGTGCTACCCAGA  
 CCTTACCCAGACTTTGACTTTATCTTCTTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTAGTGCCCCGTAC  
 TCACAGTCGAGGAGATGACAAATAGCCGCTTCCAATCCCCCTTGAGAACTGTTACAGGACCTTCTCGGCATT  
 GTGGTTCAGCCACAGAACGGACGCTGCACAACTGACGGCGTGCTGCTCGGAACCAACCCAGCTTAGCCCTGTTAATAT  
 CTGTACGTTTAGAGGCGACGTAACCTACATAACTGGCTCACGGAACCTATACCATGAATCTGGCATCACAGAATTGGA  
 ATGACTACGACCCAACCGAAGAGATTCCCGCACCTCTTGAACCCCCGACTTTGTGGGAAAAATACAGGGCGTCCTG  
 ACACAAACCACCGAACCAGATGGCTCCACACGGGGACACAAGGCAACCGTCTACACTGGCTCTGCCGATTTGCCCC  
 GAAACTGGGTAGAGTGACAGTTTGAGACCGACACTGACCGGGACTTTGAAGCCAATCAGAATACTAAGTTCACACCT  
 GTAGGAGTGATTACAGGACGGGGGCACCACTACCGGAACGAGCCGCAACAATGGGTCCTGCCCTCTTATAGCGGG  
 AGGAATACTCATAATGTGCATTTGGCTCCTGCAGTGGCTCCACGTTTCCCGGGGAACAACCTGCTCTTTTTTCGTTCA

**Figure 32R (cont)**

ACCATGCCTGGATGCTCCGGATATCCCAATATGGATCTCGATTGCCTGCTCCACAGGAATGGGTGCAGTATTTTAT  
 CAAGAGGCCGACCCAGCCCAATCCGACGTCGCACTTCTGCGGTTCTGAATCCAGACACAGGCCGCGTGTGTTTGA  
 GTGCAAATTGCACAAATCAGGATACGTTACAGTGGCTCATCTGGACAGCATGACCTGGTGATCCCACCAACGGAT  
 ATTTAGGTTGACTCCTGGGTGAATCAGTTTTATACATTAGCCCCATGGGGAATGGGACTGGCAGACGCAGGGCT  
 GTCTGA

**Figure 32S**

Amino acid sequence of VP1\_GII.4\_Syd12\_P80S+R53I (SEQ ID NO:71)

MKMASSDANPSDGSAAANLVPEVNNEVMALEPVVGAIAAPVAGQQNVIDPWIIINNFVQAPGGEFTVSPR  
 NAPGEILWSASLGPDLNPLYSHLARMYNGYAGGFVQVILAGNAFTAGKVIFAAVPPNFPTEGLSPSQVTMF  
 PHIVVDVRQLEPVLIPDLVRNNFYHYNQSNPTIKLIAMLYTPLRANNAGDDVFTVSCRVLTRPSPDFDFIFLV  
 PPTVESRTKPFVSVPLTVEEMTNSRFPIPLEKLTGPSSAFVVQPQNGRCTTDGVLLGTTQLSPVNICTFRGDVT  
 HITGSRNYTMNLASQNWNDYDPTTEEIPAPLGTPDFVGKIQGVLTQTTRTDGSTRGHKATVYTGSADFAPKLG  
 RVQFETDTRDFEANQNTKFTPVGVIQDGGTTHRNEPQQWVLPSSYGRNTHNVHLAPAVAPTFFPGEQLLFF  
 RSTMPGCSGYPNMDLDCLLPQEWVQYFYQEAAPQSDVALLRFVNPDTGRVLFECKLHKSgyvtVAHTGQ  
 HDLVIPPNGYFRFDSWVNQFYTLAPMNGTGRRRAV

**Figure 32T**

Nucleic acid sequence of human codon optimized VP1\_GII.4\_Syd12\_P80S+R53I (SEQ ID NO:72)

ATGAAAATGGCCTCGAGTGACGCTAACCTAGTGACGGCAGCGCCCAATCTTGTGCCTGAGGTTAATAATGAGG  
 TGATGGCCCTGGAGCCTGTGGTGGGCGCAGCCATAGCAGCGCCCGTGGCCGGTCAGCAGAATGTGATTGACCCGT  
 GGATAATCAACAATTTTGTCCAAGCCCCTGGTGGGGAGTTCACCGTTAGCCCGAGAAATGCGCCAGGAGAAATCCT  
 GTGGTCGGCCAGCTTGGGACCCGATCTGAACCCCTATTTGTACATCTCGCTCGGATGTACAACGGGTATGCCGGCG  
 GATTTGAAGTGACGGTGATTCTGGCTGGGAACGCGTTCCTGCTGGCAAAGTGATCTTTGACGCGGTGCTCCCAAC  
 TTCCCCACTGAAGGACTGTCTCAAGCCAGGTACAATGTTTCCACACATCGTGGTGGACGTACGGCAGCTAGAGCC  
 TGTCCTGATTCCCCTCCCTGATGTACGCAATAATTTCTACCACTACAATCAATCCAATGATCCGACCATTAACATCATC  
 GCGATGTTGTACACCCCTCTGCGCGCTAACAAATGCTGGAGACGACGTATTCACCGTGTCATGCAGAGTGCTCACCAG  
 ACCTTCACCAGACTTTGACTTTATCTTCTTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTTAGTGTCCCGTA  
 CTCACAGTCGAGGAGATGACAAATAGCCGCTTTCCAATCCCCCTTGAGAACTGTTACAGGACCTTCCTCGGCATTC  
 GTGGTTCAGCCACAGAACGGACGCTGCACAATGACGGCGTGCTGCTCGGAACCAACCCAGCTTAGCCCTGTTAATAT  
 CTGTACGTTTAGAGGCGACGTAACCTACATAACTGGCTCACGGAATATACCATGAATCTGGCATCACAGAATTGGA  
 ATGACTACGACCCAACCGAAGAGATTTCCGACCTCTTGAACCCCGACTTTGTGGGAAAAATACAGGGCGTCCTG  
 ACACAAACCACAGAACCGATGGCTCCACACGGGGACACAAGGCAACCGTCTACACTGGCTCTGCCGATTTTGGCCC  
 GAACTGGGTAGAGTGACGTTTGAAGCCGACACTGACCGGGACTTTGAAGCCAATCAGAATACTAAGTTCACACCT  
 GTAGGAGTGATTACAGGACGGGGGCACTACCCGAAACGAGCCGCAACAATGGTCTGCTCCTTATAGCGGG  
 AGGAATACTCATAATGTGCAATTTGGCTCCTGCAAGTGGCTCCACGTTTCCCGGGGAACAAGTCTTTTTTCGTTCA  
 ACCATGCCTGGATGCTCCGGATATCCCAATATGGATCTCGATTGCCTGCTCCACAGGAATGGGTGCAGTATTTTAT  
 CAAGAGGCCGACCCAGCCCAATCCGACGTCGCACTTCTGCGGTTCTGAATCCAGACACAGGCCGCGTGTGTTTGA  
 GTGCAAATTGCACAAATCAGGATACGTTACAGTGGCTCATCTGGACAGCATGACCTGGTGATCCCACCAACGGAT  
 ATTTAGGTTGACTCCTGGGTGAATCAGTTTTATACATTAGCCCCATGGGGAATGGGACTGGCAGACGCAGGGCT  
 GTCTGA

**Figure 32U**

Amino acid sequence of VP1\_GII.4\_Syd12\_P80S+S90L (SEQ ID NO:73)

MKMASSDANPSDGSAAANLVPEVNNEVMALEPVVGAAIAAPVAGQQNVIDPWIRNNFVQAPGGFTVSPRNAPGEIL  
WSASLGPDLNPLYLLHARMYNGYAGGFVQVILAGNAFTAGKVIFAAPPNFPTGLSPSQVTMFPHIVVDVRQLEPVL  
PLPDVRNNFYHYNQSNPTIKLIAMLYTPLRANNAGDDVFTVSCRVLTRPSPDFDFIFLVPPTVESRTKPFVSVPLTVEEMT  
NSRFPIPLEKLTGPSSAFVVQPQNGRCTTDGVLLGTTQLSPVNICTFRGDVTHITGSRNYTMNLASQNWNDYDPTTEEIP  
APLGTPDFVGKIQGVLTQTTTRTDGSTRGHKATVYTGSAFAPKLGRVQFETDTRDFEANQNTKFTPVGVIQDGGTTHR  
NEPQQWVLPSSYGRNTHNVHLAPAVPTFPGEQLLFFRSTMPGCSGYPNMDLDCLLPQEWVQYFYQEAAPAQSDVAL  
LRFVNPDTGRVLFECKLHKSgyvtVAHTGQHDLVIPPNgyFRFDSWVNQFYTLAPMGNGTGRRAV

**Figure 32V**

Nucleic acid sequence of human codon optimized VP1\_GII.4\_Syd12\_P80S+S90L (SEQ ID NO:74)

ATGAAAATGGCCTCGAGTGACGCTAACCTAGTGACGGCAGCGCCGCAATCTTGTGCCTGAGGTTAATAATGAGG  
TGATGGCCCTGGAGCCTGTGGTGGGCGCAGCCATAGCAGCGCCCGTGGCCGGTCAGCAGAATGTGATTGACCCGT  
GGATACGCAACAATTTTGTCCAAGCCCCTGGTGGGGAGTTCACCGTTAGCCCGAGAAATGCGCCAGGAGAAATCCT  
GTGGTCGGCCAGCTTGGGACCCGATCTGAACCCCTATTTGCTGCATCTCGCTCGGATGTACAACGGGTATGCCGGCG  
GATTTGAAGTGACGGTGATTCTGGCTGGGAACGCGTTCAGTCTGGCAAAGTGATCTTTCAGCGGTGCCTCCCAAC  
TTCCCCACTGAAGGACTGTCTCAAGCCAGGTCACAATGTTTCCACACATCGTGGTGGACGTACGGCAGCTAGAGCC  
TGTCTGATTCCCTCCCTGATGTACGCAATAATTTCTACCACTACAATCAATCCAATGATCCGACCATTAAACTCATC  
GCGATGTTGTACACCCCTCTGCGCGCTAACAATGCTGGAGACGACGTATTACCGTGTCATGCAGAGTGCTCACCAG  
ACCTTCACCAGACTTTGACTTTATCTTCTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTATAGTGCCCGTA  
CTCACAGTCGAGGAGATGACAAATAGCCGCTTCCAATCCCCCTTGAGAACTGTTACAGGACCTTCTCGGCATTC  
GTGGTTCAGCCACAGAACGGACGCTGCACAATGACGGCGTGCTGCTCGGAACCAACCAGCTTAGCCCTGTTAATAT  
CTGTACGTTTAGAGGCGACGTAACCTACATAACTGGCTCACGGAACATACCATGAATCTGGCATCACAGAATTGGA  
ATGACTACGACCAACCGAAGAGATTCCCGCACCTTGGAAACCCCGACTTTGTGGGAAAATACAGGGCGTCTCTG  
ACACAAACCACCAGAACCGATGGCTCCACACGGGGACACAAGGCAACCGTCTACACTGGCTCTGCCGATTTTGCCCC  
GAACTGGGTAGAGTGACGTTTGGAGCCGACACTGACCGGGACTTTGAAGCCAATCAGAATACTAAGTTCACACCT  
GTAGGAGTGATTACAGACGGGGGACCACTACCCGGAACGAGCCGCAACAATGGGTCTGCCCTCTTATAGCGGG  
AGGAATACTCATAATGTGCATTTGGCTCCTGCAGTGGCTCCACGTTTCCCGGGGAACAAGTCTTTTTTCGTTCA  
ACCATGCCTGGATGCTCCGATATCCAATATGGATCTCGATTGCCTGCTCCACAGGAATGGGTGCAGTATTTTAT  
CAAGAGGCCGACCAAGCCCAATCCGACGTCGCACTTCTGCGGTTCTGTGAATCCAGACACAGGCCGCGTGTGTTGA  
GTGCAAATTGCACAAATCAGGATACGTTACAGTGGCTCATACTGGACAGCATGACCTGGTGATCCCACCAACGGAT  
ATTTTAGGTTGACTCCTGGGTGAATCAGTTTATACATTAGCCCCATGGGGAATGGGACTGGCAGACGCAGGGCT  
GTCTGA

**Figure 32W**

Amino acid sequence of VP1\_GII.4\_Syd12\_P80S+Δ35-42 (SEQ ID NO:75)

MKMASSDANPSDGSAAANLVPEVNNEVMALEPVVGGQQNVIDPWIRNNFVQAPGGFTVSPRNAPGEILWSASLGPDL  
LNPLYSLHARMYNGYAGGFVQVILAGNAFTAGKVIFAAPPNFPTGLSPSQVTMFPHIVVDVRQLEPVLPLPDVRNN  
FYHYNQSNPTIKLIAMLYTPLRANNAGDDVFTVSCRVLTRPSPDFDFIFLVPPTVESRTKPFVSVPLTVEEMTNSRFPIPLE  
KLTGPSSAFVVQPQNGRCTTDGVLLGTTQLSPVNICTFRGDVTHITGSRNYTMNLASQNWNDYDPTTEEIPAPLGPDPFV

**Figure 32W (cont)**

GKIQGVLTQTRTDGSTRGHKATVYTGSAFAPKLGRVQFETDTRDFEANQNTKFTPVGVIQDGGTTHRNEPQQWVL  
 PSYSGRNTHNVHLAPAVPTFPGEQLLFFRSTMPGCSGYPNMDLCLLPQEWVQYFYQEAPAQSDVALLRFVNPDTG  
 RVLFECKLHKSGYVTVAHGTGQHDLVIPPNGYFRFDSWVNQFYTLAPMGNGTGRRRAV

**Figure 32X**

Nucleic acid sequence of human codon optimized VP1\_GII.4\_Syd12\_P80S+Δ35-42 (SEQ ID NO:76)

ATGAAAATGGCCTCGAGTGACGCTAACCTAGTGACGGCAGCGCCGCAATCTTGTGCCTGAGGTAAATAATGAGG  
 TGATGGCCCTGGAGCCTGTGGTGGGCGGTGAGCAGAATGTGATTGACCCGTGGATACGCAACAATTTGTCCAAGC  
 CCCTGGTGGGGAGTTCACCGTTAGCCCGAGAAATGCGCCAGGAGAAATCCTGTGGTCGGCCAGCTTGGGACCCGAT  
 CTGAACCCCTATTTGTACATCTCGCTCGGATGTACAACGGGTATGCCGGCGGATTGAAGTGCAGGTGATTCTGGC  
 TGGGAACGCGTTCACTGCTGGCAAAGTGATCTTGCAGCGGTGCCTCCCACTTCCCACTGAAGGACTGTCTCCAA  
 GCCAGGTACAATGTTTCCACACATCGTGGTGGACGTACGGCAGCTAGAGCCTGTCCTGATTCCCTCCCTGATGTA  
 CGCAATAATTTCTACCACTACAATCAATCCAATGATCCGACCATTAACCTCATCGCGATGTTGTACACCCCTCTGCGC  
 GCTAACAAATGCTGGAGACGACGTATTACCGTGTCTGACAGAGTGCTCACCAGACCTTACCAGACTTTGACTTTATC  
 TTCTTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTAGTGTCCCGTACTCACAGTCGAGGAGATGACAAA  
 TAGCCGCTTCCAATCCCCCTTGAGAACTGTTACAGGACCTTCTCGGCATTCTGTGGTTCAGCCACAGAACGGACG  
 CTGCACAACTGACGGCGTGCTGCTCGGAACCCAGCTTAGCCCTGTTAATATCTGTACGTTTAGAGGCGACGTAA  
 CTCACATAACTGGCTCACGGAATATAACCATGAATCTGGCATCACAGAATTGGAATGACTACGACCAACCGAAGAG  
 ATTCCCGCACCTCTTGAACCCCGACTTTGTGGGAAAAATACAGGCGCTCTGACACAAACCACGAGAACCGATGG  
 CTCCACACGGGGACACAAGGCAACCGTCTACACTGGCTCTGCCGATTTTCCCCGAAACTGGGTAGAGTGCAAGTTG  
 AGACCGACACTGACCGGGACTTTGAAGCCAATCAGAATACTAAGTTCACACCTGTAGGAGTGATTACAGGACGGGGG  
 CACCACTCACCGGAACGAGCCGCAACAATGGGTCTGCCCTCTTAGCGGGAGGAATACTCATAATGTGCATTTGG  
 CTCCTGCAGTGGCTCCACGTTTCCCGGGGAACAAGTCTCTTTTTCTTCAACCATGCCTGGATGCTCCGGATATC  
 CCAATATGGATCTCGATTGCCTGCTCCACAGGAATGGGTGCAGTATTTTATCAAGAGGCCGACACGACCCCAATCC  
 GACGTCGCACTTCTGCGGTTCTGAATCCAGACACAGGCCGCGTGTGTTGAGTGCAAATTGCACAAATCAGGATA  
 CGTTACAGTGGCTCACTGACAGCATGACCTGGTGATCCACCCACGATATTTAGGTTGACTCCTGGGTGA  
 ATCAGTTTATACATTAGCCCCATGGGGAATGGGACTGGCAGACGCAGGGCTGTCTGA

**Figure 32Y**

Amino acid sequence of VP1\_GII.4\_Syd12\_P80S+SSTAVATA (SEQ ID NO:77)

MKMASSDANPSDGSAAANLVPEVNNEVMALEPVVGSSTAVATAGQQNVIDPWIRNNFVQAPGGEFTVSPRNAPGEIL  
 WSASLGPDLNPYLSHLARMYNGYAGGFVQVILAGNAFTAGKVIFAAPPNFPTEGLSPSQVTMFPHIVVDVRQLEPVL  
 PLPDVRNNFYHYNQSNPTIKLIAMLYTPLRANNAGDDVFTVSCRVLTRPSPDFDFILVPPTVESRTKPFVSVPLTVEEMT  
 NSRFPIPLEKLTGPSSAFVQPPQNGRCTTDGVLLGTTQLSPVNICTFRGDVTHITGSRNYTMNLASQNWNDYDPTTEIP  
 APLGTPDFVGKIQGVLTQTRTDGSTRGHKATVYTGSAFAPKLGRVQFETDTRDFEANQNTKFTPVGVIQDGGTTHR  
 NEPQQWVLPSYSGRNTHNVHLAPAVPTFPGEQLLFFRSTMPGCSGYPNMDLCLLPQEWVQYFYQEAPAQSDVAL  
 LRFVNPDTGRVLFECKLHKSGYVTVAHGTGQHDLVIPPNGYFRFDSWVNQFYTLAPMGNGTGRRRAV

**Figure 32Z**

Nucleic acid sequence of human codon optimized VP1\_GII.4\_Syd12\_P80S+SSTAVATA (SEQ ID NO:78)

ATGAAAATGGCCTCGAGTGACGCTAACCCCTAGTGACGGCAGCGCCGCAATCTTGTGCCTGAGGTTAATAATGAGG  
TGATGGCCCTGGAGCCTGTGGTGGGCAGCTCCACCGCCGTCGCTACAGCCGGTCAGCAGAATGTGATTGACCCGTG  
GATACGCAACAATTTTGTCCAAGCCCCTGGTGGGGAGTTCACCGTTAGCCCGAGAAATGCGCCAGGAGAAATCCTG  
TGGTCGGCCAGCTTGGGACCCGATCTGAACCCCTATTTGTCACATCTCGCTCGGATGTACAACGGGTATGCCGGCGG  
ATTTGAAGTGCAGGTGATTCTGGCTGGGAACGCGTTCACTGCTGGCAAAGTGATCTTTGCAGCGGTGCCTCCCACT  
TCCCCACTGAAGGACTGTCTCCAAGCCAGGTACAATGTTTCCACACATCGTGGTGGACGTACGGCAGCTAGAGCCT  
GTCCTGATTCCCCTCCCTGATGTACGCAATAATTTCTACCACTACAATCAATCCAATGATCCGACCATTAACCTCATCG  
CGATGTTGTACACCCCTCTGCGCGCTAACATGCTGGAGACGACGTATTCACCGTGTGCATGCAGAGTGCTCACCAGA  
CCTTCACCAGACTTTGACTTTATCTTCTTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTTAGTGCCCCGTAC  
TCACAGTCGAGGAGATGACAAATAGCCGCTTTCGAATCCCCCTTGAGAAACTGTTACAGGACCTTCCTCGGCATTC  
GTGGTTCAGCCACAGAACGGACGCTGCACAACGACGGCGTGCTGCTCGGAACCAACCCAGCTTAGCCCTGTTAATAT  
CTGTACGTTTAGAGGCGACGTAACCTACATAACTGGCTCACGGAACATACCATGAATCTGGCATCACAGAATTGGA  
ATGACTACGACCCAACCGAAGAGATTCCCGCACCTTTGGAACCCCGACTTTGTGGGAAAAATACAGGGCGTCTCTG  
ACACAAACCACCAGAACCGATGGCTCCACACGGGGACACAAGGCAACCGTCTACACTGGCTCTGCCGATTTTGCCCC  
GAAACTGGGTAGAGTGACGTTTGAGACCGACACTGACCGGGACTTTGAAGCCAATCAGAATACTAAGTTCACACCT  
GTAGGAGTGATTACAGGACGGGGGCACCACTACCCGGAACGAGCCGCAACAATGGGTCTGCCCTCTTATAGCGGG  
AGGAATACTCATAATGTGCATTTGGCTCCTGCAGTGGCTCCACGTTTCCCGGGGAACAACCTGCTCTTTTTTCGTTCA  
ACCATGCCTGGATGCTCCGATATCCCAATATGGATCTCGATTGCCTGCTCCACAGGAATGGGTGCAGTATTTTTAT  
CAAGAGGCCGACCCAGCCCAATCCGACGTCGCACTTCTGCGGTTCTGTGAATCCAGACACAGGCCGCGTGTGTTGA  
GTGCAAATTGCACAAATCAGGATACGTTACAGTGGCTCATACTGGACAGCATGACCTGGTGATCCCACCAACGGAT  
ATTTTAGGTTGACTCCTGGGTGAATCAGTTTTATACATTAGCCCCCATGGGGAATGGGACTGGCAGACGCAGGGCT  
GTCTGA

**FIGURE 32AA**

Amino acid sequence of VP1 GII.4 Syd12 A39V+R53I (SEQ ID NO:188)

MKMASSDANPSDGSAAANLVPEVNNEVMALEPVVGAAIAPVAGQQNVIDPWIINNFFVQAPGGFEFTVSPR  
NAPGEILWSAPLGPDLNPLYSLHARMYNGYAGGFVQVILAGNAFTAGKVIFAAPPPNFPTEGLSPSQVTMF  
PHIVVDVRQLEPVLIPLDVRNNFYHYNQSNPDITKLIAMLYTPLRANNAGDDVFTVSCRVLTRPSPDFDFIFLV  
PPTVESRTKPFVSPVLTVEEMTNSRFPIPLEKLFTGPSSAFVVQPQNGRCTTDGVLGTTQLSPVNICTFRGDVT  
HITGSRNYTMNLASQNWNDYDPTTEEIPAPLGTPDFVGKIQGVLTQTTRTDGSTRGHKATVYTGSADFAPKLG  
RVQFETDTRDFEANQNTKFTPVGVIQDGGTTHRNEPQQWVLPSSYSGRNTHNVHLAPAVAPTFFGEQLLFF  
RSTMPGCSGYPNMDLDCLLPQEWVQYFYQEAAPAQSDVALLRFVNPDTGRVLFECKLHKSGYVTVAHGTGQ  
HDLVIPPNGYFRFDSWVNQFYTLAPMGNGTGRRRAV

**FIGURE 32BB**

Nucleic acid sequence of human codon optimized VP1 GII.4\_Syd12\_A39V+R53I (SEQ ID NO:189)

ATGAAAATGGCCTCGAGTGACGCTAACCTAGTGACGGCAGCGCCGCAATCTTGTGCCTGAGGTTAAT  
 AATGAGGTGATGGCCCTGGAGCCTGTGGTGGGCGCAGCCATAGCAGTCCCCGTGGCCGGTCAGCAGAA  
 TGTGATTGACCCGTGGATAATCAACAATTTTGTCCAAGCCCCCTGGTGGGGAGTTACCGTTAGCCCCGAGA  
 AATGCGCCAGGAGAAATCCTGTGGTCGGCCCCATTGGGACCCGATCTGAACCCCTATTTGTCACATCTCG  
 CTCGGATGTACAACGGGTATGCCGGCGGATTTGAAGTGCAGGTGATTCTGGCTGGGAACGCGTTCACTG  
 CTGGCAAAGTGATCTTTGCAGCGGTGCCTCCCACTTCCCCACTGAAGGACTGTCTCCAAGCCAGGTCAC  
 AATGTTTCCACACATCGTGGTGGACGTACGGCAGCTAGAGCCTGTCCTGATTCCCCTCCCTGATGTACGC  
 AATAATTTCTACCACTACAATCAATCCAATGATCCGACCATTAACTCATCGCGATGTTGTACACCCCTCTG  
 CGCGCTAACAATGCTGGAGACGACGTATTCACCGTGTCATGCAGAGTGCTCACCAGACCTTCACCAGACT  
 TTGACTTTATCTTCTTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTTAGTGTCCCGTACTCACA  
 GTCGAGGAGATGACAAATAGCCGCTTTCCAATCCCCCTTGAGAACTGTTACAGGACCTTCCTCGGCAT  
 TCGTGGTTCAGCCACAGAACGGACGCTGCACAACTGACGGCGTGCTGCTCGGAACCAACCCAGCTTAGCC  
 CTGTTAATATCTGTACGTTTAGAGGCGACGTAACCTCACATAACTGGCTCACGGAATATACCATGAATCTG  
 GCATCACAGAATTGGAATGACTACGACCAACCGAAGAGATTCGCGACCTCTTGGAACCCCCGACTTTG  
 TGGGAAAAATACAGGGCGTCTGACACAAACCACCAGAACCGATGGCTCCACACGGGGACACAAGGCA  
 ACCGTCTACACTGGCTCTGCCGATTTTGGCCCGAACTGGGTAGAGTGACGTTTGAGACCGACACTGACC  
 GGGACTTTGAAGCCAATCAGAATACTAAGTTCACACCTGTAGGAGTGATTCAGGACGGGGGACCACTC  
 ACCGGAACGAGCCGCAACAATGGGTCTGCCCTCTATAGCGGGAGGAATACTCATAATGTGCATTTGG  
 CTCCTGCAGTGGCTCCACGTTTCCCGGGGAACAACCTGCTCTTTTTCGTTCAACCATGCCTGGATGCTCC  
 GGATATCCCAATATGGATCTCGATTGCCTGCTCCACAGGAATGGGTGCAGTATTTTTATCAAGAGGCCG  
 CACCAGCCCAATCCGACGTCGCACTTCTGCGGTTCTGAATCCAGACACAGGCCGCGTGTGTTGAGTG  
 CAAATTGCACAAATCAGGATACGTTACAGTGGCTCATACTGGACAGCATGACCTGGTGATCCCACCCAAC  
 GGATATTTTAGGTTGACTCCTGGGTGAATCAGTTTATACATTAGCCCCCATGGGGAATGGGACTGGCA  
 GACGCAGGGCTGTCTGA

**FIGURE 32CC**

Amino acid sequence of VP1 GII.4 Syd12 A39V+R53I+P80S (SEQ ID NO:190)

MKMASSDANPSDGSAAANLVPEVNNEVMALEPVVGAAIAPVPVAGQQNVIDPWIINNFEVQAPGGEFTVSPR  
 NAPGEILWSASLGPLNPLYSLARMYNGYAGGFEVQVILAGNAFTAGKVIFAAVPPNFPTEGLSPSQVTMF  
 PHIVVDVRQLEPVLIPLDVRNNFYHYNQSNPTIKLIAMLYTPLRANNAGDDVFTVSCRVLTRPSPDFDFIFLV  
 PPTVESRTKPFVSVPLTVEEMTNSRFPIPLEKLFTGPSSAFVVQPQNGRCTTDGVLLGTTQLSPVNICTFRGDVT  
 HITGSRNYTMNLASQNWNDYDPTTEEIPAPLGTPDFVGKIQGVLTQTTRTDGSTRGHKATVYTGSADFAPKLG  
 RVQFETDTRDFEANQNTKFTPVGVIQDGGTTHRNEPQQWVLPSSYSGRNTHNVHLAPAVAPTFFPGEQLLF  
 RSTMPGCSGYPNMDLDCLLPQEWVQYFYQEAAPQSDVALLRFVNPDTGRVLFECKLHKSGYVTVAHGTGQ  
 HDLVIPPNGYFRFDSWVNQFYTLAPMGNGTGRRRAV

**FIGURE 32DD**

Nucleic acid sequence of human codon optimized VP1 GII.4\_Syd12\_A39V+R53I+P80S (SEQ ID NO:191)

ATGAAAATGGCCTCGAGTGACGCTAACCCCTAGTGACGGCAGCGCCGCAATCTTGTGCCTGAGGTAAATAATGAGG  
TGATGGCCCTGGAGCCTGTGGTGGGCGCAGCCATAGCAGTCCCCGTGGCCGGTCAGCAGAATGTGATTGACCCGTG  
GATAATCAACAATTTTGTCCAAGCCCCTGGTGGGGAGTTCACCGTTAGCCCGAGAAATGCGCCAGGAGAAATCCTGT  
GGTCGGCCAGCTTGGGACCCGATCTGAACCCCTATTTGTCACATCTCGCTCGGATGTACAACGGGTATGCCGGCGGA  
TTTGAAGTGCAGGTGATTCTGGCTGGGAACGCGTTCACTGCTGGCAAAGTGATCTTTGCAGCGGTGCCTCCCACTT  
CCCCACTGAAGGACTGTCTCAAGCCAGGTCAATGTTTCCACACATCGTGGTGGACGTACGGCAGCTAGAGCCTG  
TCCTGATTCCCCTCCCTGATGTACGCAATAATTTCTACCACTACAATCAATCCAATGATCCGACCATTAAACTCATCGC  
GATGTTGTACACCCCTCTGCGCGCTAACAAATGCTGGAGACGACGTATTACCGTGTGCATGCAGAGTGCTCACCAGAC  
CTTACCAGACTTTGACTTTATCTTCTTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTTAGTGTCCCCGTACT  
CACAGTCGAGGAGATGACAAATAGCCGCTTTCCAATCCCCCTTGAGAACTGTTACAGGACCTTCTCGGCATTGCG  
TGTTTCAGCCACAGAACGGACGCTGCACAATGACGGCGTGCTGCTCGGAACCAACCCAGCTTAGCCCTGTTAATATC  
TGACGTTTAGAGGCGACGTAACCTACATAACTGGCTCACGGAACCTATACCATGAATCTGGCATCACAGAATTGGAA  
TGACTACGACCCAACCGAAGAGATTCCCGCACCTCTTGAACCCCCGACTTTGTGGGAAAAATACAGGGCGTCCTGA  
CACAAACCACCAGAACCGATGGCTCCACACGGGGACACAAGGCAACCGTCTACACTGGCTCTGCCGATTTTCCCCG  
AACTGGGTAGAGTGCAGTTTGTAGACCGACACTGACCGGGACTTTGAAGCCAATCAGAATACTAAGTTCACACCTG  
TAGGAGTGATTAGGACGGGGACCACTACCGGAACGAGCCGCAACAATGGGTCTGCCCTCTATAGCGGGA  
GGAATACTCATAATGTGCATTTGGCTCCTGCAGTGGCTCCACGTTTCCCGGGGAACAAGTCTCTTTTTTCGTTCAA  
CCATGCCTGGATGCTCCGGATATCCCAATATGGATCTCGATTGCCTGCTCCACAGGAATGGGTGCAGTATTTTTATC  
AAGAGGCCGCACCAGCCCAATCCGACGTCGCACTTCTGCGTTTCGTGAATCCAGACACAGGCCGCGTGTGTTGA  
GTGCAAATTGCACAAATCAGGATACGTTACAGTGGCTCATACTGGACAGCATGACCTGGTGATCCCACCAACGGAT  
ATTTTAGGTTGACTCCTGGGTGAATCAGTTTTATACATTAGCCCCATGGGGAATGGGACTGGCAGACGCAGGGCT  
GTCTGA

**FIGURE 32EE**

Nucleic acid sequence of human codon optimized VP1 GII.4\_Syd12\_P80X; where X = A  
(**XXX**=GCC), N (**XXX**=AAC), K(**XXX**=AAG), or H(**XXX**=CAC) (SEQ ID NO:287)

ATGAAAATGGCCTCGAGTGACGCTAACCCCTAGTGACGGCAGCGCCGCAATCTTGTGCCTGAGGTAAAT  
AATGAGGTGATGGCCCTGGAGCCTGTGGTGGGCGCAGCCATAGCAGCGCCCGTGGCCGGTCAGCAGAA  
TGTGATTGACCCGTGGATACGCAACAATTTTGTCCAAGCCCCTGGTGGGGAGTTCACCGTTAGCCCGAGA  
AATGCGCCAGGAGAAATCCTGTGGTCGGCC**XXX**TTGGGACCCGATCTGAACCCCTATTTGTCACATCTCG  
CTCGGATGTACAACGGGTATGCCGGCGGATTTGAAGTGCAGGTGATTCTGGCTGGGAACGCGTTCACTG  
CTGGCAAAGTGATCTTTGCAGCGGTGCCTCCCACTTCCCCACTGAAGGACTGTCTCAAGCCAGGTACAC  
AATGTTTCCACACATCGTGGTGGACGTACGGCAGCTAGAGCCTGTCCTGATTCCCCTCCCTGATGTACGC  
AATAATTTCTACCACTACAATCAATCCAATGATCCGACCATTAAACTCATCGGATGTTGTACACCCCTCTG  
CGCGCTAACAAATGCTGGAGACGACGTATTACCGTGTGCATGCAGAGTGCTCACCAGACCTTACCAGACT  
TTGACTTTATCTTCTTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTTAGTGTCCCCGTACTCACA  
GTCGAGGAGATGACAAATAGCCGCTTTCCAATCCCCCTTGAGAACTGTTACAGGACCTTCTCGGCAT  
TCGTGGTTCAGCCACAGAACGGACGCTGCACAATGACGGCGTGCTGCTCGGAACCAACCCAGCTTAGCC

**FIGURE 32EE (cont)**

CTGTTAATATCTGTACGTTTAGAGGCGACGTAACCTCACATAACTGGCTCACGGAACCTATACCATGAATCTG  
 GCATCACAGAATTGGAATGACTACGACCCAACCGAAGAGATTCCCGCACCTCTTGGAACCCCGACTTTG  
 TGGGAAAAATACAGGGCGTCCTGACACAAACCACCGAAGGATGGCTCCACACGGGGACACAAGGCA  
 ACCGTCTACACTGGCTCTGCCGATTTTCCCCGAAACTGGGTAGAGTGCAGTTTGAGACCGACACTGACC  
 GGGACTTTGAAGCCAATCAGAATACTAAGTTCACACCTGTAGGAGTGATTCAGGACGGGGGCACCACTC  
 ACCGGAACGAGCCGCAACAATGGGTCTGCCCTCTTAGCGGGAGGAATACTCATAATGTGCATTTGG  
 CTCCTGCAGTGGCTCCACGTTTCCCGGGGAACAAGTCTCTTTTTCGTTCAACCATGCCTGGATGCTCC  
 GGATATCCCAATATGGATCTCGATTGCCTGCTCCACAGGAATGGGTGCAGTATTTTTATCAAGAGGCCG  
 CACCAGCCCAATCCGACGTCGCACTTCTGCGGTTCTGAATCCAGACACAGGCCGCGTGTGTTGAGTG  
 CAAATTGCACAAATCAGGATACGTTACAGTGGCTCATACTGGACAGCATGACCTGGTGATCCCAAC  
 GGATATTTAGGTTGACTCCTGGGTGAATCAGTTTATACATTAGCCCCCATGGGGAATGGGACTGGCA  
 GACGCAGGGCTGTCTGA

**FIGURE 32FF**

Amino acid sequence of VP1\_GII.4\_Syd12\_P80X; where X = A, N, K, or H (SEQ ID NO:286)

MKMASSDANPSDGSAAANLVPEVNNEVMALEPVVGAIAAPVAGQQNVIDPWIRNNFVQAPGGEFTVSPR  
 NAPGEILWSA~~X~~LGPDLNPYLSHLARMYNGYAGGFVQVILAGNAFTAGKVIFAAPPNFPTEGLSPSQVTMF  
 PHIVVDVRQLEPVLIPDVRNNFYHYNQSNPTIKLIAMLYTPLRANNAGDDVFTVSCRVLTRPSPDFDFIFLV  
 PPTVESRTKPFVSVPLTVEEMTNSRFPIPLEKLTGPSSAFVVQPQNGRCTTDGVLLGTTQLSPVNICTFRGDVT  
 HITGSRNYTMNLASQNWNDYDPTTEEIPAPLGTDFVQVILAGVLTQTTTRTDGSTRGHKATVYTGSAFAPKLG  
 RVQFETDTRDFEANQNTKFTPVGVIQDGGTTHRNEPQQWVLPYSYGRNTHNVHLAPAVAPTFFPGEQLLF  
 RSTMPGCSGYPNMDLDCLLPQEWVQYFYQEAAPQSDVALLRFVNPDTGRVLFECKLHKSGYVTVAHGTGQ  
 HDLVIPPNGYFRFDSWVNQFYTLAPMGNGTGRRRAV

**FIGURE 32GG (SEQ ID NO:289)**

hCod optimize sequence of VP1 GII.4\_Syd12\_P80S+A39X; X = I(~~XXX~~=ATC), M(~~XXX~~=ATG),  
 G(~~XXX~~=GGC), S(~~XXX~~=AGC), E(~~XXX~~=GAG), D(~~XXX~~=GAC), N(~~XXX~~=AAC), Q(~~XXX~~=CAG), K(~~XXX~~=AAG),  
 or H(~~XXX~~=CAC)

ATGAAAATGGCCTCGAGTGACGCTAACCTAGTGACGGCAGCGCCGCAATCTTGTGCCTGAGGTTAAT  
 AATGAGGTGATGGCCCTGGAGCCTGTGGTGGGCGCAGCCATAGCA~~XXX~~CCCGTGGCCGGTCAGCAGAA  
 TGTGATTGACCCGTGGATACGCAACAATTTTGTCCAAGCCCCTGGTGGGGAGTTCACCGTTAGCCCAGAA  
 AATGCGCCAGGAGAAATCCTGTGGTCGGCCAGCTTGGGACCCGATCTGAACCCCTATTTGTCACATCTCG  
 CTCGGATGTACAACGGGTATGCCGGCGGATTTGAAGTGCAGGTGATTCTGGCTGGGAACGCGTTCACTG  
 CTGGCAAAGTGATCTTTGCAGCGGTGCCTCCCAACTTCCCCACTGAAGGACTGTCTCCAAGCCAGGTCAC  
 AATGTTTCCACACATCGTGGTGGACGTACGGCAGCTAGAGCCTGTCCTGATTCCCCTCCCTGATGTACGC  
 AATAATTTCTACCACTACAATCAATCCAATGATCCGACCATTAACTCATCGCGATGTTGTACACCCCTCTG  
 CGCGCTAACAATGCTGGAGACGACGTATTCACCGTGTCTATGCAGAGTGCTCACCAGACCTTACCAGACT  
 TTGACTTTATCTTCTTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTTAGTGTCCCCGTAATCACA

**FIGURE 32GG (cont)**

GTCGAGGAGATGACAAATAGCCGCTTTCCAATCCCCCTTGAGAAACTGTTACAGGACCTTCCTCGGCAT  
 TCGTGGTTCAGCCACAGAACGGACGCTGCACAACTGACGGCGTGCTGCTCGGAACCAACCCAGCTTAGCC  
 CTGTTAATATCTGTACGTTTAGAGGCGACGTAACCTCACATAACTGGCTCACGGAACCTATACCATGAATCTG  
 GCATCACAGAATTGGAATGACTACGACCCAACCGAAGAGATCCCCGCACCTCTTGGAACCCCCGACTTTG  
 TGGGAAAAATACAGGGCGTCTGACACAAACCACCAGAACCGATGGCTCCACACGGGGACACAAGGCA  
 ACCGTCTACACTGGCTCTGCCGATTTTGGCCCGAAACTGGGTAGAGTGACGTTTGAGACCGACACTGACC  
 GGGACTTTGAAGCCAATCAGAATACTAAGTTCACACCTGTAGGAGTGATTCAGGACGGGGGCACCACTC  
 ACCGGAACGAGCCGCAACAATGGGTCTGCCCTCTTATAGCGGGAGGAATACTCATAATGTGCATTTGG  
 CTCCTGCAGTGGCTCCACGTTTCCCGGGGAACAACCTGCTCTTTTTCGTTCAACCATGCCTGGATGCTCC  
 GGATATCCCAATATGGATCTCGATTGCCTGCTCCACAGGAATGGGTGCAGTATTTTTATCAAGAGGCCG  
 CACCAGCCCAATCCGACGTCGCACTTCTGCGGTTCTGAATCCAGACACAGGCCGCGTGTGTTGAGTG  
 CAAATTGCACAAATCAGGATACGTTACAGTGGCTCATACTGGACAGCATGACCTGGTGATCCCACCCAAC  
 GGATATTTAGGTTGACTCCTGGGTGAATCAGTTTATACATTAGCCCCCATGGGGAATGGGACTGGCA  
 GACGCAGGGCTGTCTGA

**FIGURE 32HH (SEQ ID NO:288)**

Amino acid sequence of VP1\_GII.4\_Syd12\_P80S+A39X; where X = I, M, G, S, E, D, N, Q, K, or H

MKMASSDANPSDGSAAANLVPEVNNEVMALEPVVGAAIA~~X~~PVAGQQNVIDPWIRNNFVQAPGGEFTVSPR  
 NAPGEILWSASLGPDLNPYLSHLARMYNGYAGGFEVQVILAGNAFTAGKVIFAAPPPNFPTGLSPSQVTMF  
 PHIVVDVRQLEPVLIPLPDVRNNFYHYNQSNPTIKLIAMLYTPLRANNAGDDVFTVSCRVLTRPSPDFDFIFLV  
 PPTVESRTKPFVSVPLTVEEMTNSRFPIPLEKLFTGPSSAFVQVQNGRCTTDGVLGTTQLSPVNICTFRGDVT  
 HITGSRNYTMNLSQNWNDYDPTTEEIPAPLGTPDFVGKIQGVLTQTTRTDGSTRGHKATVYTGSADFAPKLG  
 RVQFETDTRDFEANQNTKFTPVGVIQDGGTTHRNEPQQWVLPYSYGRNTHNVHLAPAVAPTFFPGEQLLF  
 RSTMPGCSGYPNMDLDCLLPQEWVQYFYQEAPAQSDVALLRFVNPDTGRVLFECKLHKSQYVTVHTGQ  
 HDLVIPPNGYFRFDSWVNQFYTLAPMNGTGRRRAV

**Figure 33A**

Amino acid sequence of VP1\_GII.6\_Ohio\_E80S (SEQ ID NO:79)

MKMASNDAAPSNDGAANLVPEANNEVMALEPVVGASIAAPVVGQQNIIDPWIRENFVQAPQGEFTVSPRNSPGEMLL  
 NLSLGPENPYLSHLARMYNGYAGGMQVQVLAGNAFTAGKIIFAAPPPHFPVENINAAQITMCPHVIVDVRQLEPVLLP  
 LPDIRNRRFFHYNQENTSRMRLVAMLYTPLRANSGEDVFTVSCRVLTRPAPDFEFTFLVPPTVESKTKPFSLPILTGLSNSR  
 FPAPIDMLYTDPNEGIVVQVQNGRCTLDGTLQGTQLVPTQICAFRGTLIGQTSRSPDSTDSAPRRRDHPLHVQLKNDG  
 TQYDPTDEVPAVLGAIDFKGTVFGVASQRDVSGQVQVGAATRAHEVHINTTDPRTYTPKLSILMYSESDDFVTGQPVRFPI  
 GMGDNDWHQWELPDYPGHLTLNMNLAPAVAPAFPGERILFFRSIVPSAGGYGSGQIDCLIPQEWVQHFYQEAPSQS  
 AVALIRYVNPDTGRNIFEAKLHREGFITVANSNGNPIVPPNGYFRFEAWVNQFYTLTPMGTGQGRRRDQ



**FIGURE 33D (cont)**

AATGCAAGTTCAGGTGGTCCTGGCCGGCAATGCTTTACCGCGGGCAAAATCATCTTTGCGGCCGTTCTCCACACT  
 TCCCTGTCGAAAATATCAACGCCGCCAGATTACTATGTGCCCCACGTGATTGTGGATGTGCGACAGTTAGAGCCA  
 GTTCTGCTGCCCCTGCCCAGCATCAGAAACCGTTCTTCCATTACAATCAAGAGAATACTTCACGGATGAGACTTGT  
 GCGATGCTGTACACCCCTCTTCGTGCAAATTCGGCGAAGACGTGTTCACTGTGTCTTGTGAGTACTTACCCGACCC  
 GCCCCGATTTGCAATTCACCTTCCTGGTTCCCCCTACTGTGGAGAGCAAGACAAAACCTTCAGCCTCCCAATCTTA  
 ACACTCGGGGAGCTGTCTAATTCACGCTTCCCCGCACCTATTGATATGCTGTATACTGACCCCAACGAGGGGATAGT  
 GGTGCAGCCCCAAAATGGACGGTGTACTCTGACGGCACGCTCCAGGGCACAACCCAAGTGGTCCAACCCAGATT  
 TGTGCATTACAGGGGCACTTTGATTGGGCAGACATCGAGATCTCCAGATTCTACTGATTCCGCGCCAAGGAGGAGGG  
 ACCACCCACTCCACGTTCAAGTAAAAACCTGGACGGAACCCAGTACGACCTACAGACGAGGTCCCCGCTGTCCTC  
 GGAGCCATCGACTTTAAAGGAAGTGTATTTGGAGTGGCATCCCAAAGGGATGTCTCGGGGACAGAGGTGGGAGCT  
 ACGAGAGCACATGAAGTCCACATTAACACCACAGACCCAAGATATACCCCAAACTAGGGTCAATTTTAATGTATTC  
 GGAATCAGACGATTTTGTACAGGTCAGCCCGTGGGTTTACCCCGATCGGAATGGGGGACAACGATTGGCACCAG  
 TGGGAATTGCCCGATTACCTGGACACCTCACCTGAATATGAATCTGGCCCCAGCCGTCGCGCCCGCCTTCCCCGGT  
 GAGCGGATCCTCTTTTTAGAACATAGTGCCCTCCGCAGGTGGGTATGGATCAGGGCAGATTGATTGCCTGATCCC  
 CCAAGAATGGGTACAGCATTCTACCAGGAAGCAGCCCCTAGCCAGTCCGCAGTAGCACTGATCAGATATGTTAATC  
 CTGATACGGGAAGGAACATCTTGAAGCAAACTGCACCGTGAGGGCTTCAATACCGTCGCCAACAGTGGTAATAA  
 CCCTATTGTGGTGCCTCCTAATGGATACTTCAGGTTTGAGGCATGGGTGAATCAGTTTATACTCTGACTCCCATGGG  
 GACAGGCCAGGGGCGACGCCGGGATCAGTGA

**Figure 33E**

Amino acid sequence of VP1\_GII.6\_Ohio\_E80S+S90L (SEQ ID NO:83)

MKMASNDAAPSNDGAANLVPANNEVMALEPVVGASIAAPVVGQQNIIDPWIRENFVQAPQGEFTVSPRNSPGEMLL  
 NLSLGPELNPYLLHLSRMYNGYAGGMQVQVVLAGNAFTAGKIIFAAVPPHFPVENINAAQITMCPHVIVDVRQLEPVLLP  
 LPDIRNRFHYNQENTSRMRLVAMLYTPLRANSGEDVFTVSCRVLTRPAPDFEFTFLVPPTVESKTKPFSLPILTGLGSNSR  
 FPAPIDMLYTDPNEGIVVQPQNGRCTLDTLQGTQLVPTQICAFRGTGLIGQTSRSPDSDSAPRRRDHPLHVQLKNLDG  
 TQYDPTDEVPAVLGAIDFKGTVFGVASQRDVSGQVQVATRAHEVHINTTDPRYTPKLSILMYSESDDFVTGQPVRFPTPI  
 GMGDNDWHQWELPDYPGHLTLNMNLAPAVAPAFPGERILFFRSIVPSAGGYGSGQIDCLIPQEWVQHFYQEAAPSQS  
 AVALIRYVNPDTGRNIFEAKLHREGFITVANSNNPIVPPNGYFRFEAWVNQFYTLTPMGTGQGRRRDQ

**Figure 33F**

Nucleic acid sequence of human codon optimized VP1\_GII.6\_Ohio\_E80S+S90L (SEQ IDNO:84)

ATGAAGATGGCAAGCAACGACGCAGCTCCCTCCAATGATGGTGCCGCCAACCTGGTCCCCGAAGCTAATAATGAGG  
 TGATGGCGTTAGAGCCGGTGGTTGGCGCATCTATTGCAGCGCTGTGGTCGGACAGCAGAACATCATTGATCCCTG  
 GATTCGCGAGAACTTCGTACAAGCTCCACAGGGGGAGTTACAGTCTCCCCCGGAACTCCCCGGGCGAGATGCTG  
 CTCAATCTGAGCCTCGGCCCTGAACTAAACCCTTATCTGCTCCACCTTTCACGGATGTACAATGGCTACGCAGGAGGA  
 ATGCAAGTTCAGGTGGTCCTGGCCGGCAATGCTTTACCGCGGGCAAAATCATCTTTGCGGCCGTTCTCCACACTTC  
 CCTGTCGAAAATATCAACGCCGCCAGATTACTATGTGCCCCACGTGATTGTGGATGTGCGACAGTTAGAGCCAGT  
 TCTGCTGCCCCTGCCCAGCATCAGAAACCGTTCTTCCATTACAATCAAGAGAATACTTCACGGATGAGACTTGTTC  
 GATGCTGTACACCCCTCTTCGTGCAAATTCGGCGAAGACGTGTTCACTGTGTCTTGTGAGTACTTACCCGACCCGC  
 CCCCATTTCGAATTCACCTTCCTGGTTCCCCCTACTGTGGAGAGCAAGACAAAACCTTCAGCCTCCCAATCTTAAC  
 ACTCGGGGAGCTGTCTAATTCACGCTTCCCCGCACCTATTGATATGCTGTATACTGACCCCAACGAGGGGATAGTGG

**FIGURE 33F (cont)**

TGCAGCCCCAAATGGACGGTGTACTCTCGACGGCAGCTCCAGGGCACAACCCAAGTGGTGCCAACCCAGATTGT  
 GCATTCAGGGGCACTTTGATTGGGCAGACATCGAGATCTCCAGATTCTACTGATTCCGCGCCAAGGAGGAGGGACC  
 ACCCACTCCACGTTCAAGTAAAAAACCTGGACGGAACCCAGTACGACCCTACAGACGAGGTCCCCGCTGTCCTCGGA  
 GCCATCGACTTTAAAGGAACTGTATTTGGAGTGGCATCCCAAAGGGATGTCTCGGGGCAGCAGGTGGGAGCTACGA  
 GAGCACATGAAGTCCACATTAACACCACAGACCCAAGATATACCCAAAAGTGGGTCAATTTTAAATGTATTGGAA  
 TCAGACGATTTTGTACAGGTGAGCCCGTGGGTTTACCCGATCGGAATGGGGGACAACGATTGGCACCAGTGGG  
 AATTGCCCGATTACCTGGACACCTCACCTGAATATGAATCTGGCCCCAGCCGTCGCGCCCGCTTCCCCGGTGAGC  
 GGATCCTCTTTTTAGAACATAGTCCCTCCGACGGTGGGTATGGATCAGGGCAGATTGATTGCCTGATCCCCAA  
 GAATGGGTACAGCATTTCTACCAGGAAGCAGCCCTAGCCAGTCCGACGTAGCACTGATCAGATATGTTAATCCTGA  
 TACGGGAAGGAACATCTTCAAGCAAACTGCACCGTAGGGGCTTATTACCGTCGCCAACAGTGGTAATAACCT  
 ATTGTGGTGCCTCCTAATGGATACTTCAGGTTTGGGATGGGTGAATCAGTTTATACTCTGACTCCCATGGGGAC  
 AGGCCAGGGGCGACGCCGGGATCAGTGA

**Figure 34A**

Amino acid sequence of VP1\_GII.12\_HS10\_E80S (SEQ ID NO:88)

MKMASNDAAPSNDGAAGLVPEVNNETMALEPVAGASIAAPLTGQNNVIDPWIRLNFVQAPNGEFTVSPRNSPGEVLL  
 NLSLGPENLPYLAHLSRMYNGYAGGVEVQVLLAGNAFTAGKLVFAAVPPHFPLENISPGQITMFPHVIIDVRTLEPVLLPLP  
 DVRNNFFHYNQNEPRMRLVAMLYTPLRSNGSGDDVFTVSCRVLTRSPDFDFNYLVPPTVESKTKPFTLPILTIGELTNS  
 RFPVPIDELYTSPNESLVVQPQNGRCALDQELQGTQLLPTAICSFGRINQKVSGENHVWNMQVTNIDGTPFDPTEVDV  
 PAPLGTPDFSGKLFGLVLSQRDHDNACRSHDAVIATNSAKFTPKLGAIQIGTWEQDDVHINQPTKFTPVGLFESEGFNQW  
 TLPNYSGALTINMGLAPPVAPTFPGEQILFFRSHIPKGGVADPVIDCLLPQEWIQHLYQESAPSQTDVALIRFTNPDTGRV  
 LFEAKLHRSGYITVANTGSRPIVVPANGYFRFDSWVNQFYSLAPMGTGNRRRVQ

**Figure 34B**

Nucleic acid sequence of human codon optimized VP1\_GII.12\_HS10\_E80S (SEQ ID NO:89)

ATGAAGATGGCGTCTAATGATGCTGCTCCTTCCAATGATGGCGCAGCCGGCCTGGTCCCTGAAGTGAATAACGAGA  
 CTATGGCTCTCGAACCGTGCCCGGAGCCTCAATTGCCGCCCCCTCACTGGCCAGAACAACGTGATTGATCCCTGG  
 ATCAGACTGAACTTCGTTCAAGGCTCCTAATGGGGAGTTCACCGTGTCCCCGAGAACTCCCCGGCGAAGTGTTATT  
 GAATTTGAGCTTAGGACCAGAACTCAACCCCTATCTGGCACATCTGTCTCGGATGTACAACGGCTATGCGGGCGGAG  
 TGGAGGTGCAAGTTCTTCTCGCTGGTAATGCATTCACAGCAGGAAAATTAGTATTTGCAGCGTTCCACCCATTTTC  
 CACTTGAAAACATAAGCCCAGGCCAGATCACCATGTTCCCTCACGTGATAATCGACGTGCGGACATTAGAGCCCGTG  
 CTGCTACCCCTGCCGACGTGAGGAACAATTTCTTCACTACAATCAGCAAAATGAACCAAGAATGCGCCTGGTCGC  
 CATGCTCTATACTCCTTTAAGAAAGTAATGGCAGTGGGGATGACGTGTTTACTGTTAGCTGTGCGGTGCTCACCCGAC  
 CTTCCCCAGATTTGCACTTCAATTATCTGGTCCCCCCCACGGTAGAGTCCAAAACAAAGCCTTTCACTCTTCAATCCT  
 TACAATTGGCGAACTGACCAACTCACGCTTTCAGTGCCTATTGATGAGCTGTACACAAGTCCAAATGAATCCCTTGT  
 CGTTCAGCCACAGAATGGGCGCTGCGCGCTGACGGTGAGCTCCAGGGCACAACACAAGTGTGCCAACCGCTATA  
 TGCTCTTTCAGGGGGCGTATTAATCAGAAGGTCTCCGGGGAGAACCACGTGTGGAACATGCAAGTGACGAATATCG  
 ACGGGACACCTTTCGATCCAACAGAGGATGTCCAGCGCCTCTAGGTACCCCTGACTTCTCAGGCAAGTTGTTCCGGC  
 GTCCTTTCACGCGGACCATGATAATGCTTGCCGGAGCCACGATGCCGTCATTGCCACCAACTCAGCCAAATTCACC  
 CAAAACTTGGAGCGATACAGATCGAACTTGGGAACAAGACGACGTCCATATCAACCAACCAACAAAGTTTACCCC  
 TGTTGGCCTTTTCGAAAGCGAAGGCTTAACCAAGTGGACACTTCCCAATTACAGCGGGGCTCTCACTCTTAATATGG

**FIGURE 34B (cont)**

GACTCGCACCAACCGTCGCTCCAACGTTTCTGGTGAGCAGATTTGTTTTCCGCAGTCATATTCCACTGAAGGGTG  
 GAGTTGCTGATCCCGTGATAGACTGCCTCCTCCCTCAGGAATGGATTGAGCACTTGTATCAGGAGTCCGCTCCCTCGC  
 AGACCGATGTGGCCCTGATACGCTTCACAAACCCCGATACCGGAAGAGTGTTGTTTGAAGCTAACTTCATCGCTCC  
 GGTTACATCACAGTAGCCAACACGGGTTCCAGGCCAATCGTAGTTCGGGCAAACGGATACTTTGATTTCGACAGTTG  
 GGTCAATCAGTTCTACAGCCTGGCTCCAATGGGAACAGGAAATGGGAGGAGGCGTGTGCAGTAA

**Figure 34C**

Amino acid sequence of VP1\_GII.12\_HS10\_A90L (SEQ ID NO:90)

MKMASNDAAPSNDGAAGLVPEVNNETMALEPVAGASIAAPLTGQNNVIDPWIRLNFVQAPNGEFTVSPRNSPGEVLL  
 NLELGPENLPYLLHLSRMYNGYAGGVEVQVLLAGNAFTAGKLVFAAVPPHFPLENISPGQITMFPHVIIDVRTLEPVLLPLP  
 DVRNNFFHYNQQNEPRMRLVAMLYTPLRSNGSGDDVFTVSCRVLTRSPDFDFNYLVPPTVESKTKPFTLPILTIGELTNS  
 RFPVPIDELYTSPNESLVVQPQNGRCALDGELQGTTQLLPATICSFRGRINQKVSGENHVWNMQVTNIDGTPFDPTEDEV  
 PAPLGTPDFSGKLFGLVLSQRDHDNACRSHDAVIATNSAKFTPKLGAIQIGTWEQDDVINQPTKFTPVGLFESEGFNQW  
 TLPNYSGALTINMGLAPPVAPTFPGEQILFFRSHIPKGGVADPVIDCLLPQEWIQHLYQESAPSQTDVALIRFTNPDTGRV  
 LFEAKLHRSGYITVANTGSRPIVVPANGYFRFDSWVNQFYSLAPMGTGNGRRRVQ

**Figure 34D**

Nucleic acid sequence of human codon optimized VP1\_GII.12\_HS10\_A90L (SEQ ID NO:91)

ATGAAGATGGCGTCTAATGATGCTGCTCCTTCCAATGATGGCGCAGCCGGCCTGGTCCCTGAAGTGAATAACGAGA  
 CTATGGCTCTCGAACCCGTGGCCGGAGCCTCAATTGCCGCCCCCTCACTGGCCAGAACAACGTGATTGATCCCTGG  
 ATCAGACTGAACTTCGTTTCAAGGCTCCTAATGGGGAGTTTACCGTGTCCCCGAGAACTCCCCGGCGAAGTGTTATT  
 GAATTTGGAATTAGGACCAGAACTCAACCCCTATCTGCTCCATCTGTCTCGGATGTACAACGGCTATGCGGGCGGAG  
 TGGAGGTGCAAGTTCTTCTCGCTGGTAATGCATTCACAGCAGGAAAATTAGTATTTGCAGCGTTTCCACCCATTTTC  
 CACTTGAAAACATAAGCCCAGGCCAGATCACCATGTTCCCTCACGTGATAATCGACGTGCGGACATTAGAGCCCGTG  
 CTGCTACCCCTGCCGACGTGAGGAACAATTTCTTCACTACAATCAGCAAAATGAACCAAGAATGCGCCTGGTCGC  
 CATGCTCTATACTCCTTTAAGAAGTAATGGCAGTGGGGATGACGTGTTTACTGTTAGCTGTCGGGTGCTCACCCGAC  
 CTTCCCAGATTTGCACTTCAATTATCTGGTCCCCCCCACGGTAGAGTCCAAAACAAAGCCTTTCACTCTTCCAATCCT  
 TACAATTGGCGAAGTACCAACTCACGCTTTCAGTGCCTATTGATGAGCTGTACACAAGTCCAAATGAATCCCTTGT  
 CGTTCAGCCACAGAATGGGCGCTGCGCGCTTGACGGTGAGCTCCAGGGCACAACACAAGTGTGCCAACCGCTATA  
 TGCTCTTTCAGGGGGCGTATTAATCAGAAGGTCTCCGGGGAGAACCACGTGTGGAACATGCAAGTGACGAATATCG  
 ACGGGACACCTTTCGATCCAACAGAGGATGTCCAGCGCCTCTAGGTACCCCTGACTTCTCAGGCAAGTTGTTCCGGC  
 GTCCTTTCAGCGCGACCATGATAATGCTTGCCGGAGCCACGATGCCGTCATTGCCACCAACTCAGCCAAATTCACC  
 CAAAACTTGGAGCGATACAGATCGGAATTGGGAACAAGACGACGTCCATATCAACCAACCAACAAAGTTTACCCC  
 TGTTGGCCTTTTCGAAAGCGAAGGCTTTAACCAGTGGACACTTCCCAATTACAGCGGGGCTCTCACTCTTAATATGG  
 GACTCGCACCAACCGTCGCTCCAACGTTTCTGGTGAGCAGATTTGTTTTCCGCAGTCATATTCCACTGAAGGGTG  
 GAGTTGCTGATCCCGTGATAGACTGCCTCCTCCCTCAGGAATGGATTGAGCACTTGTATCAGGAGTCCGCTCCCTCGC  
 AGACCGATGTGGCCCTGATACGCTTCACAAACCCCGATACCGGAAGAGTGTTGTTTGAAGCTAACTTCATCGCTCC  
 GGTTACATCACAGTAGCCAACACGGGTTCCAGGCCAATCGTAGTTCGGGCAAACGGATACTTTGATTTCGACAGTTG  
 GGTCAATCAGTTCTACAGCCTGGCTCCAATGGGAACAGGAAATGGGAGGAGGCGTGTGCAGTAA

**Figure 34E**

Amino acid sequence of VP1\_GII.12\_HS10\_E80S+A90L (SEQ ID NO:92)

MKMASNDAAPSNDGAAGLVPEVNNETMALEPVAGASIAAPLTGQNNVIDPWIRLNQVQAPNGEFTVSPRNSPGEVLL  
NLSLGPENLPYLLHLSRMYNGYAGGVEVQVLLAGNAFTAGKLVFAAVPPHFPLENISPGQITMFPVHIIDVRTLEPVLLPLP  
DVRNNFFHYNNQNEPRMRLVAMLYTPLRSNGSGDDVFTVSCRVLTRPSPDFDFNYLVPPTVESKTKPFTLPILTIGELTNS  
RFPVPIDELYTSPNESLVVQPQNGRCALDGELQGTQLLPTAICSFGRINQKVS GENHVWNMQVTNIDGTPFDPTEDV  
PAPLGTPDFSGKLFGLVLSQRDHDNACRSHDAVIATNSAKFTPKLGAIQGTWEQDDVHINQPTKFTPVGLFESEGFNQW  
TLPNYSGALTLMGLAPPVAPTFFGEQILFFRSHIPLKGGVADPVIDCLLPQEWIQHLYQESAPSQTDVALIRFTNPDTGRV  
LFEAKLHRSGYITVANTGSRPIVVPANGYFRFDSWVNQFYSLAPMGTGNRRRVQ

**Figure 34F**

Nucleic acid sequence of human codon optimized VP1\_GII.12\_HS10\_E80S+A90L (SEQ ID NO:93)

ATGAAGATGGCGTCTAATGATGCTGCTCCTTCCAATGATGGCGCAGCCGGCCTGGTCCCTGAAGTGAATAACGAGA  
CTATGGCTCTCGAACCGTGCCCGGAGCCTCAATTGCCGCCCCCTCACTGGCCAGAACACGTGATTGATCCCTGG  
ATCAGACTGAACTTCGTTCAAGGCTCCTAATGGGGAGTTCACCGTGTCCTCCGAGAACTCCCCGGCGAAGTGTTATT  
GAATTTGAGCTTAGGACCAGAACTCAACCCCTATCTGCTCCATCTGTCTCGGATGTACAACGGCTATGCGGGCGGAG  
TGGAGGTGCAAGTTCTTCTCGCTGGTAATGCATTCACAGCAGGAAAATTAGTATTTGCAGCGGTTCCACCCATTTTC  
CACTTGAAAACATAAGCCCAGGCCAGATCACCATGTTCCCTCACGTGATAATCGACGTGCGGACATTAGAGCCCGTG  
CTGCTACCCCTGCCGACGTGAGGAACAATTTCTTCACTACAATCAGCAAAATGAACCAAGAATGCGCCTGGTCGC  
CATGCTCTATACTCCTTTAAGAAGTAATGGCAGTGGGGATGACGTGTTTACTGTTAGCTGTGCGGTGCTCACCCGAC  
CTTCCCCAGATTTGCACTTCAATTATCTGGTCCCCCCCACGGTAGAGTCCAAAACAAAGCCTTTCACTCTTCCAATCCT  
TACAATTGGCGAACTGACCAACTCAGCCTTCCAGTGCTATTGATGAGCTGTACACAAGTCCAAATGAATCCCTTGT  
CGTTCAGCCACAGAATGGGCGCTGCGCGCTTGACGGTGAGCTCCAGGGCACAACACAACCTGTTGCCAACCGCTATA  
TGCTCTTTCAGGGGGCGTATTAATCAGAAGGTCTCCGGGGAGAACCACGTGTGGAACATGCAAGTGACGAATATCG  
ACGGGACACCTTTCGATCCAACAGAGGATGTCCAGCGCCTCTAGGTACCCCTGACTTCTCAGGCAAGTTGTTCCGGC  
GTCCTTTCCAGCGCGACCATGATAATGCTTGCCGGAGCCACGATGCCGTCATTGCCACCAACTCAGCCAAATTCACC  
CCAAAACCTTGAGCGATACAGATCGGAACTTGGAACAAGACGACGTCCATATCAACCAACCAACAAAGTTTACCCC  
TGTTGGCCTTTTCGAAAGCGAAGGCTTTAACCAGTGGACACTTCCAATTACAGCGGGGCTCTCACTCTTAATATGG  
GACTCGCACCAACCGTCGCTCCAACGTTTCTGGTGAGCAGATTTGTTTTTCCGCAGTCAATTCCACTGAAGGGTG  
GAGTTGCTGATCCCGTGATAGACTGCCTCCTCCCTCAGGAATGGATTGAGCACTTGTATCAGGAGTCCGCTCCCTCGC  
AGACCGATGTGGCCCTGATACGCTTCAAAACCCCGATACCGGAAGAGTGTTGTTTGAAGCTAACTTCATCGCTCC  
GGTTACATCACAGTAGCCAACACGGGTTCCAGGCCAATCGTAGTTCGGGCAAACGGATACTTTCGATTGACAGATTG  
GGTCAATCAGTTCTACAGCCTGGCTCCAATGGGAACAGGAAATGGGAGGAGGCGTGTGCAGTAA

**FIGURE 34G**

Amino acid sequence of VP1 GII.17 Kawa 2014 A0A077KVU6\_A39V (SEQ ID NO:192)

MKMASNDAAPSNDGAAGLVPEGNNETLPLEPVAGAAIAVPVTGQNNIIDPWIRTNFVQAPNGEFTVSPRNS  
PGEILLNLELGPDLNPYLAHLRMYNGYAGGVEVQVLLAGNAFTAGKILFAAVPPNFPVEFLSPAQITMLPHLI  
VDVRTLEPIMIPDPVRNTFFHYNNQPNRMRMLVAMLYTPLRSNGSGDDVFTVSCRVLTRPTPDFEFTYLVPP  
SVESKTKPFSLPILTSELNTRFVPIDSLFTAQNNVLQVQCQNGRCTLGELQGTQLLPSGICAFRGRVTAE  
TDHRDKWHMQLQNLNGTTYDPTDDVPAPLGTPDFKGVVFGVASQRNVGNDAPGSTRAHEAVISTYSPQFV

**FIGURE 34G (cont)**

PKLGSVNFRSNDNDFQLQPTKFTPVGINDDGDHPFRQWELPDYSGLLTLNMNLAPPVAPNFPGEQLLFFRSF  
 VPCSGGYNQGIVDCLIPQEWIQHFYQESAPSQSDVALIRYVNPDTGRTLFEAKLHRSGYITVAHSGDYPLVVPA  
 NGYFRFDSWVNQFYSLAPMGTGNRRRAQ

**FIGURE 34H**

Nucleic acid sequence of VP1 hCod GII.17 Kawa 2014 A0A077KVU6\_A39V (SEQ ID NO:193)

ATGAAAATGGCATCTAACGACGCAGCCCCCTCAAACGATGGCGCTGCTGGACTCGTGCCGGAGGGGAAT  
 AATGAGACACTTCCACTAGAGCCGTTGCAGGCGCCGCTATAGCTGTGCCAGTGACAGGGCAGAATAAT  
 ATTATAGACCCTTGGATTTCGACAAACTTCGTGCAGGCACCCAACGGCGAGTTTACAGTATCCCCCGGA  
 ACTCCCCAGGTGAGATACTCCTGAATCTTGAGCTCGGCCCTGACCTCAATCCATATCTGGCTCATCTGAGC  
 CGCATGTACAATGGTTACGCTGGGGGGTTCGAAAGTGCAGGTCCTCCTGGCCGGAAACGCCTTACCGCT  
 GGCAAAATTCTGTTTGGCGCCGTTCCACAAACTTTCCAGTCGAATTCCTCTCTCCCGCGAAATAACCAT  
 GCTGCCACATTTGATCGTTGACGTGCGGACCCTGGAGCCAATAATGATTCCCCTGCCGGATGTGCGTAAC  
 ACCTTTTTCCATTATAACAATCAGCCAAACTCTCGGATGAGACTTGTTGCTATGCTGTACCCCCCTGCG  
 GAGCAACGGCAGTGGCGATGATGTGTTTACCGTGAGTTGCAGAGTCCTGACGCGCCCAACCCCGGACTT  
 CGAGTTCACCTACCTGGTGCCCCCTTCTGTGGAATCTAAGACCAAACCGTTTTCACTGCCAATCTTAACTCT  
 CTCCGAAGTACTAACAGCCGTTTCCAGTACCCATAGATTCTCTTTTACCGCTCAAAACAACGTACTCC  
 AAGTCCAGTGCCAGAACGGCCGCTGTACGCTTGATGGTGAGTTGCAGGGGACAACACAGCTACTCCCCA  
 GTGGCATCTGTGCATTCCGGGGCCGCGTGACCGCTGAGACAGACCATCGTGACAAATGGCACATGCAAC  
 TCCAAAACCTTAAACGGGACCACCTACGACCAACCGACGACGTCCCTGCTCCGCTAGGGACTCCTGACTT  
 TAAGGGGGTGGTGTTTCGGAGTGGCCTCTCAGCGGAATGTTGGGAATGACGCCCCCGGCTCTACCCGAGC  
 TCACGAGGCCGTTATCTCAACATATAGCCCCCAATTTGTGCCAAGCTCGGATCCGTTAATTTTCGTAGTA  
 ACGACAACGACTTCCAACGCAACCAACGAAGTTTACGCCAGTGGGGATTAATGATGATGGAGACCATC  
 CTTTCCGCCAATGGGAACCTACCAGATTATTCTGGGCTGCTCACCTCAATATGAACCTCGCCCCACCCGTG  
 GCCCCTAATTTCCCCGGTGAGCAGCTGCTGTTTTTTCGGAGCTTTGTGCCATGCAGTGGCGGATATAATCA  
 AGGCATCGTAGACTGCTTGATTCCCCAAGAGTGGATACAACATTTTACCAGGAAAGTGCGCCCTCCCAG  
 TCCGATGTGGCCCTGATACGGTACGTTAACCCCGATACCGGAAGAACATTATTCGAAGCGAAATTGCACA  
 GATCAGGGTACATTACCGTTGCACATTCCGGCGATTATCCCCTGGTGGTTCCCGCCAACGGTTACTTTAG  
 GTTCGATAGTTGGGTCAACCAGTTCTATTCACTAGCCCCAATGGGCACCGGTAACGGCAGACGCCGGGCT  
 CAGTAG

**FIGURE 34I**

Amino acid sequence of VP1 GII.17 Kawa 2014 A0A077KVU6\_R53I (SEQ ID NO:194)

MKMASNDAAPSNDGAAGLVPEGNNETLPLEPVAGAAIAAPVTGQNNIIDPWIIITNFVQAPNGEFTVSPRNS  
 PGEILLNLELGPDLNPYLAHLRMYNGYAGGVEVQVLLAGNAFTAGKILFAAVPPNFPVEFLSPAQITMLPHLI  
 VDVRTLEPIMIPLDVRNTFFHYNNQPNSRMRLVAMLYTPLRSNGSGDDVFTVSCRVLTRPTPDFEFTYLVPP  
 SVESKTKPFLPILTLSELTNSRFPVPIDSLFTAQNNVLQVQCQNGRCTLDELQGTQLLPSGICAFRGRVTAE  
 TDHRDKWHMQLQNLNGTTYDPTDDVPAPLGTDFKGVVFGVASQRNVGNDAPGSTRAHEAVISTYSPQFV

**FIGURE 34I (cont)**

PKLGSVNFRSNDNDFQLQPTKFTPVGINDDGDHPFRQWELPDYSGLLTLMNMLAPPVAPNFPGEQLLFFRSF  
 VPCSGGYNQGIVDCLIPQEWIQHFYQESAPSQSDVALIRYVNPDTGRTLFEAKLHRSGYITVAHSGDYPLVVPA  
 NGYFRFDSWVNQFYSLAPMGTGNRRRAQ

**FIGURE 34J**

Nucleic acid sequence of VP1 hCod GII.17 Kawa 2014 A0A077KVU6\_R53I (SEQ ID NO:195)

ATGAAAATGGCATCTAACGACGCAGCCCCCTCAAACGATGGCGCTGCTGGACTCGTGCCGGAGGGGAAT  
 AATGAGACACTTCCACTAGAGCCGTTGCAGGCGCCGCTATAGCTGCCCCAGTGACAGGGCAGAATAAT  
 ATTATAGACCCTTGATTATCACAACTTCGTGCAGGCACCCAACGGCGAGTTTACAGTATCCCCCGGA  
 ACTCCCCAGGTGAGATACTCCTGAATCTTGAGCTCGGCCCTGACCTCAATCCATATCTGGCTCATCTGAGC  
 CGCATGTACAATGGTTACGCTGGGGGGTCTGAAGTGCAGGTCCTCCTGGCCGGAAACGCCTTACCGCT  
 GGCAAAATTCTGTTTGGCGCCGTTCCACAACTTTCCAGTGAATTCCTCTCTCCCGCGCAATAACCAT  
 GCTGCCACATTTGATCGTTGACGTGCGGACCCTGGAGCCAATAATGATTCCCCTGCCGGATGTGCGTAAC  
 ACCTTTTTCCATTATAACAATCAGCCAACTCTCGGATGAGACTTGTTGCTATGCTGTACCCCCCTGCG  
 GAGCAACGGCAGTGGCGATGATGTGTTTACCGTGAGTTGCAGAGTCCTGACGCGCCCAACCCCGGACTT  
 CGAGTTCACCTACCTGGTGCCCCCTTCTGTGGAATCTAAGACCAAACCGTTTTCACTGCCAATCTTAACCTCT  
 CTCCGAAGTACTAACAGCCGTTTCCAGTACCCATAGATTCTCTTTTACCGCTCAAAACAACGTACTCC  
 AAGTCCAGTGCCAGAACGGCCGCTGTACGCTTGATGGTGAGTTGCAGGGGACAACACAGCTACTCCCCA  
 GTGGCATCTGTGCATTCCGGGGCCGCGTGACCGCTGAGACAGACCATCGTGACAAATGGCACATGCAAC  
 TCCAAAACCTTAAACGGGACCACCTACGACCAACCGACGACGTCCCTGCTCCGCTAGGGACTCCTGACTT  
 TAAGGGGGTGGTGTTGCGAGTGGCCTCTCAGCGGAATGTTGGGAATGACGCCCCCGGCTCTACCCGAGC  
 TCACGAGGCCGTTATCTCAACATATAGCCCCCAATTTGTGCCAAGCTCGGATCCGTTAATTTTCGTAGTA  
 ACGACAACGACTTCCAACGCAACCAACGAAGTTTACGCCAGTGGGGATTAATGATGATGGAGACCATC  
 CTTCCGCCAATGGGAACCTACCAGATTATTCTGGGCTGCTCACCTCAATATGAACCTCGCCCCACCCGTG  
 GCCCCTAATTTCCCCGGTGAGCAGCTGCTGTTTTTTCGGAGCTTTGTGCCATGCAGTGGCGGATATAATCA  
 AGGCATCGTAGACTGCTTGATTCCCCAAGAGTGGATACAACATTTTACCAGGAAAGTGCGCCCTCCCAG  
 TCCGATGTGGCCCTGATACGGTACGTTAACCCCGATACCGGAAGAACATTATTCGAAGCGAAATTGCACA  
 GATCAGGGTACATTACCGTTGCACATTCCGGCGATTATCCCCTGGTGGTTCCCGCCAACGGTTACTTTAG  
 GTTCGATAGTTGGGTCAACCAGTTCTATTACTAGCCCCAATGGGCACCGGTAACGGCAGACGCCGGGCT  
 CAGTAG

**FIGURE 34K**

Amino acid sequence of VP1 GII.17 Kawa 2014 A0A077KVU6\_A90L (SEQ ID NO:196)

MKMASNDAAPSNDGAAGLVPEGNNETLPLEPVAGAAIAAPVTGQNNIIDPWIRTNFVQAPNGEFTVSPRNS  
 PGEILLNLELGPDLNPYLLHLSRMNGYAGGVEVQVLLAGNAFTAGKILFAAVPPNFPVEFLSPAQITMLPHLIV  
 DVRTLEPIMIPLDVRNTFFHYNNQPNSRMRLVAMLYTPLRSNGSGDDVFTVSCRVLTRPTDFEFTYLVPPS  
 VESKTKPFSPLILTSELNSRFPVPIDSLFTAQNNVLQVQCQNGRCTLGELQGTQLLPSGICAFRGRVTAET  
 DHRDKWHMQLQLNLNGTTYDPTDDVPAPLGPDPFGVVFVGVASQRNVGNDAPGSTRAHEAVISTYSPQFVP

**FIGURE 34K (cont)**

KLGSVNFRSNDNDFQLQPTKFTVPVGINDDGDHPFRQWELPDYSGLLTLNMNLAPPVAPNFPGEQLLFFRSFV  
PCSGGYNQGIVDCLIPQEWIQHFYQESAPSQSDVALIRYVNPDTGRTLFEAKLHRSGYITVAHSGDYPLVPPA  
NGYFRFDSWVNQFYSLAPMGTGNRRRAQ

**FIGURE 34L**

Nucleic acid sequence of VP1 hCod GII.17 Kawa 2014 A0A077KVU6\_A90L (SEQ ID NO:197)

ATGAAAATGGCATCTAACGACGCAGCCCCCTCAAACGATGGCGCTGCTGGACTCGTGCCGGAGGGGAAT  
AATGAGACACTTCCACTAGAGCCGTTGCAGGCGCCGCTATAGCTGCCCCAGTGACAGGGCAGAATAAT  
ATTATAGACCCTTGGATTTCGGACAACTTCGTGCAGGCACCCAACGGCGAGTTTACAGTATCCCCCGGA  
ACTCCCCAGGTGAGATACTCCTGAATCTTGAGCTCGGCCCTGACCTCAATCCATATCTGCTGCATCTGAGC  
CGCATGTACAATGGTTACGCTGGGGGGTTCGAAAGTGCAGGTCCTCCTGGCCGGAAACGCCTTTACCGCT  
GGCAAAATTCTGTTTGGCGCCGTTCCACCAAACTTTCCAGTCGAATTCCTCTCTCCCGCGCAATAACCAT  
GCTGCCACATTTGATCGTTGACGTGCGGACCCTGGAGCCAATAATGATTCCCCTGCCGGATGTGCGTAAC  
ACCTTTTTCCATTATAACAATCAGCCAACTCTCGGATGAGACTTGTTGCTATGCTGTACCCCCCTGCG  
GAGCAACGGCAGTGGCGATGATGTGTTTACCGTGAGTTGCAGAGTCCTGACGCGCCCAACCCCGGACTT  
CGAGTTCACCTACCTGGTGCCCCCTTCTGTGGAATCTAAGACCAAAACCGTTTTCACTGCCAATCTTAACCTCT  
CTCCGAACTGACTAACAGCCGTTTCCAGTACCCATAGATTCTCTTTTACCGCTCAAAACAACGTACTCC  
AAGTCCAGTGCCAGAACGGCCGCTGTACGCTTGATGGTGAGTTGCAGGGGACAACACAGCTACTCCCCA  
GTGGCATCTGTGCATTCCGGGGCCGCGTGACCGCTGAGACAGACCATCGTGACAAATGGCACATGCAAC  
TCCAAAACCTTAAACGGGACCACCTACGACCAACCGACGACGTCCCTGCTCCGCTAGGGACTCCTGACTT  
TAAGGGGGTGGTGTTTCGGAGTGGCCTCTCAGCGGAATGTTGGGAATGACGCCCCCGGCTCTACCCGAGC  
TCACGAGGCCGTTATCTCAACATATAGCCCCCAATTTGTGCCAAGCTCGGATCCGTTAATTTTCGTAGTA  
ACGACAACGACTTCCAACGCAACCAACGAAGTTTACGCCAGTGGGGATTAATGATGATGGAGACCATC  
CTTCCGCCAATGGGAACTACCAGATTATTCTGGGCTGCTCACCTCAATATGAACCTCGCCCCACCCGTG  
GCCCCTAATTTCCCCGGTGAGCAGCTGCTGTTTTTTCGGAGCTTTGTGCCATGCAGTGGCGGATATAATCA  
AGGCATCGTAGACTGCTTGATTCCCCAAGAGTGGATACAACATTTTACCAGGAAAGTGCGCCCTCCCAG  
TCCGATGTGGCCCTGATACGGTACGTTAACCCCGATACCGGAAGAACATTATTCGAAGCGAAATTGCACA  
GATCAGGGTACATTACCGTTGCACATTCCGGCGATTATCCCCTGGTGGTTCCCGCCAACGGTTACTTTAG  
GTTTCGATAGTTGGGTCAACCAGTTCTATTCACTAGCCCCAATGGGCACCGGTAACGGCAGACGCCGGGCT  
CAGTAG

**FIGURE 34M**

Amino acid sequence of VP1 GII.17 Kawa 2014 A0A077KVU6\_A39V+M53I (SEQ ID NO:198)

MKMASNDAAPSNDGAAGLVPEGNNETLPLEPVAGAAIAPVPTGQNNIIDPWIIITNFVQAPNGEFTVSPRNS  
PGEILLNLELGPDLNPLYLAHLRMYNGYAGGVEVQVLLAGNAFTAGKILFAAVPPNFPVEFLSPAQITMLPHLI  
VDVRTLEPIMIPLDVRNTFFHYNNQPNSRMRLVAMLYTPLRSNGSGDDVFTVSCRVLTRPTPDFEFTYLVPP  
SVESKTKPFLPILTLSELTNSRFPVPIDSLFTAQNNVLQVQCQNGRCTLGELQGTQLLPSGICAFRGRVTAE  
TDHRDKWHMQLQNLNGTTYDPTDDVPAPLGTDFKGVVFGVASQRNVGNDAPGSTRAHEAVISTYSPQFV

**FIGURE 34M (cont)**

PKLGSVNFRSNDNDFQLQPTKFTPVGINDDGDHPFRQWELPDYSGLLTNLMNLAPPVAPNFPGEQLLFFRSF  
 VPCSGGYNQGIVDCLIPQEWIQHFYQESAPSQSDVALIRYVNPDTGRTLFEAKLHRSGYITVAHSGDYPLVVPA  
 NGYFRFDSWVNQFYSLAPMGTGNRRRAQ

**FIGURE 34N**

Nucleic acid sequence of VP1 hCod GII.17 Kawa 2014 A0A077KVU6\_A39V+M53I (SEQ ID NO:199)

ATGAAAATGGCATCTAACGACGCAGCCCCCTCAAACGATGGCGCTGCTGGACTCGTGCCGGAGGGGAAT  
 AATGAGACACTTCCACTAGAGCCGTTGCAGGCGCCGCTATAGCTGTGCCAGTGACAGGGCAGAATAAT  
 ATTATAGACCCTTGATTATCACAACTTCGTGCAGGCACCCAACGGCGAGTTTACAGTATCCCCCGGA  
 ACTCCCCAGGTGAGATACTCCTGAATCTTGAGCTCGGCCCTGACCTCAATCCATATCTGGCTCATCTGAGC  
 CGCATGTACAATGGTTACGCTGGGGGGTCTGAAGTGCAGGTCCTCCTGGCCGGAAACGCCTTACCGCT  
 GGCAAAATTCTGTTTGGCGCCGTTCCACAACTTTCCAGTGAATTCCTCTCTCCCGCGCAAATAACCAT  
 GCTGCCACATTTGATCGTTGACGTGCGGACCCTGGAGCCAATAATGATTCCCCTGCCGGATGTGCGTAAC  
 ACCTTTTTCCATTATAACAATCAGCCAACTCTCGGATGAGACTTGTTGCTATGCTGTACCCCCCTGCG  
 GAGCAACGGCAGTGGCGATGATGTGTTTACCGTGAGTTGCAGAGTCCTGACGCGCCCAACCCCGGACTT  
 CGAGTTCACCTACCTGGTGCCCCCTTCTGTGGAATCTAAGACCAAACCGTTTTCACTGCCAATCTTAACCTCT  
 CTCCGAACTGACTAACAGCCGTTTCCAGTACCCATAGATTCTTTTTACCGCTCAAAACAACGTACTCC  
 AAGTCCAGTGCCAGAACGGCCGCTGTACGCTTGATGGTGAGTTGCAGGGGACAACACAGCTACTCCCCA  
 GTGGCATCTGTGCATTCCGGGGCCGCGTGACCGCTGAGACAGACCATCGTGACAAATGGCACATGCAAC  
 TCCAAAACCTTAAACGGGACCACCTACGACCAACCGACGACGTCCCTGCTCCGCTAGGGACTCCTGACTT  
 TAAGGGGGTGGTGTTGCGAGTGGCCTCTCAGCGGAATGTTGGGAATGACGCCCCCGGCTCTACCCGAGC  
 TCACGAGGCCGTTATCTCAACATATAGCCCCCAATTTGTGCCAAGCTCGGATCCGTTAATTTTCGTAGTA  
 ACGACAACGACTTCCAACGCAACCAACGAAGTTTACGCCAGTGGGGATTAATGATGATGGAGACCATC  
 CTTCCGCCAATGGGAACCTACCAGATTATTCTGGGCTGCTCACCTCAATATGAACCTCGCCCCACCCGTG  
 GCCCCTAATTTCCCCGGTGAGCAGCTGCTGTTTTTTCGGAGCTTTGTGCCATGCAGTGGCGGATATAATCA  
 AGGCATCGTAGACTGCTTGATTCCCCAAGAGTGGATACAACATTTTACCAGGAAAGTGCGCCCTCCCAG  
 TCCGATGTGGCCCTGATACGGTACGTTAACCCCGATACCGGAAGAACATTATTCGAAGCGAAATTGCACA  
 GATCAGGGTACATTACCGTTGCACATTCCGGCGATTATCCCCTGGTGGTTCCCGCCAACGGTTACTTTAG  
 GTTCGATAGTTGGGTCAACCAGTTCTATTCACTAGCCCCAATGGGCACCGGTAACGGCAGACGCCGGGCT  
 CAGTAG

**FIGURE 34O**

Amino acid sequence of VP1 GII.17 Kawa 2014 A0A077KVU6\_E80S+A90L (SEQ ID NO:200)

MKMASNDAAPSNDGAAGLVPEGNNETLPLEPVAGAAIAAPVTGQNNIIDPWIRTNFVQAPNGEFTVSPRNS  
 PGEILLNLSLGPDLNPYLLHLSRMNGYAGGVEVQVLLAGNAFTAGKILFAAVPPNFPVEFLSPAQITMLPHLIV  
 DVRTLEPIMIPLDVRNTFFHYNNQPNSRMRLVAMLYTPLRSNGSGDDVFTVSCRVLTRPTDFEFTYLVPPS  
 VESKTKPFSPLILTSELNSRFPVPIDSLFTAQNNVLQVQCQNGRCTLGELQGTQLLPSGICAFRGRVTAET  
 DHRDKWHMQLQLNLNGTTYDPTDDVPAPLGTDFKGVVFGVASQRNVGNDAPGSTRAHEAVISTYSPQFVP

**FIGURE 34O (cont)**

KLGSVNFRSNDNDFQLQPTKFTVPVGINDDGDHPFRQWELPDYSGLLTLNMNLAPPVAPNFPGEQLLFFRSFV  
PCSGGYNQGIVDCLIPQEWIQHFYQESAPSQSDVALIRYVNPDTGRTLFEAKLHRSGYITVAHSGDYPLVPPA  
NGYFRFDSWVNQFYSLAPMGTGNRRRAQ

**FIGURE 34P**

Nucleic acid sequence of VP1 hCod GII.17 Kawa 2014 A0A077KVU6\_E80S+A90L (SEQ ID NO:201)

ATGAAAATGGCATCTAACGACGCAGCCCCCTCAAACGATGGCGCTGCTGGACTCGTGCCGGAGGGGAAT  
AATGAGACACTTCCACTAGAGCCGTTGCAGGCGCCGCTATAGCTGCCCCAGTGACAGGGCAGAATAAT  
ATTATAGACCCTTGGATTTCGGACAAACTTCGTGCAGGCACCCAACGGCGAGTTTACAGTATCCCCCGGA  
ACTCCCCAGGTGAGATACTCCTGAATCTTAGCCTCGGCCCTGACCTCAATCCATATCTGCTGCATCTGAGC  
CGCATGTACAATGGTTACGCTGGGGGGTTCGAAAGTGCAGGTCCTCCTGGCCGGAAACGCCTTTACCGCT  
GGCAAATTCGTTTGCCGCCGTTCCACCAAATTTCCAGTCGAATTCCTCTCTCCCGCGCAAATAACCAT  
GCTGCCACATTTGATCGTTGACGTGCGGACCCTGGAGCCAATAATGATTCCCCTGCCGGATGTGCGTAAC  
ACCTTTTTCCATTATAACAATCAGCCAAACTCTCGGATGAGACTTGTTGCTATGCTGTACCCCCCTGCG  
GAGCAACGGCAGTGGCGATGATGTGTTTACCGTGAGTTGCAGAGTCCTGACGCGCCCAACCCCGGACTT  
CGAGTTCACCTACCTGGTGCCCCCTTCTGTGGAATCTAAGACCAAACCGTTTTCACTGCCAATCTTAACCTCT  
CTCCGAACTGACTAACAGCCGTTTCCAGTACCCATAGATTCTCTTTTACCGCTCAAAACAACGTACTCC  
AAGTCCAGTGCCAGAACGGCCGCTGTACGCTTGATGGTGAGTTGCAGGGGACAACACAGCTACTCCCCA  
GTGGCATCTGTGCATTCCGGGGCCGCGTGACCGCTGAGACAGACCATCGTGACAAATGGCACATGCAAC  
TCCAAAATTAACGGGACCACCTACGACCAACCGACGACGTCCCTGCTCCGCTAGGGACTCCTGACTT  
TAAGGGGGTGGTGTCGGAGTGGCCTCTCAGCGGAATGTTGGGAATGACGCCCCCGGCTCTACCCGAGC  
TCACGAGGCCGTTATCTCAACATATAGCCCCCAATTTGTGCCAAGCTCGGATCCGTTAATTTTCGTAGTA  
ACGACAACGACTTCCAACGCAACCAACGAAGTTTACGCCAGTGGGGATTAATGATGATGGAGACCATC  
CTTCCGCCAATGGGAACTACCAGATTATTCTGGGCTGCTCACCTCAATATGAACCTCGCCCCACCCGTG  
GCCCCTAATTTCCCCGGTGAGCAGCTGCTGTTTTTTCGGAGCTTTGTGCCATGCAGTGGCGGATATAATCA  
AGGCATCGTAGACTGCTTGATTCCCCAAGAGTGGATACAACATTTTACCAGGAAAGTGCGCCCTCCCAG  
TCCGATGTGGCCCTGATACGGTACGTTAACCCCGATACCGGAAGAACATTATTCGAAGCGAAATTGCACA  
GATCAGGGTACATTACCGTTGCACATTCCGGCGATTATCCCCTGGTGGTTCCCGCCAACGGTTACTTTAG  
GTTTCGATAGTTGGGTCAACCAGTTCTATTACTAGCCCCAATGGGCACCGGTAACGGCAGACGCCGGGCT  
CAGTAG

**Figure 35A**

Amino acid sequence of VP2\_GI.1\_Norwalk (SEQ ID NO:99)

MAQAIIGAIAASTAGSALGAGIQVGGEAALQSQRYQQLQLQENSFKHDREMIGYQVEASNQLLAKNLATRYSLLRAGG  
LTSADAARSVAGAPVTRIVDWNGVRVSAPESSATTLRSGGFMSVPIPFASKQKQVQSSGISNPNYSPSSISRTTSWVESQ  
NSSRFGNLSPHYAEALNTVWLTPPGSTASSTLSSVPRGYFNTDRLPLFANNRR

**Figure 35B**

Nucleic acid sequence of human codon optimized VP.2\_GI1\_Norwalk (SEQ ID NO:100)

ATGGCTCAGGCCATTATTGGCGCCATCGCTGCAAGTACAGCCGGGAGTGCATTGGGGGCCGGAATACAGGTGGGC  
GGGGAAGCTGCATTGCAGAGCCAGCGGTACCAGCAAAACCTGCAGTTACAGGAGAATAGCTTTAAACACGACAGG  
GAGATGATTGGATATCAGGTGGAGGCCAGCAATCAGCTGCTCGCCAAAACTTGGCTACTCGATACTCATTACTGCG  
CGCCGGGGGGTTGACTAGCGCCGACGCCGACGATCTGTCTCGCAGGCGCCCCCTGACTCGGATCGTAGACTGGAA  
CGGGGTACGAGTCTCGGCTCCCGAGTCGTCTGCAACCACCTGAGGTCGGGAGGGTTTATGTCCGTGCCCATCCCAT  
TCGCTAGCAAACAGAAACAGGTCCAGAGCTCCGGAATCTCCAATCCCAATTACTCCCCTAGCTCTATCTCTCGTACCA  
CTTCTGGGTCGAGAGTCAGAACAGCAGTAGATTTGGCAACCTGAGCCCCTACCATGCTGAAGCCCTGAACACTGTG  
TGGTTGACTCCACCTGGTAGCACGGCCTCCTCAACCCTGAGTTCGTGCTCGCGGGTACTTCAATACCGACAGACTT  
CCTCTGTTCTGCTAACAACCGCCGCTGA

**Figure 36A**

Amino acid sequence of VP2\_GI.3\_Lil08 (SEQ ID NO:94)

MAQAIFGAIAATAAGSAVGAGIQAGTEAALQHQRFAQDLTLQSNTFKHKDKEMLGQVVGASTALLQNSLNTRYNMLTD  
AGLSSSDAARMVVGAPATRVVDWNGTRISAPRSTATTLRSGGFMTIPTLYKGKQQQKAPTEIGLSNPNYGSSVSSRVAD  
WVSSQNSSHSLGPYHPSALQTTWVTPPGSSSTSTISSVSTVPRYFNTDRLPLFANMRK

**Figure 36B**

Nucleic acid sequence of human codon optimized VP2\_GI.3\_Lil08 (SEQ ID NO:95)

ATGGCTCAGGCAATCTTCGGCGCAATCGCTGCCACTGCTGCCGGATCCGCTGTGGGAGCCGGCATAACAGGCCGGAA  
CTGAGGCGGCCCTTCAGCATCAGCGGTTCCAGCAGGATCTGACATTACAGAGTAACACATTCAAACATGACAAAGGA  
GATGCTGGGTCTGCAGGTGGGTGCCAGTACTGCCCTGCTCCAAAACCTCTCTGAATACCAGATATAACATGTTAACTG  
ATGCGGGACTGTCTAGTAGCGACGCAGCTCGCATGGTCGTGGGCGCCCCAGCTACGAGAGTTGTGGACTGGAATG  
GCACCCGAATCAGTGCACCAAGGTCTACAGCCACTACCCTCAGAAGTGGCGGCTTTATGACCATCCCGACTTTATAC  
AAGGGCAAACAACAGCAGAAGGCACCTACTGAAATCGGTCTCTCCAATCCCAACTACGGCAGCAGTGTGTCTTCTCG  
CGTGGCCGATTGGGTCTCAAGCCAGAACTCCAGTCATAGTTCTTGGGCCTTATCATCCATCAGCCTTGACAGAAC  
TTGGGTCACCCCACCCGGGTCCAGTAGCACGTCAACCATCAGTTCGTCTCCACAGTCCCTCGCTATTTTAATACTGA  
TAGGCTTCCCCTGTTCTGCAAACATGAGGAAGTGA

**Figure 37A**

Amino acid sequence of VP2\_GII6\_HS10 (SEQ ID NO:96)

MASAFGLAGDVITNGVGLINAGANAVNQKVEYDFNKQLQMASFKHKDKEMLSQVVLATKQLQQEMMNIRQGVLT  
AGGFSPADAARGAVNAPMTKILDWNGTRYWAPNSMKTTSSYGQFSSSPVHKSPAPSQHTALPKSRLQNDFAVSYSFPS  
SVSSQSTHSTALSAGTGSSRSISPSTATPTLSRTSDWVRGQNERLSPFMDGALQTAFTVPPSSKASSNGTVSTVPAVLDS  
WTPMFNTHRQPLFAHPRRRGESQV

**Figure 37B**

Nucleic acid sequence of human codon optimized VP2\_GII6\_HS10 (SEQ ID NO:97)

ATGGCCTCCGCATTTCTAGCTGGATTGGCCGGGGACGTGATCACCAACGGCGTAGGATCGCTGATTAATGCAGGCG  
CCAATGCTGTTAATCAGAAAGTTGAATACGACTTCAACAAACAACTGCAGATGGCTTCATTCAAGCACGACAAAGAA  
ATGTTGCAGTCACAGGTTCTCGCCACCAAGCAGCTACAACAGGAGATGATGAACATTCGGCAGGGCGTACTGACCG  
CTGGAGGATTACAGCCCTGCTGACGCAGCACGGGGGGCCGTGAACGCGCCGATGACCAAGATCCTGGATTGGAACG  
GAACTCGGTATTGGGCTCCCAACTCTATGAAACCACTTCTACTCTGGTCAGTTCTCCAGCTCGCCAGTCCACAAAA  
GTCCGGCCCCCTTACAGCACACAGCACTCCCTAAGTCCAGGCTGCAAAACGACTTTGCCTCCGTGTAATCCTTCCCAT  
CCAGCGTGTCTCTCAGAGCACTCATTCAACCGCCCTGTCCGCCGGAAGTGGGTCTAGCCGCAGCATTTCCCCAAGC  
ACAGTACTCCAACCTGAGCAGGACTAGCGATTGGGTGAGAGGACAAAACGAACGACTGTCCCTTTTCATGGACG  
GAGCTCTGCAAAACGCTTCGTCACCTCCACTAGCAGCAAGGCCTCGAGCAACGGTACGGTTAGTACCGTGCCAAAG  
GCTGTTCTTGACAGCTGGACCCCCATGTTTAACACACACAGGCAGCCATTGTTTGCACACCCCAGGCGACGGGGAGA  
ATCACAAGTTTAG

**Figure 38A**

Cloning vector 1190 from left to right T-DNA (SEQ ID NO:162)

TGGCAGGATATATTGTGGTGTAAACAAATTGACGCTTAGACAACCTTAATAACACATTGCGGACGTTTTTAATGTACT  
GAATTAACGCCGAATCCCGGGCTGGTATATTTATATGTTGTCAAATAACTCAAAAACCATAAAAGTTTAAGTTAGCA  
AGTGTGTACATTTTACTTGAACAAAAATATTACCTACTACTGTTATAAATCATTATTAAACATTAGAGTAAAGAAAT  
ATGGATGATAAGAACAAGAGTAGTGATTTTTGACAACAATTTTGTGCAACATTTGAGAAAATTTGTTGTTCTCTC  
TTTTATTGGTCAAAAACAATAGAGAGAGAAAAAGGAAGAGGGAGAATAAAAACATAATGTGAGTATGAGAGAGA  
AAGTTGTACAAAAGTTGTACCAAAATAGTTGTACAAATATCATTGAGGAATTTGACAAAAGCTACACAAATAAGGGT  
TAATTGCTGTAAATAAATAAGGATGACGCATTAGAGAGATGTACCATTAGAGAATTTTTGGCAAGTCATTAAAAAGA  
AAGAATAAATTATTTTTAAAATTTAAAGTTGAGTCATTTGATTAAACATGTGATTATTTAATGAATTGATGAAAGAGT  
TGGATTAAAGTTGTATTAGTAATTAGAAATTTGGTGTCAAATTTAATTTGACATTTGATCTTTTCTATATTGCCCA  
TAGAGTCAGTTAACTCATTTTTATATTTATAGATCAAATAAGAGAAATAACGGTATATTAATCCCTCCAAAAA  
AAACGGTATATTTACTAAAAATCTAAGCCACGTAGGAGGATAACAGGATCCCCGTAGGAGGATAACATCCAATCC  
AACCAATCACAACAATCTGATGAGATAACCCACTTTAAGCCCACGCATCTGTGGCACATCTACATTATCTAAATCAC  
ACATTTCTCCACACATCTGAGCCACACAAAAACCAATCCACATCTTTATCACCCATTCTATAAAAAATCACACTTTGTG  
AGTCTACACTTTGATTCCCTTCAAACACATACAAAGAGAAGAGACTAATTAATTAATTAATCATCTTGAGAGAAAATG  
GAACGAGCTATACAAGGAAACGACGCTAGGGAACAAGCTAACAGTGAACGTTGGGATGGAGGATCAGGAGGTACC  
ACTTCTCCCTTCAAACCTCCTGACGAAAGTCCGAGTTGGACTGAGTGGCGGTACATAACGATGAGACGAATTCGAA  
TCAAGATAATCCCCTTGGTTTCAAGGAAAGCTGGGGTTTCGGGAAAGTTGATTTAAGAGATATCTCAGATACGACA  
GGACGGAAGCTTCACTGCACAGAGTCCTTGGATCTTGGACGGGAGATTTCGGTTAACTATGCAGCATCTCGATTTTTC  
GGTTTCGACCAGATCGGATGTACCTATAGTATTCGGTTTCGAGGAGTTAGTATCACCGTTTCTGGAGGGTCGCGAAC  
TCTTCAGCATCTCTGTGAGATGGCAATTCGGTCTAAGCAAGAACTGCTACAGCTTGCCCAATCGAAGTGGAAGTA  
ATGTATCAAGAGGATGCCCTGAAGTACTCAAACCTTCGAAAAAGAAAGCGAGTAAGTTAAATGCTTCTTCGTCTC  
CTATTTATAATATGGTTTGTATTGTTAATTTTGTCTTGTAAGAGCTTAATTAATCGTTGTTGTTATGAAATACTAT  
TTGTATGAGATGAAGTGGTGAATGTAATTCATTACATAAGTGGAGTCAGAATCAGAATGTTTCCTCCATAACTAAC  
TAGACATGAAGACCTGCCGCTACAATTGTCTTATATTTGAACAACTAAAATTGAACATCTTTGCCACAACCTTTATA  
AGTGGTTAATATAGCTCAAATATATGGTCAAGTTCAATAGATTAATAATGGAAATATCAGTTATCGAAATTCATTAAC  
AATCAACTTAACGTTAATACTACTAATTTTATATCATCCCTTTGATAAATGATAGTACACCAATTAGGAAGGAGCAT  
GCTCGCTAGGAGATTGTCGTTTCCGCTTCAGTTTGCAAGCTGCTCTAGCCGTGTAGCCAATACGCAACCGCCTC

**FIGURE 38A (cont)**

TCCCCGCGCGTTGGGAATTACTAGCGCGTGTGACAAAGCTTGCATGCCGGTCAACATGGTGGAGCACGACACACTT  
 GTCTACTCCAAAAATATCAAAGATACAGTCTCAGAAGACCAAAGGGCAATTGAGACTTTTCAACAAAGGGTAATATC  
 CGGAAACCTCCTCGGATTCCATTGCCAGCTATCTGTCACTTTATTGTGAAGATAGTGAAAAAGGAAGGTGGCTCCT  
 ACAAATGCCATCATTGCGATAAAGGAAAGGCCATCGTTGAAGATGCCTCTGCCGACAGTGGTCCCAAAGATGGACC  
 CCCACCCACGAGGAGCATCGTGAAAAAGAAGACGTTCCAACCACGTCTTCAAAGCAAGTGGATTGATGTGATAAC  
 ATGGTGGAGCACGACACACTTGTCTACTCCAAAAATATCAAAGATACAGTCTCAGAAGACCAAAGGGCAATTGAGA  
 CTTTTCAACAAAGGGTAATATCCGAAACCTCCTCGGATTCCATTGCCAGCTATCTGTCACTTTATTGTGAAGATAG  
 TGAAAAAGGAAGGTGGCTCCTACAAATGCCATCATTGCGATAAAGGAAAGGCCATCGTTGAAGATGCCTCTGCCGA  
 CAGTGGTCCCAAAGATGGACCCCCACCCACGAGGAGCATCGTGAAAAAGAAGACGTTCCAACCACGTCTTCAAAG  
 CAAGTGGATTGATGTGATATCTCCACTGACGTAAGGGATGACGCACAATCCCACTATCCTTCGCAAGACCCCTCCTCT  
 ATATAAGGAAGTTCATTTCAATTTGGAGAGGTATTAATCTTAATAGGTTTTGATAAAAGCGAACGTGGGGAAACCC  
 GAACCAAACCTTCTCTAACTCTCTCATCTCTCTTAAAGCAAACCTCTCTCTTGTCTTTCTTGCCTGAGCGATCTTC  
 AACGTTGTCAGATCGTGCTCGGCACCGCGGATGGCGAAAAACGTTGCGATTTTCGGCTTATTGTTTTCTCTCTTGT  
 GTTGGTTCCTTCTCAGATCTTCGCTGCAGGCTCCTCAGCCAAAACGACACCCCATCTGTCTATCCACTGGCCCTG  
 GATCTGCTGCCAACTAACTCCATGGTGACCTGGGATGCCTGGTCAAGGGCTATTTCCCTGAGCCAGTGACAGTG  
 ACCTGGAACTCTGGATCCCTGTCCAGCGGTGTGCACACCTTCCAGCTGTCCTGCAGTCTGACCTCTACACTCTGAGC  
 AGCTCAGTGACTGTCCCTCCAGCACCTGGCCAGCGAGACCGTCACCTGCAACGTTGCCACCCGCCAGCAGCAC  
 CAAGGTGGACAAGAAAAATTGTGCCAGGGATTGTGGTTGTAAGCCTTGCAATGTACAGTCCAGAAAGTATCATCTG  
 TCTTCATCTTCCCCCAAAGCCCAAGGATGTGCTCACCATTACTCTGACTCCTAAGGTCACGTGTGTTGTGGTAGACA  
 TCAGCAAGGATGATCCCGAGGTCCAGTTCAGCTGGTTGTAGATGATGTGGAGGTGCACACAGCTCAGACGCAACC  
 CCGGGAGGAGCAGTTCAACAGCACTTCCGCTCAGTCAGTGAACCTCCCATCATGCACCAGGACTGGCTCAATGGCA  
 AGGAGCGATCGCTCACCATCACCATCACCATCACCATTAAAGGCCTATTTCTTTAGTTTGAATTTACTGTTA  
 TTCGGTGTGCATTTCTATGTTTGGTGAGCGTTTTCTGTGCTCAGAGTGTGTTTATTTTATGTAATTTAATTTCTTTGT  
 GAGCTCCTGTTTAGCAGGTGCTCCCTTCAGCAAGGACACAAAAAGATTTAATTTTATTAATAAAAAAAAAAAAAAAAAA  
 GACCGGGAATTCGATATCAAGCTTATCGACCTGCAGATCGTTCAAACATTTGGCAATAAAGTTTCTTAAGATTGAATC  
 CTGTTGCCGGTCTTGCATGATTATCATATAATTTCTGTTGAATTACGTTAAGCATGTAATAATTAACATGTAATGCAT  
 GACGTTATTTATGAGATGGGTTTTATGATTAGAGTCCCGCAATTATACATTTAATACGCGATAGAAAACAAATATA  
 GCGCGCAAACTAGGATAAATTATCGCGCGCGGTGTCATCTATGTTACTAGATCTCTAGAGTCTCAAGCTTGGCGCGC  
 CCACGTGACTAGTGGCACTGGCCGTGTTTTACAACGTGCTGACTGGGAAAACCTGGCGTTACCCAACCTAATCGC  
 CTTGCAGCATATCCCCCTTCGCCAGCTGGCGTAATAGCGAAGAGGCCCGCACCGATCGCCCTTCCCAACAGTTGCG  
 CAGCTGAATGGCGAATGCTAGAGCAGCTTGAGCTTGGATCAGATTGTCGTTTCCCGCCTTCAGTTAACTATCAG  
 TGTTTGACAGGATATATTGGCGGGTAAACCTAAGAGAAAAGAGCGTTTA

**Figure 38B**

Construct 2724 from 2X35S promoter to NOS terminator (SEQ ID NO:163)

GTCAACATGGTGGAGCACGACACACTTGTCTACTCCAAAAATATCAAAGATACAGTCTCAGAAGACCAAAGGGCAA  
 TTGAGACTTTTCAACAAAGGGTAATATCCGAAACCTCCTCGGATTCCATTGCCAGCTATCTGTCACTTTATTGTGA  
 AGATAGTGAAAAAGGAAGGTGGCTCCTACAAATGCCATCATTGCGATAAAGGAAAGGCCATCGTTGAAGATGCCTC  
 TGCCGACAGTGGTCCCAAAGATGGACCCCCACCCACGAGGAGCATCGTGAAAAAGAAGACGTTCCAACCACGTCT  
 TCAAAGCAAGTGGATTGATGTGATAACATGGTGGAGCACGACACACTTGTCTACTCCAAAAATATCAAAGATACAGT  
 CTCAGAAGACCAAAGGGCAATTGAGACTTTTCAACAAAGGGTAATATCCGAAACCTCCTCGGATTCCATTGCCAG  
 CTATCTGTCACTTTATTGTGAAGATAGTGAAAAAGGAAGGTGGCTCCTACAAATGCCATCATTGCGATAAAGGAAAG  
 GCCATCGTTGAAGATGCCTCTGCCGACAGTGGTCCCAAAGATGGACCCCCACCCACGAGGAGCATCGTGAAAAAG  
 AAGACGTTCCAACCACGTCTTCAAAGCAAGTGGATTGATGTGATATCTCCACTGACGTAAGGGATGACGCACAATCC

**FIGURE 38B (cont)**

CACTATCCTTCGCAAGACCCCTTCTCTATATAAGGAAGTTCATTTTCATTTGGAGAGGTATTAATAATCTTAATAGGTTTT  
 GATAAAAGCGAACGTGGGGAAACCCGAACCAACCTTCTTCTAAACTCTCTCATCTCTCTTAAAGCAAACCTTCTCT  
 CTTGTCTTTCTTGCGTGAGCGATCTTCAACGTTGTGAGATCGTGCTTCGGCACCAGTACAATGATGATGGCTAGTAAA  
 GATGCGACCTCCTCTGTGGATGGTGCGTCAGGGGCGAGGACAACCTCGTACCCGAGGTAAACGCCAGCGACCCACTTG  
 CCATGGACCCCGTTGCCGGAAGTTCACAGCAGTGGCCACAGCCGGTCAAGTGAATCCAATTGATCCGTGGATTATC  
 AACAAATTCGTCCAGGCACCCAGGGCGAGTTCACAATTCACCAAACAATACACCGGGCGATGTGCTATTGATCT  
 TTCCTTGGGTCTCACCTTAACCTTTTCTACTCCATCTCTACAGATGTACAATGGTTGGGTAGGAAACATGAGAGT  
 CCGGATCATGCTGGCTGGCAATGCCTTTACCGCTGGCAAGATCATCGTCAGTTGTATTCTCCCGGATTTGGATCTCA  
 TAATCTGACCATTGCTCAAGCGACTCTTTTCCCATGTGATCGCCGACGTTAGGACCCTGGACCCCATCGAGGTGCC  
 CCTGGAGGACGTCCGGAATGTTTTGTTCCACAACAACGACAGAAACCAGCAGACGATGAGACTTGTCTGTATGCTCT  
 ATACCCCACTGCGGACTGGAGGCGGGACTGGAGACTCCTTCGTTGTGGCAGGAAGAGTGATGACATGCCCTCCCC  
 CGACTTCAACTTTCTTTTCTGGTCCCAACCGTTGAGCAGAAGACGCGGCCCTTTACACTGCCAATCTCCCGCTT  
 TCAAGTCTGAGTAATCACGGGCCCCATTGCCGATCTCCTCAATGGGAATCTCCCCGACAACGTCCAGTCTGTCCAA  
 TTCCAAAATGGGAGATGCACACTGGACGGTCGCCTGGTGGGAACAACCTCCGGTGTCCCTCTCACATGTGCCAAAAT  
 CCGCGGCACATCAAATGGTACCGTAATCAATCTGACAGAACTTGATGGCACGCCCTTCCATCCCTTTGAAGGACCAG  
 CCCCTATTGGATTTCTGATCTGGGAGGTTGCGACTGGCACATAAACATGACACAGTTTGGCCACTCCAGCCAGACA  
 CAGTATGATGTCGATACAACCCAGATACCTTCGTGCCACACCTGGGATCTATTCAAGCTAACGGTATTGGATCCGG  
 CAACTACGTGGGAGTCTTATCTTGGATCTCACCACCATCCACCCCTCAGGATCCAGGTTGACTTGTGGAAGATACC  
 GAATTATGGATCCTCGATCACTGAAGCCACGCACCTCGACCTTCCGTCTACCCACCAGGTTTTGGAGAAGTCTTGGT  
 GTTTTTCATGAGCAAAATGCCCCGCCCTGGAGCCTACAATCTCCCTGCCTACTCCCTCAAGAGTATATTAGTCACCT  
 CGCATCTGAGCAGGCCCGACCGTTGGCGAGGCAGCCCTGCTGCATTATGTGGATCCGGACACCGGCAGGAACCTG  
 GGTGAGTTCAAAGCTTATCTGACGGTTTTCTAACATGTGTACCAAATGGCGCTTCCAGCGGCCCTCAACAGCTCCCA  
 ATCAATGGCGTGTTCGTTTTGTGAGCTGGGTAAAGCCGCTTCTACCAGCTGAAGCCCGTGGGGACAGCTTCTTCTGC  
 CCGCGGACGCTCGGTCTGCGGAGATAAAGGCCTATTTCTTTAGTTTGAATTTACTGTTATTCGGTGTGCATTTCTA  
 TGTTTGGTGAGCGTTTTCTGTGCTCAGAGTGTGTTATTTTATGTAATTTAATTTCTTTGTGAGCTCCTGTTTAGCAG  
 GTCGTCCCTTACAGCAAGGACACAAAAAGATTTTAAATTTATTAATAAAAAAAAAAAAAAAAAAGACCGGGAATTCGATAT  
 CAAGCTTATCGACCTGCAGATCGTTCAAACATTTGGCAATAAAGTTTCTTAAGATTGAATCCTGTTGCCGGTCTTGCG  
 ATGATTATCATATAATTTCTGTTGAATTACGTTAAGCATGTAATAATTAACATGTAATGCATGACGTTATTTATGAGAT  
 GGGTTTTATGATTAGAGTCCCAGCAATTATACATTTAATACGCGATAGAAAACAAAATATAGCGCGCAAACTAGGAT  
 AATTATCGCGCGCGGTGTCATCTATGTTACTAGAT

**Figure 38C**

Cloning vector 3677 from left to right T-DNA (SEQ ID NO:164)

TGGCAGGATATATTGTGGTGTAAACAAATTGACGCTTAGACAACCTTAATAACACATTGCGGACGTTTTTAATGTACT  
 GAATTAACGCCGAATCCCGGGCTGGTATATTTATATGTTGTCAAATAACTCAAAAACCATAAAAGTTTAAGTTAGCA  
 AGTGTGTACATTTTACTTGAACAAAAATATTCACCTACTACTGTTATAAATCATTATTAACATTAGAGTAAAGAAAT  
 ATGGATGATAAGAACAAGAGTAGTGATATTTTACAACAATTTTGTGCAACATTTGAGAAAATTTTGTGTTCTCTC  
 TTTTCATTGGTCAAAAACAATAGAGAGAGAAAAAGGAAGAGGGAGAATAAAAACATAATGTGAGTATGAGAGAGA  
 AAGTTGTACAAAAGTTGTACCAAAATAGTTGTACAAATATCATTGAGGAATTTGACAAAAGCTACACAAATAAGGGT  
 TAATTGCTGTAAATAAATAAGGATGACGCATTAGAGAGATGTACCATTAGAGAATTTTGGCAAGTCATTAAAAAGA  
 AAGAATAAATTTATTTTAAAAATTAAGTTGAGTCATTTGATTAAACATGTGATTATTTAATGAATTGATGAAAGAGT  
 TGGATTAAAGTTGTATTAGTAATTAGAATTTGGTGTCAAATTTAATTTGACATTTGATCTTTTCTATATATTGCCCCA  
 TAGAGTCAGTTAACTCATTTTATATTTATAGATCAAATAAGAGAAATAACGGTATATTAATCCCTCCAAAAA  
 AAACGGTATATTTACTAAAAATCTAAGCCACGTAGGAGGATAACAGGATCCCGTAGGAGGATAACATCCAATCC  
 AACCAATCACACAATCCTGATGAGATAACCCACTTTAAGCCACGCATCTGTGGCACATCTACATTATCTAAATCAC  
 ACATTCTTCCACACATCTGAGCCACACAAAAACCAATCCACATCTTTATCACCCATTCTATAAAAAATCACACTTTGTG  
 AGTCTACACTTTGATTCCCTTCAAACACATACAAAGAGAAGAGACTAATTAATTAATTAATCATCTTGAGAGAAAAATG  
 GAACGAGCTATACAAGGAAACGACGCTAGGGAACAAGCTAACAGTGAACGTTGGGATGGAGGATCAGGAGGTACC

**FIGURE 38C (cont)**

ACTTCTCCCTTCAAACCTCCTGACGAAAGTCCGAGTTGGACTGAGTGGCGGCTACATAACGATGAGACGAATTCGAA  
 TCAAGATAATCCCCTTGGTTTCAAGGAAAGCTGGGGTTTCGGGAAAGTTGTATTTAAGAGATATCTCAGATACGACA  
 GGACGGAAGCTTCACTGCACAGAGTCCTTGGATCTTGGACGGGAGATTTCGGTTAACTATGCAGCATCTCGATTTTTC  
 GGTTCGACCAGATCGGATGTACCTATAGTATTCGGTTTCGAGGAGTTAGTATCACCGTTTCTGGAGGGTCGCGAAC  
 TCTTCAGCATCTCTGTGAGATGGCAATTCGGTCTAAGCAAGAACTGCTACAGCTTGCCCCAATCGAAGTGGAAGTA  
 ATGTATCAAGAGGATGCCCTGAAGGTAAGTCAAAACCTTCGAAAAAGAAAGCGAGTAAGTTAAATGCTTCTTCGTCTC  
 CTATTTATAATATGGTTTGTATTGTTAATTTTGTCTGTAGAAAGAGCTTAATTAATCGTTGTTGTTATGAAATACTAT  
 TTGTATGAGATGAAGTGGTGAATGTAATTCATTTACATAAGTGGAGTCAGAATCAGAATGTTTCCTCCATAACTAAC  
 TAGACATGAAGACCTGCCGCGTACAATTGTCTTATATTTGAACAACTAAAATTGAACATCTTTGCCACAACCTTTATA  
 AGTGGTTAATATAGCTCAAATATATGGTCAAGTTCAATAGATTAATAATGGAAATATCAGTTATCGAAATTCATTAAC  
 AATCAACTTAACGTTATTAATACTACTAATTTTATATCATCCCTTTGATAAATGATAGTACACCAATTAGGAAGGAGCAT  
 GCTCGCCTAGGAGATTGTCGTTTCCCGCCTTCAGTTTGCAAGCTGCTCTAGCCGTGTAGCCAATACGCAAACCGCCTC  
 TCCCCGCGCGTTGGGAATTACTAGCGCGTGTGACAAAGCTTGCATGCCGGTCAACATGGTGGAGCACGACACACTT  
 GTCTACTCCAAAAATATCAAAGATACAGTCTCAGAAGACCAAAGGGCAATTGAGACTTTTCAACAAAGGGTAATATC  
 CGAAACCTCCTCGGATTCCATTGCCAGCTATCTGTCACTTTATTGTGAAGATAGTGGAAAAGGAAGGTGGCTCCT  
 ACAAATGCCATCATTGCGATAAAGGAAAGGCCATCGTTGAAGATGCCTCTGCCGACAGTGGTCCCAAAGATGGACC  
 CCCACCCACGAGGAGCATCGTGAAAAAGAAGACGTTCCAACCACGTCTTCAAAGCAAGTGGATTGATGTGATAAC  
 ATGGTGGAGCACGACACACTTGTCTACTCCAAAAATATCAAAGATACAGTCTCAGAAGACCAAAGGGCAATTGAGA  
 CTTTTCACAAAGGGTAATATCCGAAACCTCCTCGGATTCCATTGCCAGCTATCTGTCACTTTATTGTGAAGATAG  
 TGGAAAAGGAAGGTGGCTCCTACAAATGCCATCATTGCGATAAAGGAAAGGCCATCGTTGAAGATGCCTCTGCCGA  
 CAGTGGTCCCAAAGATGGACCCCAACCCACGAGGAGCATCGTGAAAAAGAAGACGTTCCAACCACGTCTTCAAAG  
 CAAGTGGATTGATGTGATATCTCCACTGACGTAAGGGATGACGCACAATCCCACTATCCTTCGCAAGACCCCTTCTCT  
 ATATAAGGAAGTTCATTTCAATTTGGAGAGGTATTAATCTTAATAGGTTTGTATAAAGCGAACGTGGGGAAACCC  
 GAACCAAACTTCTTCTAACTCTCTCTCATCTCTTAAAGCAAACTTCTCTTGTCTTTCTTGCCTGAGCGATCTTC  
 AACGTTGTCAGATCGTGCTTCGGCACCGCGGATGGCGAAAAACGTTGCGATTTTCGGCTTATTGTTTTCTTCTTGT  
 GTTGGTTCCTTCTCAGATCTTCGCTGCAGGCTCCTCAGCCAAAACGACACCCCATCTGTCTATCCACTGGCCCTG  
 GATCTGCTGCCAACTAACTCCATGGTGACCTGGGATGCCTGGTCAAGGGCTATTTCCCTGAGCCAGTGACAGTG  
 ACCTGGAACCTCGGATCCCTGTCCAGCGGTGTGCACACCTTCCAGCTGTCTGCAGTCTGACCTCTACACTCTGAGC  
 AGCTCAGTGACTGTCCCTCCAGCACCTGGCCAGCGAGACCGTCACCTGCAACGTTGCCACCCGGCCAGCAGCAC  
 CAAGTGGACAAGAAAAATTGTGCCAGGGATTGTGGTTGTAAGCCTTGCAATGTACAGTCCAGAAAGTATCATCTG  
 TCTTCATCTTCCCCCAAAGCCCAAGGATGTGCTCACCATTACTCTGACTCCTAAGGTCACGTGTGTTGTGGTAGACA  
 TCAGCAAGGATGATCCCGAGGTCCAGTTCAGCTGGTTGTAGATGATGTGGAGGTGCACACAGCTCAGACGCAACC  
 CCGGGAGGAGCAGTTCAACAGCACTTCCGCTCAGTCAGTGAACTTCCCATCATGCACCAGGACTGGCTCAATGGCA  
 AGGAGCGATCGCTCACCATCACCATCACCATCACCATTAAAGGCCTATTTTCTTTAGTTTGAATTTACTGTTA  
 TTCGGTGTGCAATTTCTATGTTTGGTGAGCGGTTTTCTGTGCTCAGAGTGTGTTATTTTATGTAATTTAATTTCTTTGT  
 GAGCTCCTGTTTAGCAGGTGCTCCCTCAGCAAGGACACAAAAAGATTTAATTTTATTATCGTTCAAACATTTGGCA  
 ATAAAGTTTCTTAAGATTGAATCCTGTTGCCGGTCTTGCGATGATTATCATATAATTTCTGTTGAATTACGTTAAGCAT  
 GTAATAATTAACATGTAATGCATGACGTTATTTATGAGATGGGTTTTATGATTAGAGTCCCGCAATTATACATTTAA  
 TACGCGATAGAAAAACAAATATAGCGCGCAAACTAGGATAAATATATCGCGCGCGGTGTCATCTATGTTACTAGATCT  
 CTAGGTAAAAATCCCAATTATATTTGGTCTAATTTAGTTTGGTATTGAGTAAACAAATTCGAACCAACCAAAATAT  
 AAATATATAGTTTTATATATATGCCTTTAAGACTTTTTATAGAATTTTCTTTAAAAAATATCTAGAAATATTTGCGACT  
 CTTCTGGCATGTAATATTTTCGTTAAATATGAAGTGCTCCATTTTATTAACCTTTAAATAATTGGTTGTACGATCACTTTC  
 TTATCAAGTGTTACTAAAATGCGTCAATCTCTTGTCTTCCATATTCATATGTCAAAATCTATCAAAATTCCTATATAT  
 CTTTTTCGAATTTGAAGTGAAATTTGATAATTTAAATTAAGTAAATAGACATATCATTATTTAGGTATCATATTGATTTT  
 ATACTTAATTAATAATTTGGTTAACTTTGAAAGTGACATCAACGAAAAATAGTCAAACGACTAAAATAAATAAAT  
 ATCATGTGTTATTAAGAAAAATTCCTATAAGAATATTTAATAGATCATATGTTTGTAAAAAAATTAATTTTACTA  
 ACACATATATTTACTTATCAAAAAATTTGACAAAGTAAGATTAATAAATATTCATCTAACAAAAAAACCAGAAAA  
 TGCTGAAAAACCCGGCAAAACCGAACCAATCCAAACCGATATAGTTGGTTTGGTTTGATTTTGATATAAACCGAACCA  
 ACTCGGTCCATTTGACCCCTAATCATAATAGCTTTAATATTTCAAGATATTATTAAGTTAACGTTGTCAATATCCTGG  
 AAATTTTGCAAAATGAATCAAGCCTATATGGCTGTAATATGAATTTAAAGCAGCTCGATGTGGTGGTAATATGTAA

**FIGURE 38C (cont)**

TTTACTTGATTCTAAAAAATATCCCAAGTATTAATAATTTCTGCTAGGAAGAAGGTTAGCTACGATTTACAGCAAAG  
 CCAGAATACAAAGAACCATAAAGTGATTGAAGCTCGAAATATACGAAGGAACAAATATTTTTAAAAAATACGCAAT  
 GACTTGGAACAAAAGAAAGTGATATATTTTTGTTCTTAAACAAGCATCCCCTCTAAAGAATGGCAGTTTTCTTTGC  
 ATGTAACATTATGCTCCCTCGTTACAAAAATTTGGACTACTATTGGGAACTTCTTCTGAAAAATTCTAGAGTCTCAA  
 GCTTGGCGCGCCACGTGACTAGTGGCACTGGCCGTCGTTTTACAACGTCGTGACTGGGAAAACCTGGCGTTACCC  
 AACTTAATCGCCTTGACGACATCCCCCTTCGCCAGCTGGCGTAATAGCGAAGAGGCCCGCACCGATCGCCCTTCCC  
 AACAGTTGCGCAGCCTGAATGGCGAATGCTAGAGCAGCTTGAGCTTGGATCAGATTGTCGTTTCCGCTTCAGTTT  
 AAACATCAGTGTTTGACAGGATATATTGGCGGGTAAACCTAAGAGAAAAGAGCGTTTA

**Figure 38D**

Construct 4133 from 2X35S promoter to NOS terminator (SEQ ID NO:165)

GTCAACATGGTGGAGCACGACACACTTGTCTACTCCAAAAATATCAAAGATACAGTCTCAGAAGACCAAAGGGCAA  
 TTGAGACTTTTCAACAAAGGGTAATATCCGGAAACCTCCTCGGATTCCATTGCCAGCTATCTGTCACTTTATTGTGA  
 AGATAGTGGAAAAGGAAGGTGGCTCCTACAAATGCCATCATTGCGATAAAGGAAAGGCCATCGTTGAAGATGCCTC  
 TGCCGACAGTGGTCCCAAAGATGGACCCCCACCCACGAGGAGCATCGTGAAAAAGAAGACGTTCCAACCACGTCT  
 TCAAAGCAAGTGGATTGATGTGATAACATGGTGGAGCACGACACACTTGTCTACTCCAAAAATATCAAAGATACAGT  
 CTCAGAAGACCAAAGGGCAATTGAGACTTTTCAACAAAGGGTAATATCCGGAAACCTCCTCGGATTCCATTGCCAG  
 CTATCTGTCACTTTATTGTGAAGATAGTGGAAAAGGAAGGTGGCTCCTACAAATGCCATCATTGCGATAAAGGAAAG  
 GCCATCGTTGAAGATGCCTCTGCCGACAGTGGTCCCAAAGATGGACCCCCACCCACGAGGAGCATCGTGAAAAAG  
 AAGACGTTCCAACCACGTCTTCAAAGCAAGTGGATTGATGTGATATCTCCACTGACGTAAGGGATGACGCACAATCC  
 CACTATCCTTCGCAAGACCTTCTCTATATAAGGAAGTTCATTTCAATTTGGAGAGGTATTAATAATAGGTTTT  
 GATAAAAGCGAACGTGGGGAACCCGAACCAACCTTCTTCTAACTCTCTCATCTCTTAAAGCAAATCTCTCT  
 CTTGTCTTTCTTGCCTGAGCGATCTTCAACGTTGTGAGATCGTGCTTCCGACCAAGTACAATGAAAATGGCCTCGAGT  
 GACGTAACCTAGTGACGGCAGCGCCCAATCTTGTGCTGAGGTTAATAATGAGGTGATGGCCTGGAGCCTG  
 TGGTGGGCGCAGCCATAGCAGCGCCGTCGCGGTGAGCAGAATGTGATTGACCCGTGGATACGCAACAATTTGT  
 CCAAGCCCTGGTGGGAGTTACCGTTAGCCCGAGAAATGCGCCAGGAGAAATCCTGTGGTGGCCAGCTTGGGA  
 CCCGATCTGAACCCCTATTTGTACATCTCGCTCGGATGTACAACGGGTATGCCGGCGGATTTGAAGTGCAGGTGAT  
 TCTGGCTGGGAACGCTTCACTGCTGGCAAAGTATCTTGCAGCGGTGCTCCCAACTTCCCACTGAAGGACTGT  
 CTCCAAGCCAGGTACAATGTTCCACACATCGTGGTGGACGTACGGCAGCTAGAGCCTGTCTGATTCCCCTCCCT  
 GATGTACGCAATAATTTCTACCACTACAATCAATCCAATGATCCGACCATTAACCTCATCGCGATGTTGTACACCCCTC  
 TGCGCGTAACAATGCTGGAGACGACGTATTCACCGTGTATGCAGAGTGCTCACCAGACCTTACCAGACTTTGAC  
 TTTATCTTCTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTTAGTGCCCCGTAACAGTCTGAGGAGATG  
 ACAAATAGCCGCTTCCAATCCCCCTTGAGAACTGTTACAGGACCTTCTCGGCATTCTGTTGTTAGCCACAGAAC  
 GGACGCTGCACAACTGACGGCGTGTCTCGGAACCAACCCAGCTTAGCCCTGTTAATATCTGTACGTTTAGAGGCGA  
 CGTAACTCACATAACTGGCTCACGGAATATACCATGAATCTGGCATCACAGAATTGGAATGACTACGACCCAACCG  
 AAGAGATTCGCGACCTCTTGAACCCCCGACTTTGTGGGAAAAATACAGGGCGTCTGACACAAACCACAGAAC  
 GATGGCTCCACACGGGGACACAAGGCAACCGTCTACACTGGCTCTGCCGATTTTGCCCCGAACTGGGTAGAGTGC  
 AGTTTGAGACCGACACTGACCGGGACTTTGAAGCCAATCAGAATACTAAGTTCACACCTGTAGGAGTGATTACAGGA  
 CGGGGGCACCCTACCGGAACGAGCCGCAACAATGGGTCTGCCCTCTATAGCGGGAGGAATACTCATAATGTG  
 CATTTGGCTCTGCACTGGCTCCACGTTTCCCGGGGAACAAGTCTTTTTTCTGTTCAACCATGCCTGGATGCTCC  
 GGATATCCCAATATGGATCTCGATTGCCTGCTCCACAGGAATGGGTGAGTATTTTTATCAAGAGGCCCGACCCAGC  
 CCAATCCGACGTCGCACTTCTGCGTTCTGTAATCCAGACACAGGCCGCGTGTGTTGAGTGCAAATTCACAAAT  
 CAGGATACGTTACAGTGGCTCATACTGGACAGCATGACCTGGTGATCCCAACCGATATTTAGGTTGCACTCC  
 TGGGTGAATCAGTTTTATACATTAGCCCCATGGGGAATGGGACTGGCAGACGAGGGCTGTCTGAAGGCCTATTT  
 TCTTTAGTTTGAATTTACTGTTATTCGGTGTGCAATTTCTATGTTTGGTGAGCGTTTTCTGTGCTCAGAGTGTGTTTAT  
 TTTATGTAATTTAATTTCTTTGTGAGCTCTGTTTAGCAGGTCTCCCTCAGCAAGGACACAAAAAGATTTTAAATTTT  
 ATTATCGTTCAAACATTTGGCAATAAAGTTTCTTAAGATTGAATCCTGTTGCCGGTCTTGCGATGATTATCATATAATT  
 TCTGTTGAATTACGTTAAGCATGTAATAATTAACATGTAATGCATGACGTTATTTATGAGATGGGTTTTATGATTAG

**FIGURE 38D (cont)**

AGTCCCGCAATTATACATTTAATACGCGATAGAAAAACAAATATAGCGCGCAAAGTAGGATAAATTATCGCGCGCGG  
TGTCATCTATGTTACTAGAT

**Figure 38E**

Construct 4135 from 2X35S promoter to NOS terminator (SEQ ID NO:166)

GTCAACATGGTGGAGCACGACACACTTGTCTACTCCAAAAATATCAAAGATACAGTCTCAGAAGACCAAAGGGCAA  
TTGAGACTTTTCAACAAAGGGTAATATCCGGAAACCTCCTCGGATTCCATTGCCAGCTATCTGTCACTTTATTGTGA  
AGATAGTGGAAAAAGGAAGGTGGCTCCTACAAATGCCATCATTGCGATAAAGGAAAGGCCATCGTTGAAGATGCCTC  
TGCCGACAGTGGTCCCAAAGATGGACCCCCACCCACGAGGAGCATCGTGGAAGAAAGACGTTCCAACACAGTCT  
TCAAAGCAAGTGGATTGATGTGATAACATGGTGGAGCACGACACACTTGTCTACTCCAAAAATATCAAAGATACAGT  
CTCAGAAGACCAAAGGGCAATTGAGACTTTTCAACAAAGGGTAATATCCGGAAACCTCCTCGGATTCCATTGCCAG  
CTATCTGTCACTTTATTGTGAAGATAGTGGAAAAAGGAAGGTGGCTCCTACAAATGCCATCATTGCGATAAAGGAAAG  
GCCATCGTTGAAGATGCCTCTGCCGACAGTGGTCCCAAAGATGGACCCCCACCCACGAGGAGCATCGTGGAAGAAAG  
AAGACGTTCCAACACAGTCTTCAAAGCAAGTGGATTGATGTGATATCTCCACTGACGTAAGGGATGACGCACAATCC  
CACTATCCTTCGCAAGACCTTCTCTATATAAGGAAGTTCATTTCAATTTGGAGAGGTATTAATAATAGGTTTT  
GATAAAGCGAACGTGGGGAAACCCGAACCAACCTTCTTCTAACTCTCTCTCATCTCTTAAAGCAAATCTCTCT  
CTTGCTTTCTTGCGTGAGCGATCTTCAACGTTGTGAGATCGTGCTTCGGCACCAGTACAATGAAATGGCCTCGAGT  
GACGCTAACCTAGTGACGGCAGCGCCGCAATCTTGCTGCTGAGGTTAATAATGAGGTGATGGCCTGGAGCCTG  
TGGTGGGCGCAGCCATAGCAGCGCCCGTGGCCGGTCAGCAGAATGTGATTGACCCGTGGATACGCAACAATTTGT  
CCAAGCCCTGGTGGGGAGTTCACCGTTAGCCCGAGAAATGCGCCAGGAGAAATCCTGTGGTCGGCCAGCTTGGGA  
CCCGATCTGAACCCCTATTTGCTGCATCTCGCTCGGATGTACAACGGGTATGCCGGCGGATTTGAAGTGCAGGTGAT  
TCTGGCTGGGAACGCGTTCACTGCTGGCAAAGTATCTTTCAGCGGTGCCTCCCACTTCCCACTGAAGGACTGT  
CTCCAAGCCAGGTACAATGTTTCCACACATCGTGGTGGACGTACGGCAGCTAGAGCCTGTCTGATTCCCCTCCCT  
GATGTACGCAATAATTTCTACCACTACAATCAATCCAATGATCCGACCATTAACCTCATCGCGATGTTGTACACCCCTC  
TGCGCGCTAACAAATGCTGGAGACGACGTATTCACCGTGTATGCAGAGTGCTCACCAGACCTTACCAGACTTTGAC  
TTTATCTTCTAGTGCCCCCACTGTTGAGAGCCGAACCAAGCCCTTTAGTGTCCTCCGTAACAGTCTGAGGAGATG  
ACAAATAGCCGCTTTCAATCCCCCTTGAGAACTGTTACAGGACCTTCTCGGCATTCTGTTTACGCCACAGAAC  
GGACGCTGCACAACGACGGCGTGTGCTCGGAACCCAGCTTAGCCCTGTTAATATCTGTACGTTTAGAGGCGA  
CGTAACCTACATAACTGGCTCACGGAACATACCATGAATCTGGCATCACAGAATTGGAATGACTACGACCCAACCG  
AAGAGATTCCCGCACCTTTGGAACCCCGACTTTGTGGAAAAATACAGGGCGTCTGACACAAACCACCAGAACC  
GATGGCTCCACACGGGGACACAAGGCAACCGTCTACACTGGCTCTGCCGATTTTGCCCCGAACTGGGTAGAGTGC  
AGTTTGAGACCGACACTGACCGGGACTTTGAAGCCAATCAGAATACTAAGTTCACACCTGTAGGAGTGATTCAGGA  
CGGGGGCACCACTCACCGGAACGAGCCGCAACAATGGGTCTGCCCTCTATAGCGGGAGGAATACTCATAATGTG  
CATTTGGCTCCTGCAGTGGCTCCACGTTTCCCGGGGAACAACGCTCTTTTTTCTGTTCAACCATGCCTGGATGCTCC  
GGATATCCCAATATGGATCTCGATTGCCTGCTCCACAGGAATGGGTGCAGTATTTTATCAAGAGGCCGACCCAGC  
CCAATCCGACGTCGACTTCTGCGTTCTGTAATCCAGACACAGGCCGCGTGTGTTGAGTGCAAATTGCACAAAT  
CAGGATACGTTACAGTGGCTCATACTGGACAGCATGACCTGGTGATCCCAACCGGATATTTAGGTTGCACTCC  
TGGGTGAATCAGTTTTATACATTAGCCCCATGGGGAATGGGACTGGCAGACGAGGGCTGTCTGAAGGCCTATTT  
TCTTTAGTTTGAATTTACTGTTATTCGGTGTGCATTTCTATGTTTGGTGAGCGTTTTCTGTGCTCAGAGTGTGTTTAT  
TTTATGTAATTTAATTTCTTTGTGAGCTCCTGTTAGCAGGTCGTCCCTCAGCAAGGACACAAAAAGATTTTAAATTT  
ATTATCGTTCAAACATTTGGCAATAAAGTTTCTTAAGATTGAATCCTGTTGCCGGTCTTGCGATGATTATCATATAATT  
TCTGTTGAATTACGTTAAGCATGTAATAATTAACATGTAATGCATGACGTTATTTATGAGATGGGTTTTATGATTAG  
AGTCCCGCAATTATACATTTAATACGCGATAGAAAAACAAATATAGCGCGCAAAGTAGGATAAATTATCGCGCGCGG  
TGTCATCTATGTTACTAGAT

Figure 39A

Construct 2724 (VP1 Wt Gl.1 hCod)

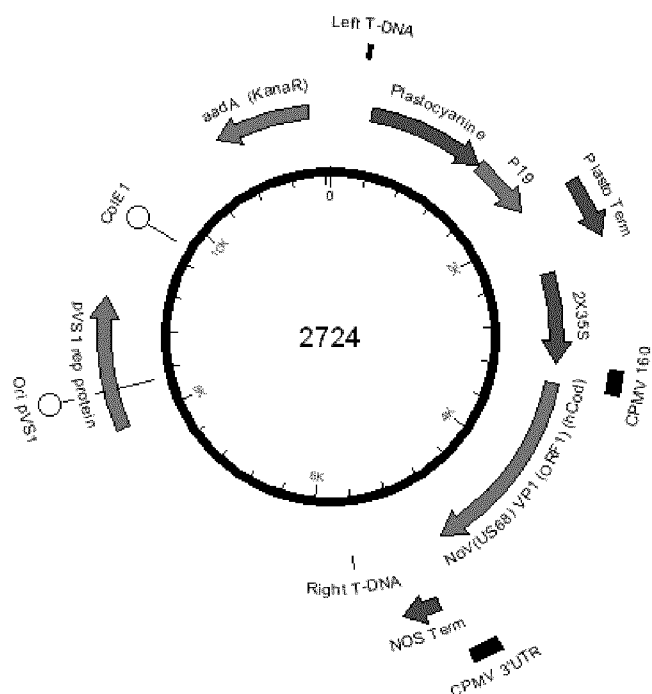


Figure 39B

Construct 3300 (Wt Gl.2 hCod)

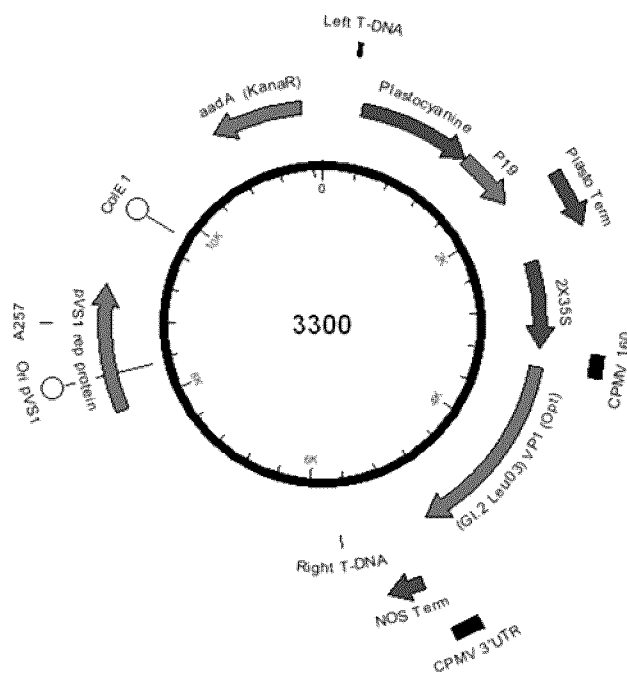


Figure 39C

Construct 3979 (Wt Gl.3 hCod)

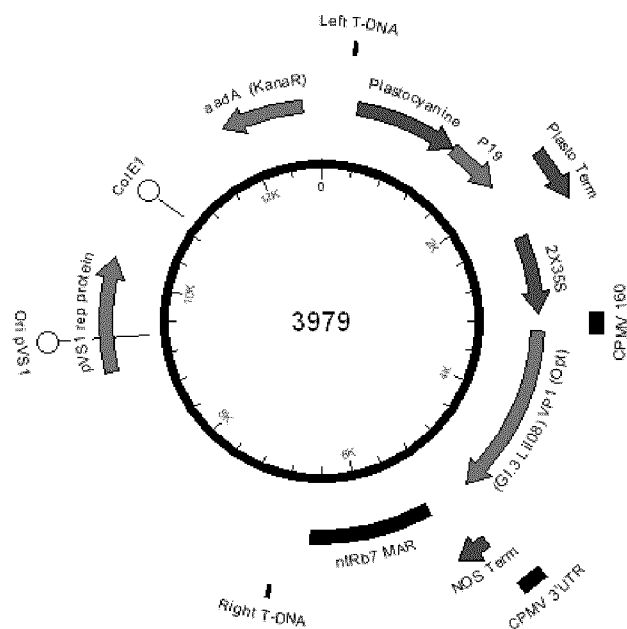
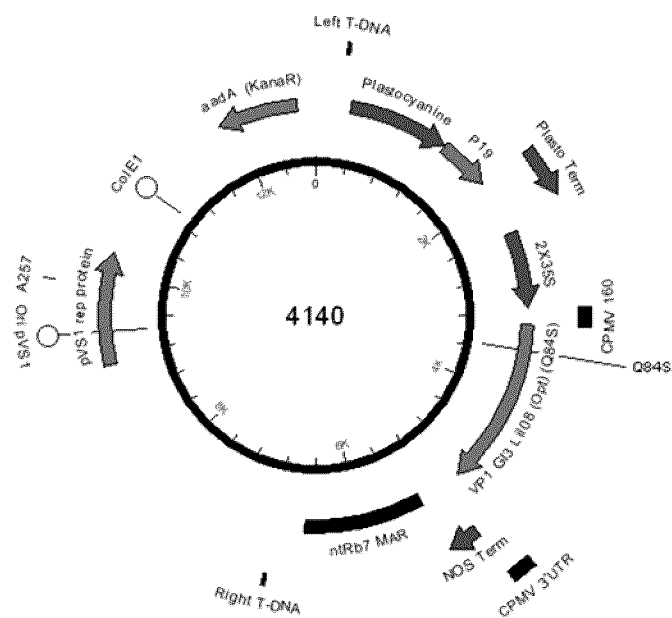


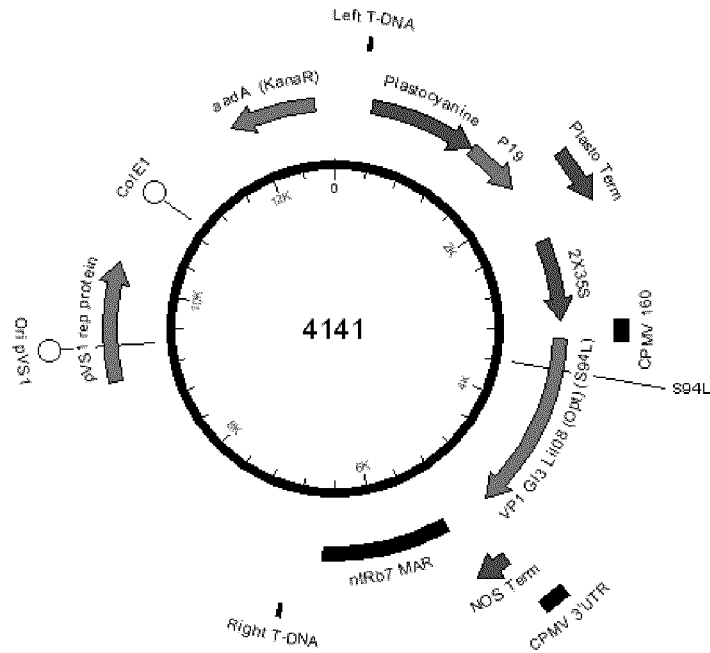
Figure 40A

Construct 4140 (VP1 Gl.3\_Q84S hCod)

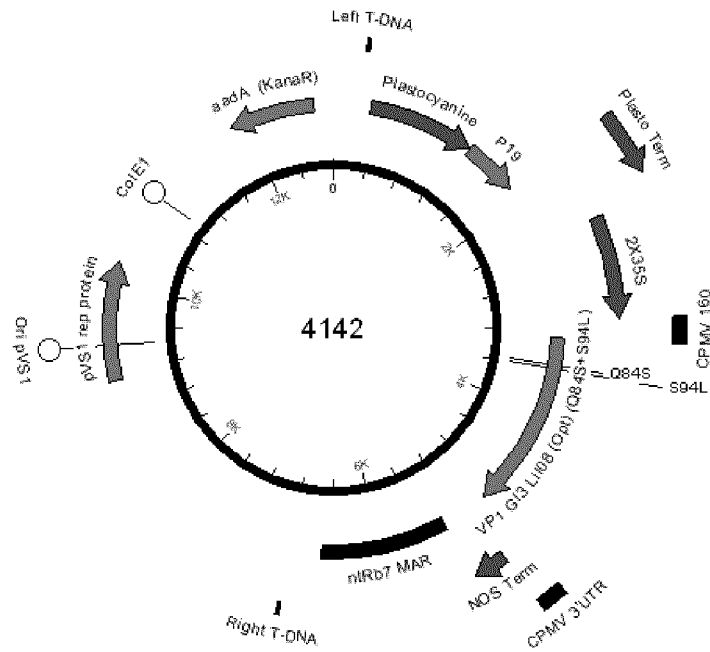


**Figure 40B**

Construct 4141 (VP1 GI.3\_S94L hCod)

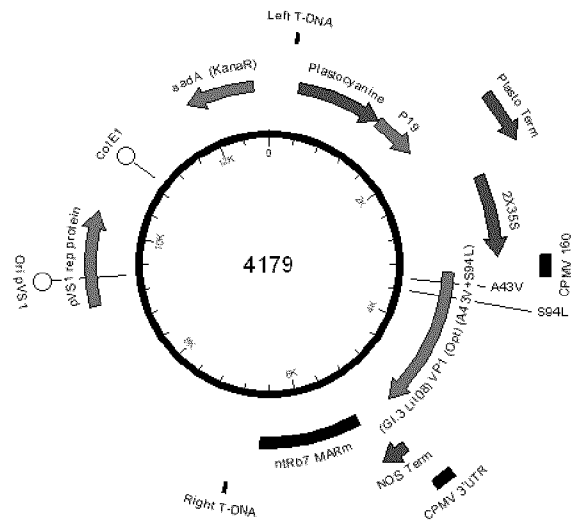
**Figure 40C**

Construct 4142 (VP1 GI.3\_Q84S+S94L hCod)

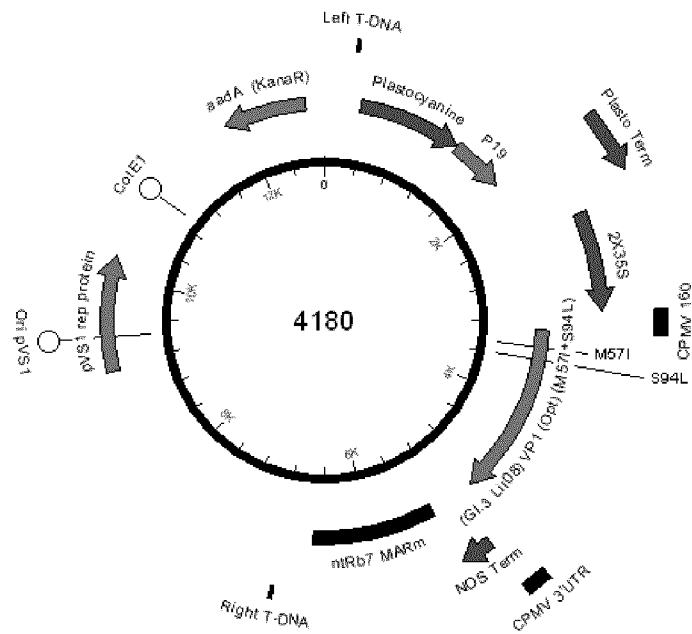


**FIGURE 40D**

Construct 4179 (VP1 GI.3\_A43V+S94L hCod)

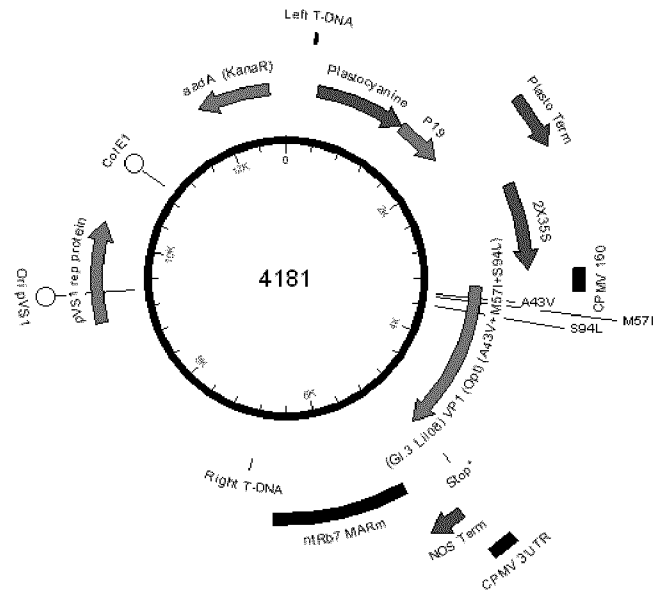
**FIGURE 40E**

Construct 4180 (VP1 GI.3\_M57I+S94L hCod)

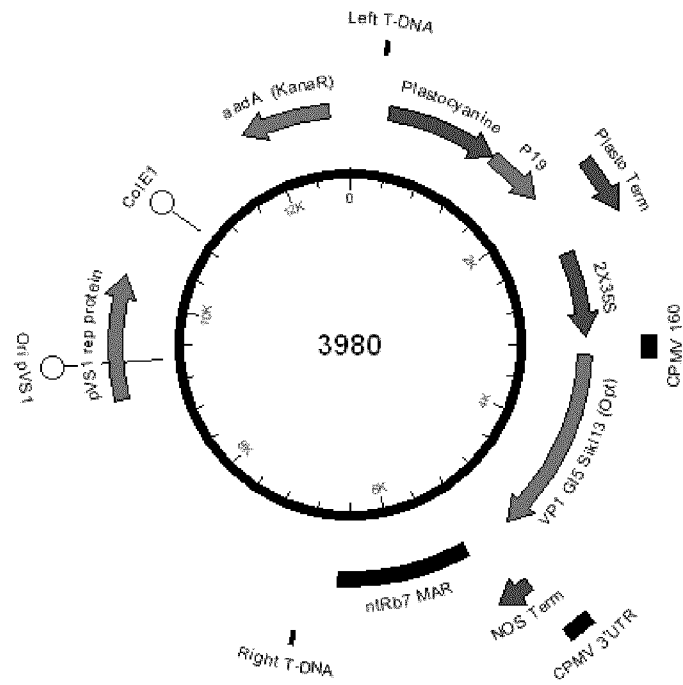


**FIGURE 40F**

Construct 4181 (VP1 GI.3\_A43V+M57I+S94L hCod)

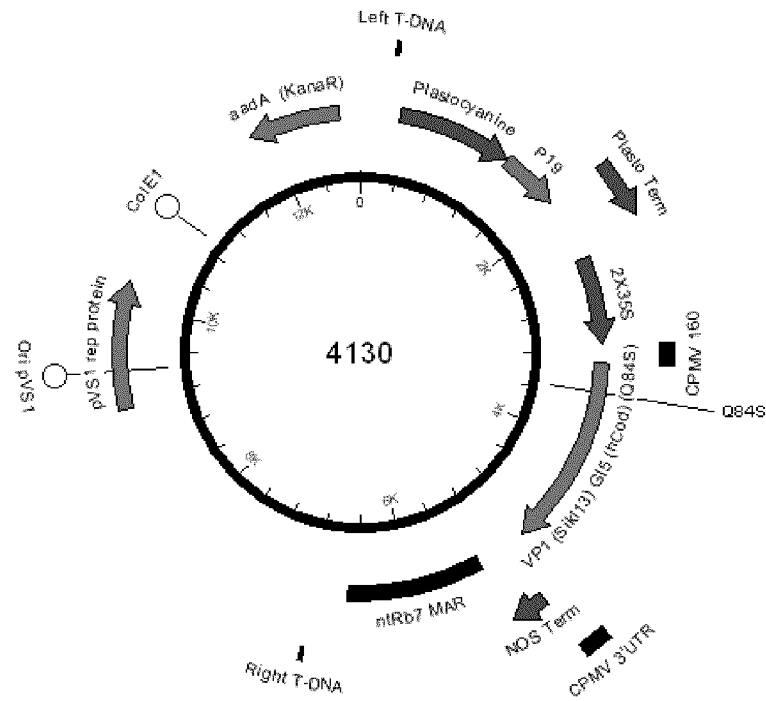
**Figure 41A**

Construct 3980 (VP1 Wt GI.5 hCod)

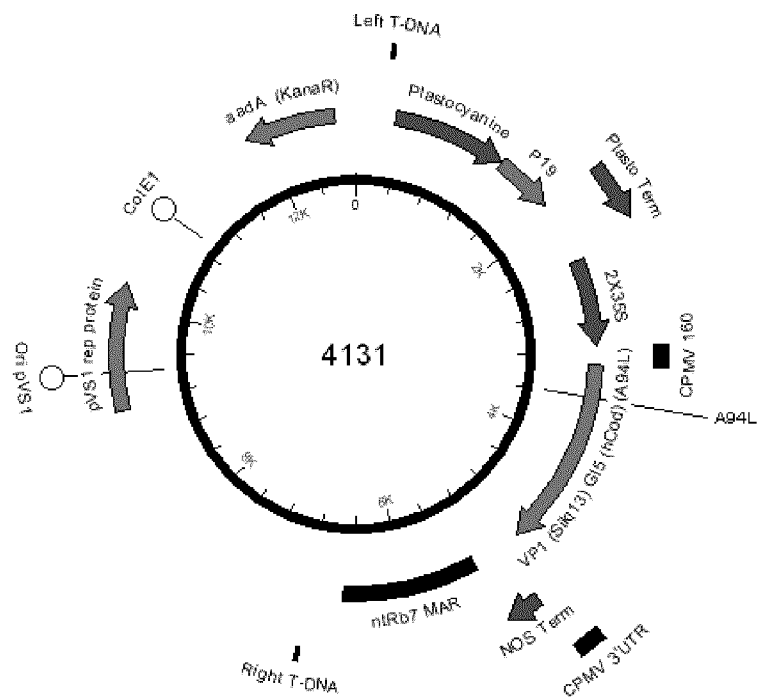


**Figure 41B**

Construct 4130 (VP1 GI.5\_Q84S)

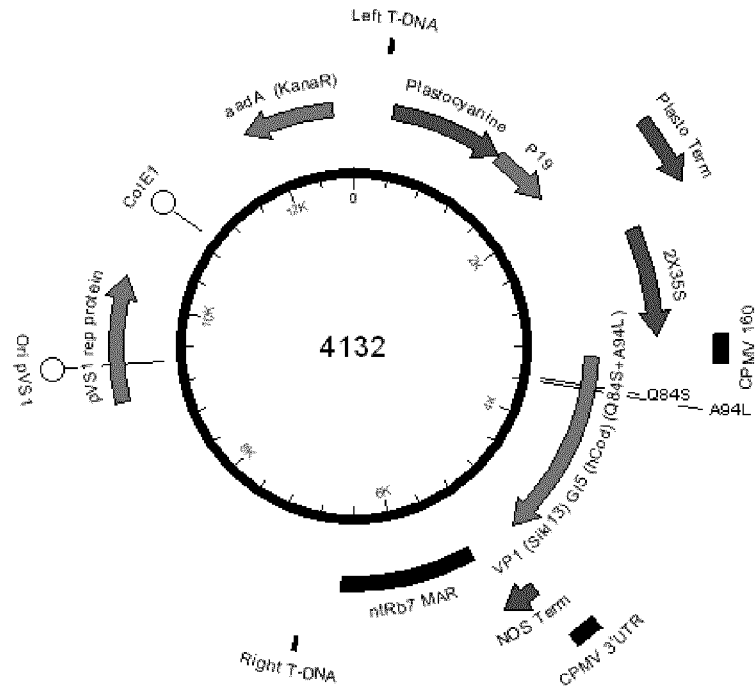
**Figure 41C**

Construct 4131 (VP1 GI.5\_A94L hCod)

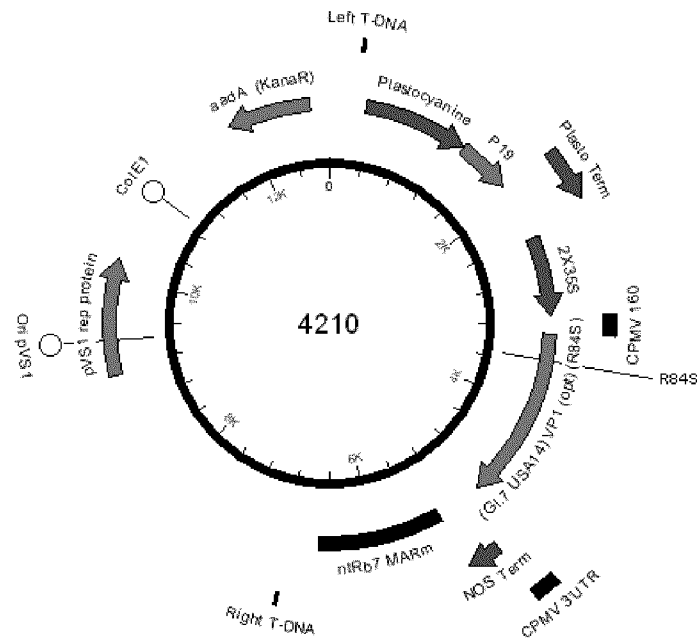


**Figure 41D**

Construct 4132 (VP1 GI.5\_Q84S+A94L hCod)

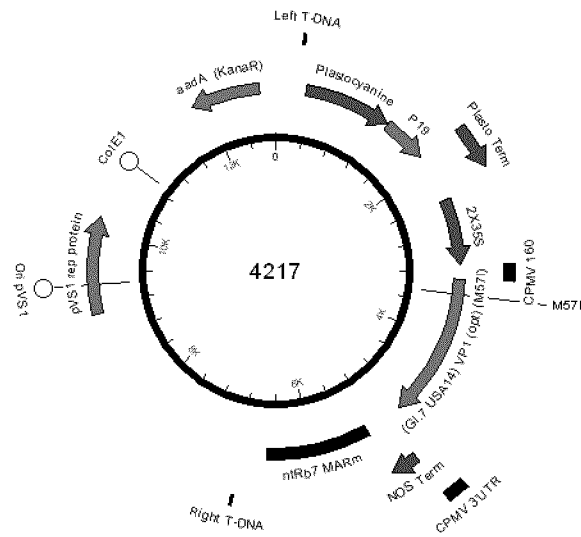
**FIGURE 41E**

Construct 4210 (VP1 GI.7\_R84S hCod)



**FIGURE 41F**

Construct 4217 (VP1 GI.7\_M57I hCod)

**FIGURE 41G**

Construct 4218 (VP1 GI.7\_M57I+R84S hCod)

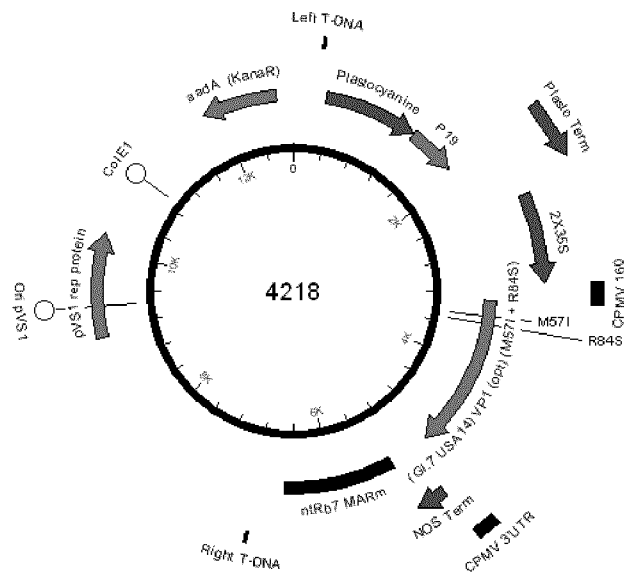


Figure 42A

Construct 3982 (Wt VP1 GII.2 hCod)

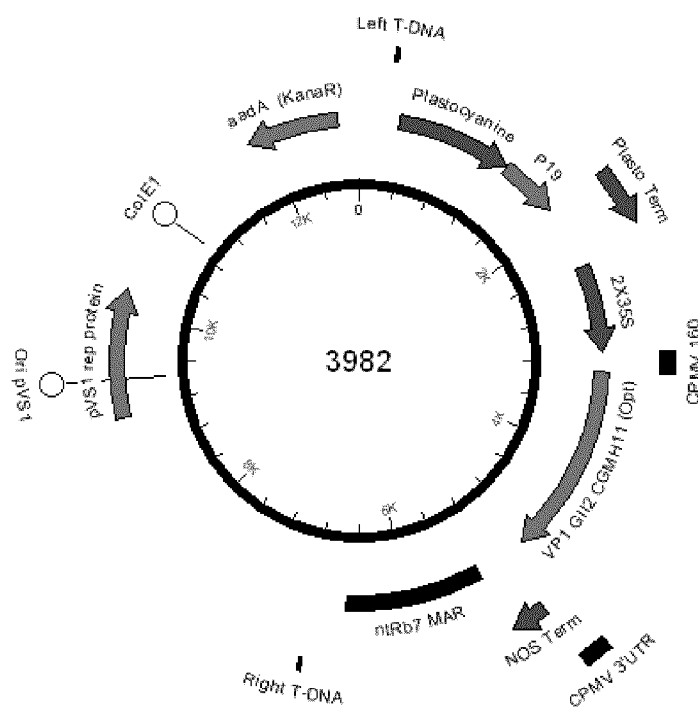


Figure 42B

Construct 4143 (VP1 GII.2\_E80S)

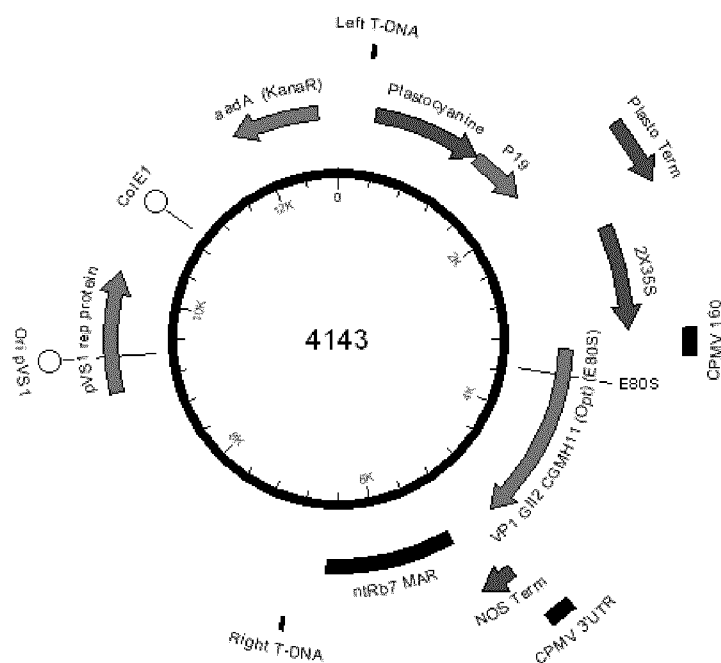


Figure 42C

Construct 4144 (VP1 GII.2\_A90L hCod)

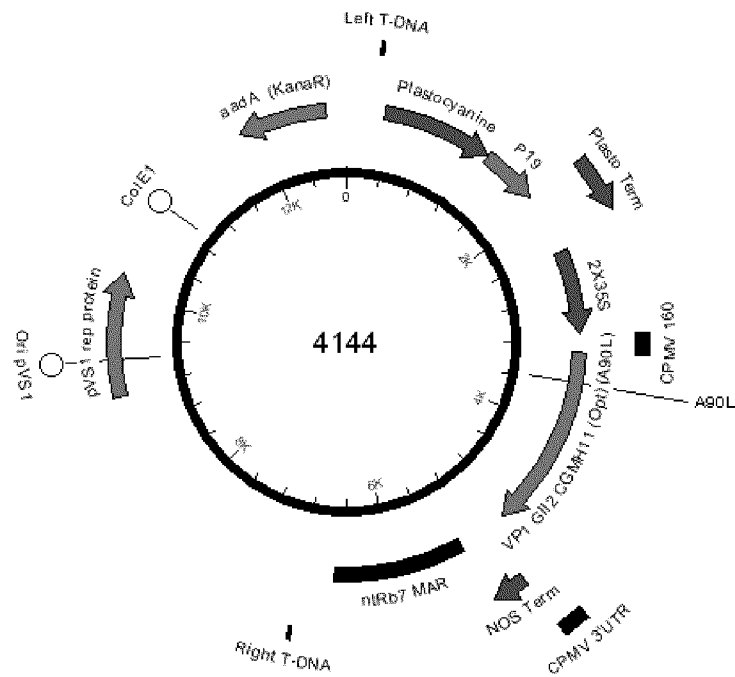
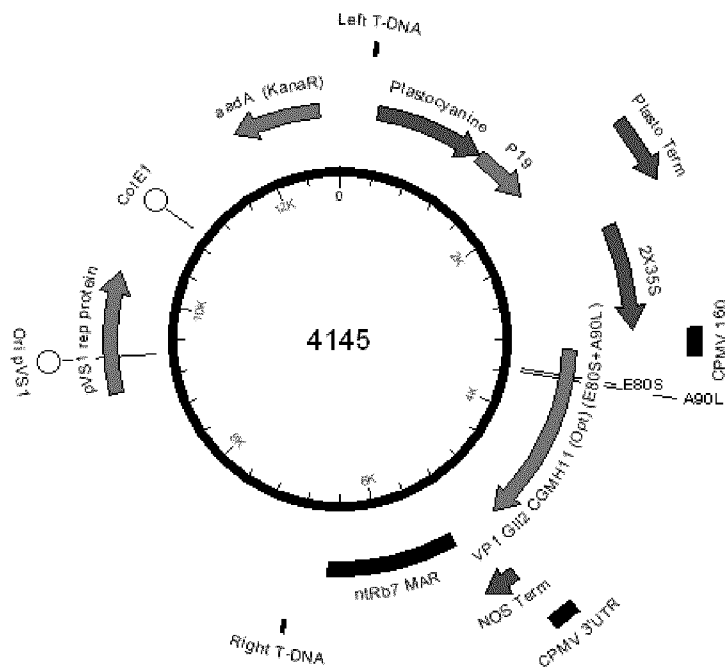


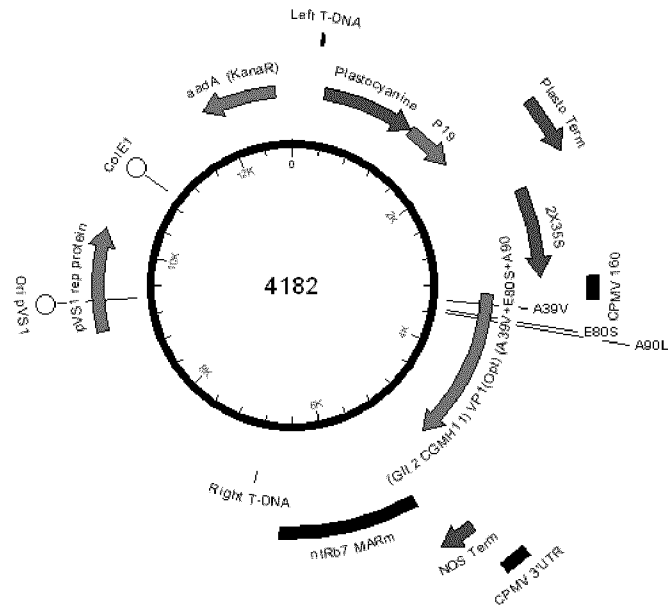
Figure 42D

Construct 4145 (VP1 GII.2\_E80S+A90L hCod)

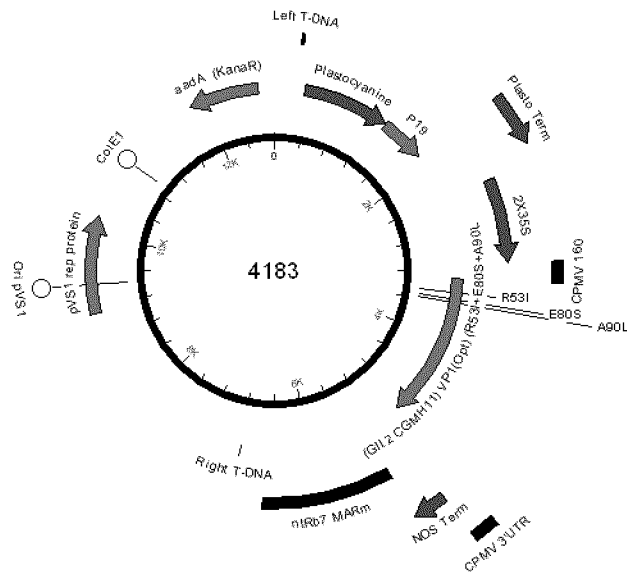


**FIGURE 42E**

Construct 4182 (VP1 GII.2\_A39V+E80S+A90L hCod)

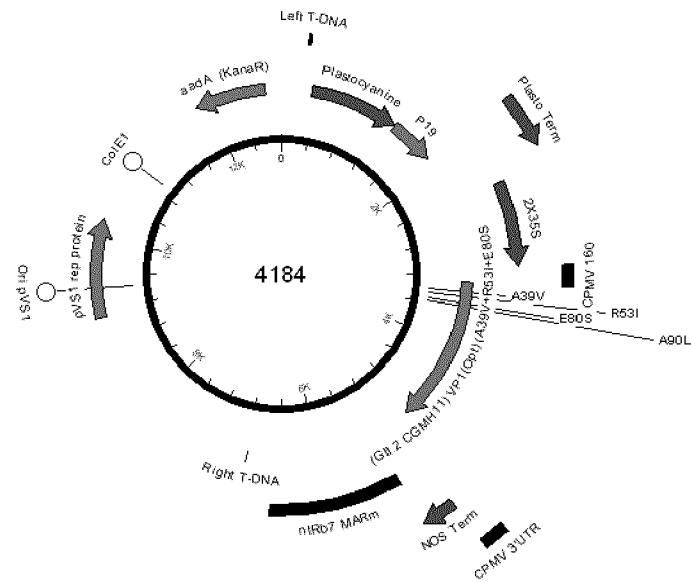
**FIGURE 42F**

Construct 4183Y (VP1 GII.2\_R53I+E80S+A90L hCod)

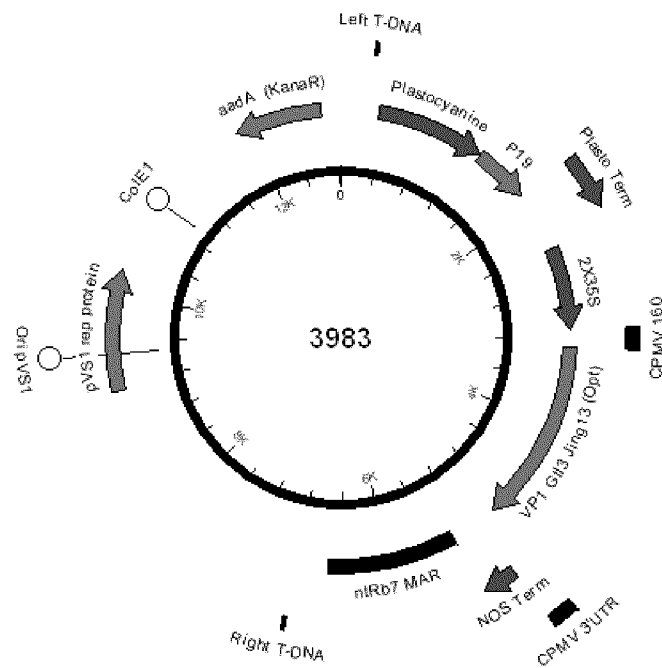


**FIGURE 42G**

Construct 4184 (VP1 GII.2\_A39V+R53I+E80S+A90L hCod).

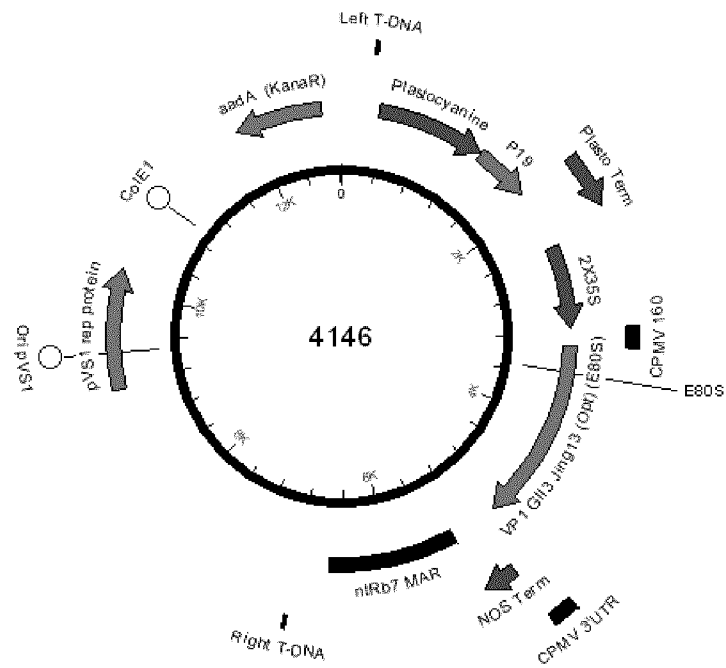
**Figure 43A**

Construct 3983 (Wt VP1 GII.3 hCod)

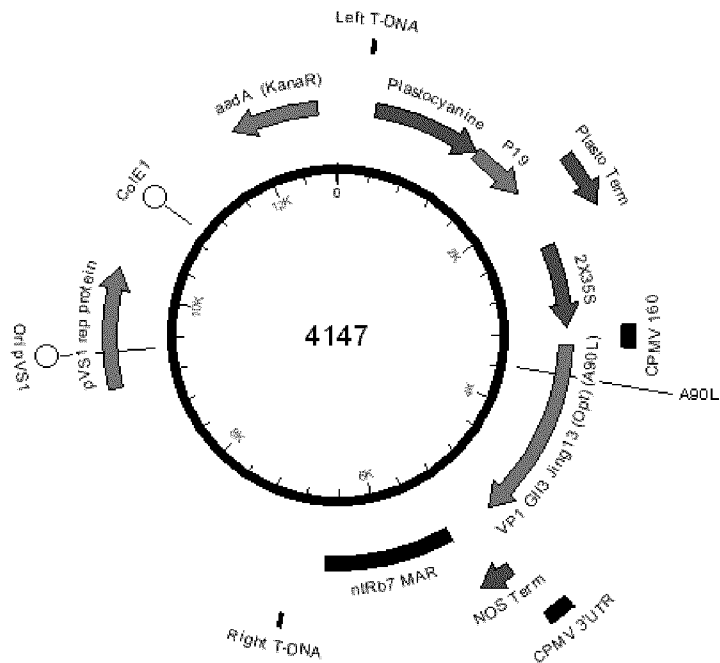


**Figure 43B**

Construct 4146 (VP1 GII.3\_E80S hCod)

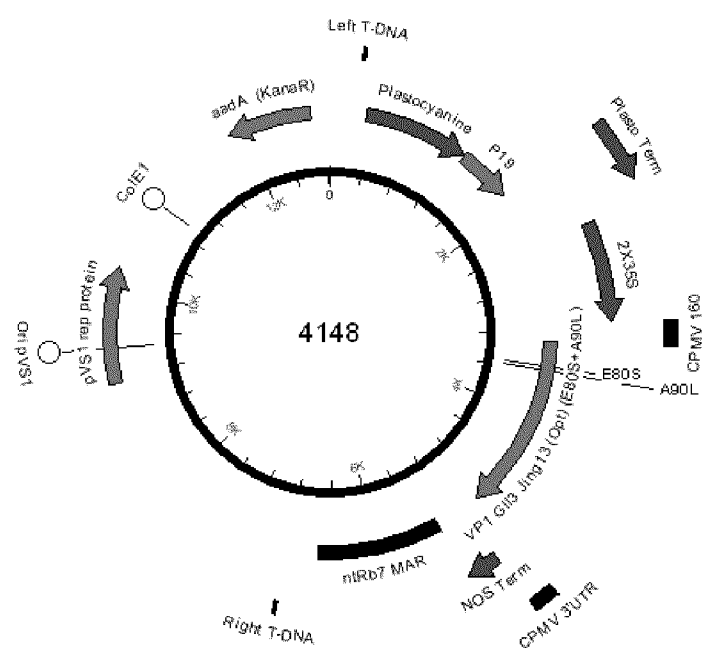
**Figure 43C**

Construct 4147 (VP1 GII.3\_A90L hCod)

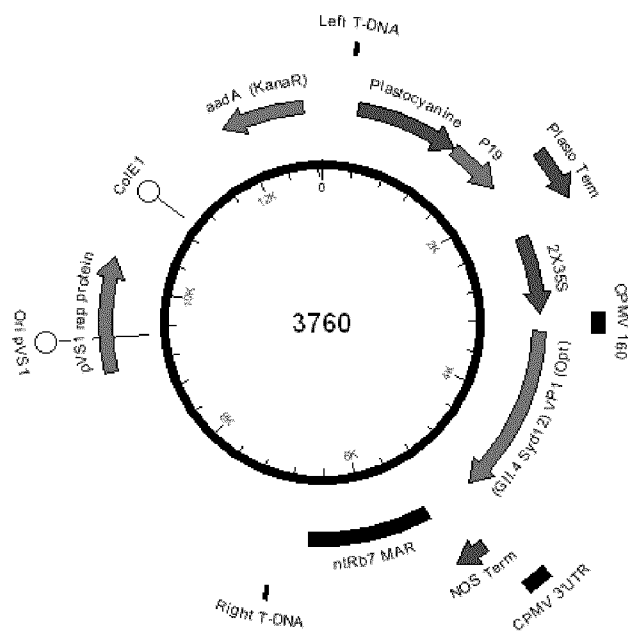


**Figure 43D**

Construct 4148 (VP1 GII.3\_E80S+A90L)

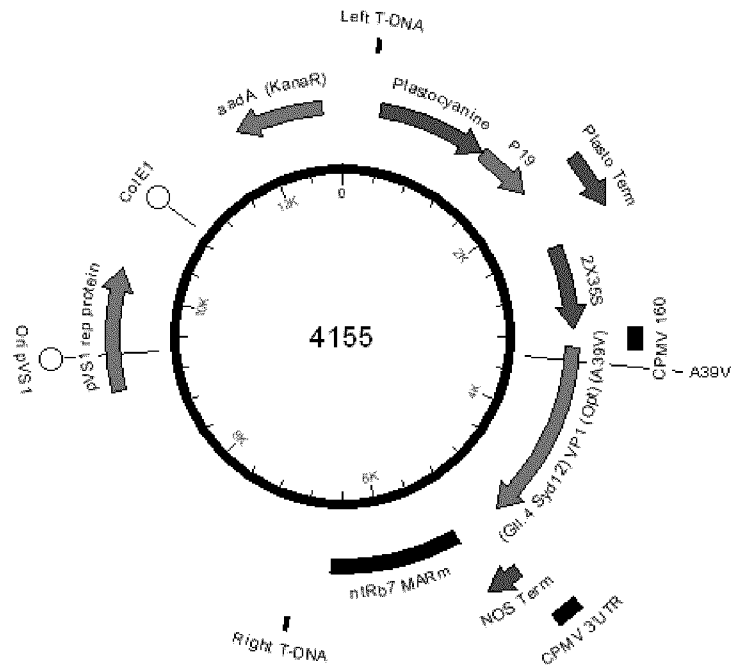
**Figure 44A**

Construct 3760 (Wt VP1 GII.4 hCod)

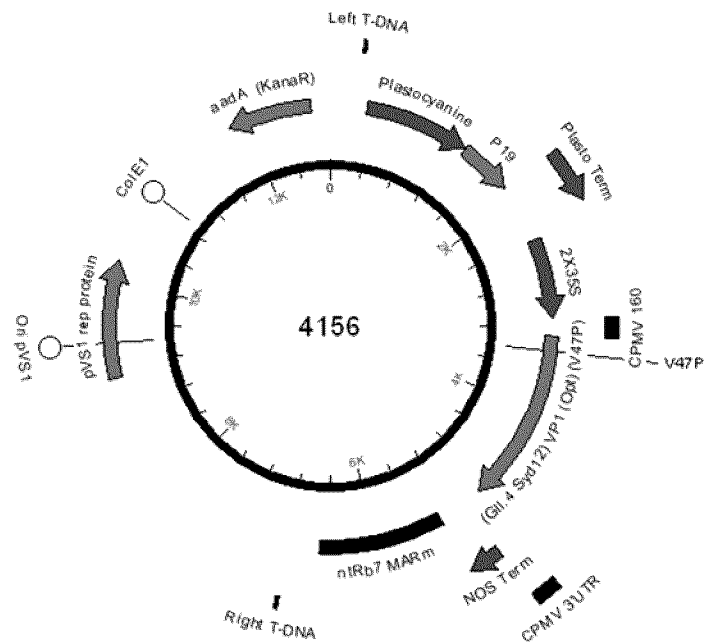


**Figure 44B**

Construct 4155 (VP1 GII.4\_A39V hCod)

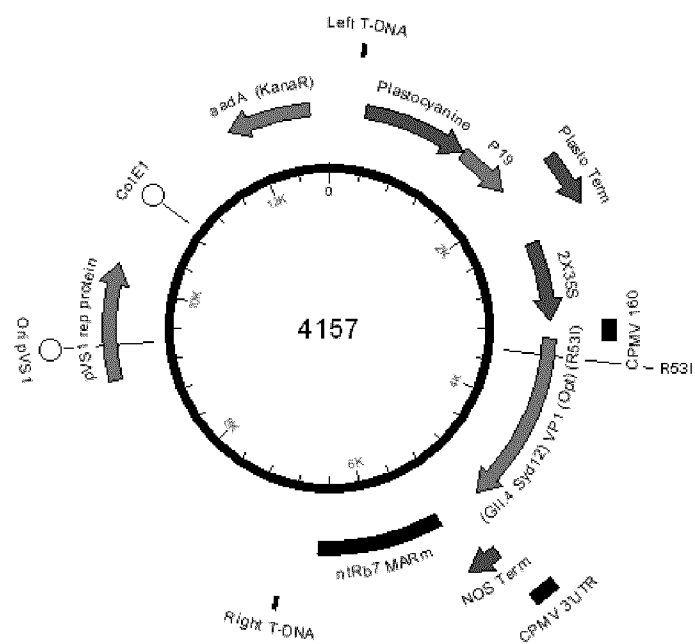
**Figure 44C**

Construct 4156 (VP1 GII.4\_V47P hCod)

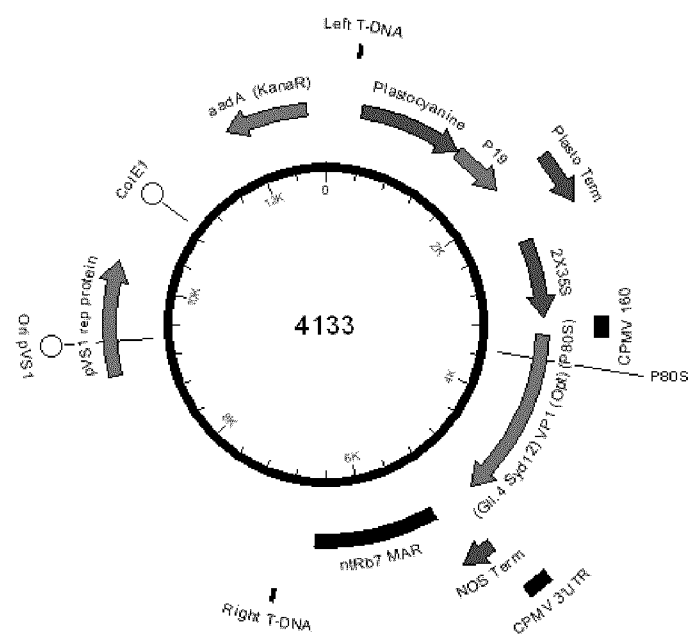


**Figure 44D**

Construct 4157 (VP1 GII.4\_R53I hCod)

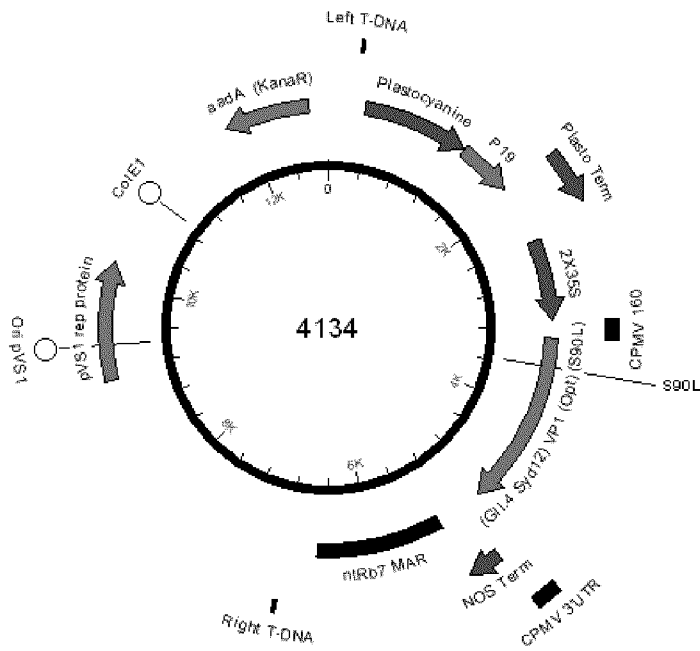
**Figure 44E**

Construct 4133 (VP1 GII.4\_P80S hCod)

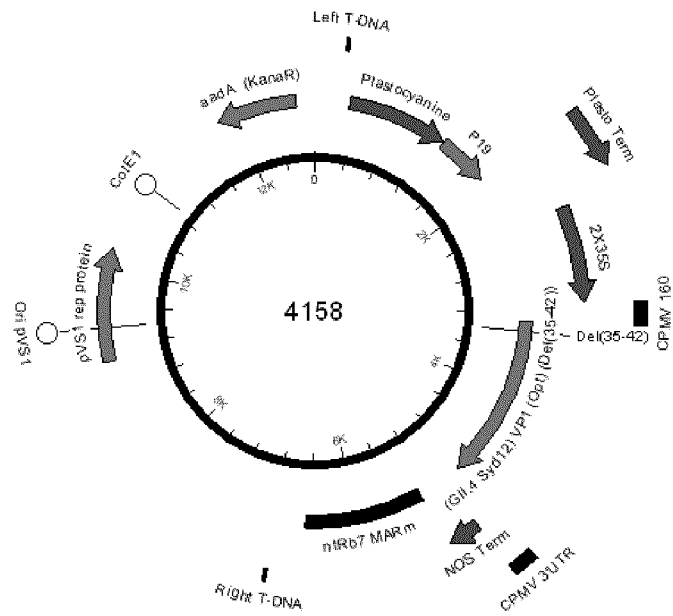


**Figure 44F**

Construct 4134 (VP1 GII.4\_S90L hCod)

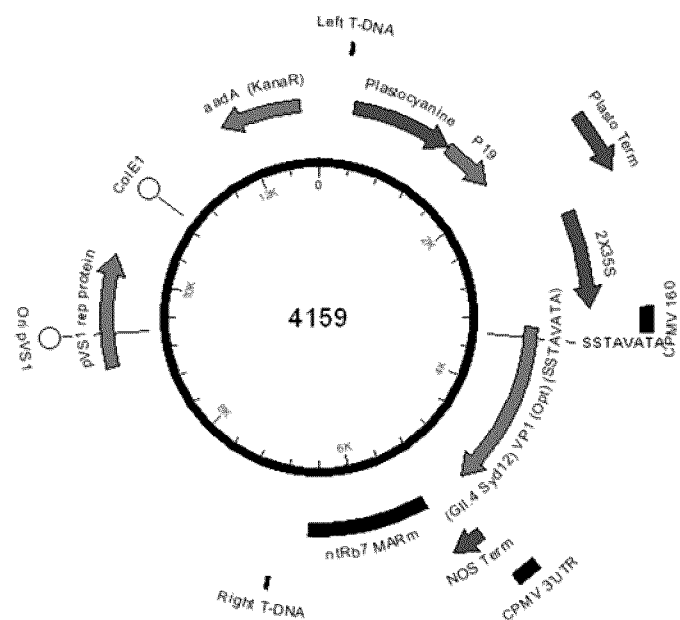
**Figure 44G**

Construct 4158 (VP1 GII.4\_Δ35-42 hCod)

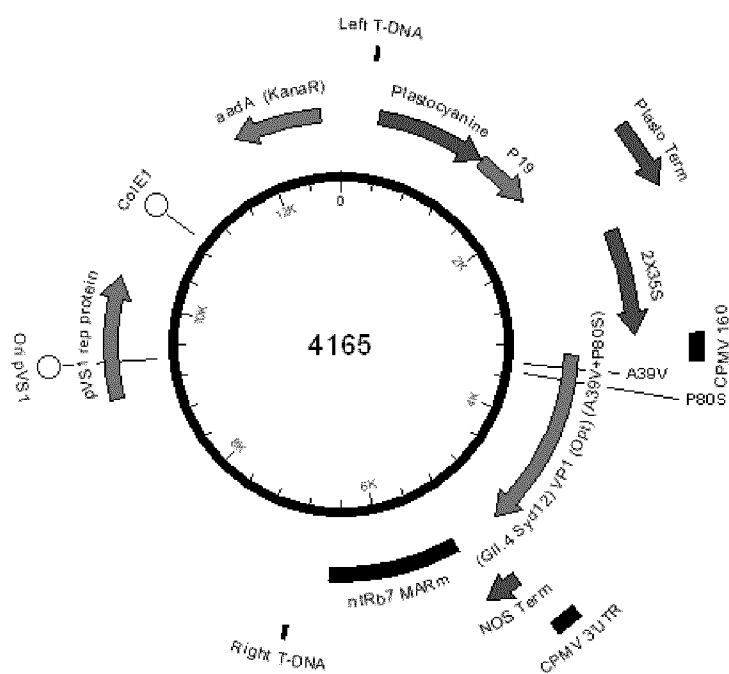


**Figure 44H**

Construct 4159 (VP1 GII.4\_SSTAVATA hCod)

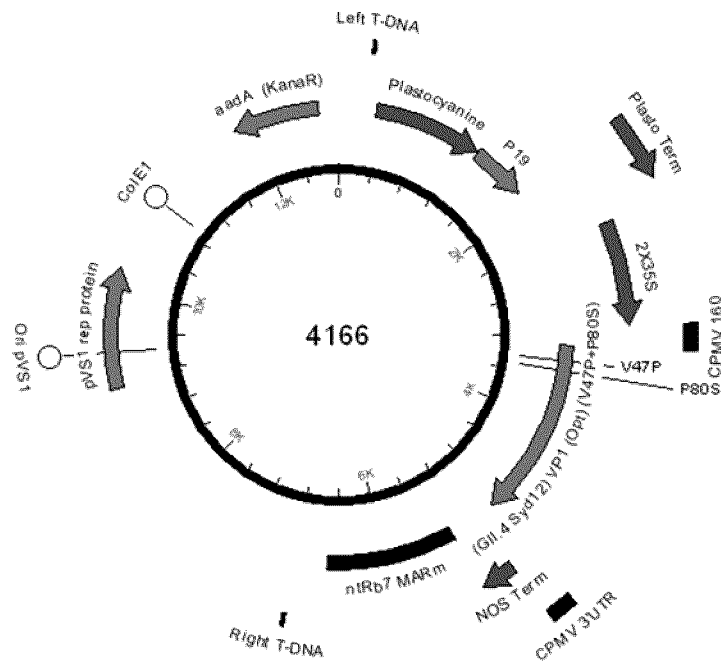
**Figure 44I**

Construct 4165 (VP1 GII.4\_A39V+P80S hCod)

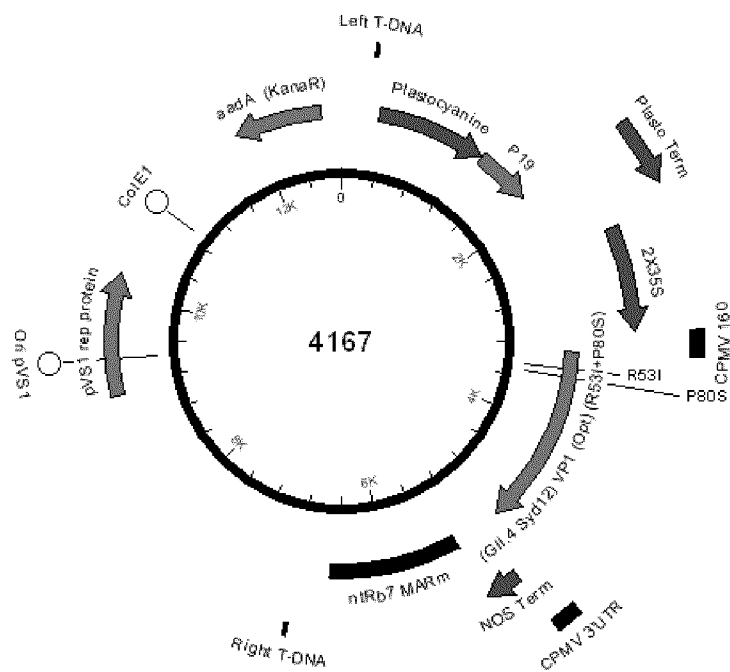


**Figure 44J**

Construct 4166 (VP1 GII.4\_V47P+P80S hCod)

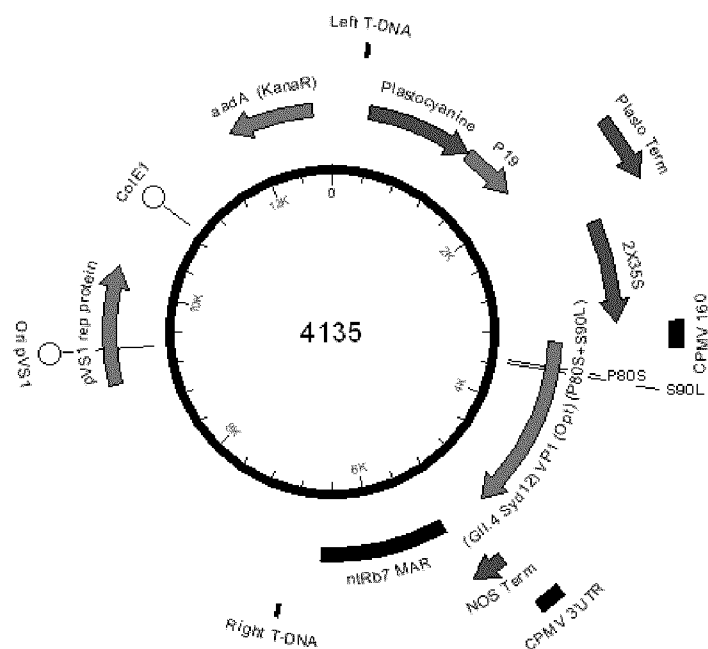
**Figure 44K**

Construct 4167 (VP1 GII.4\_R53I+P80S hCod)

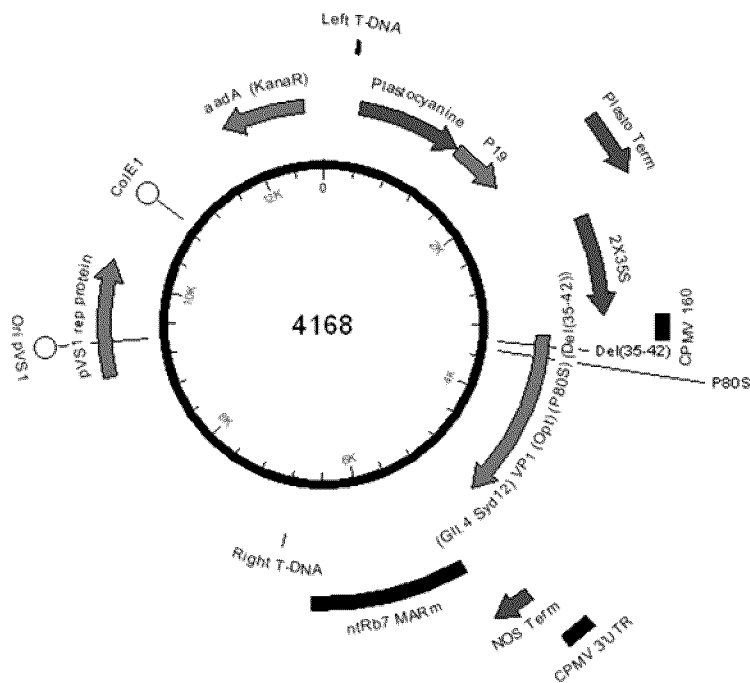


**Figure 44L**

Construct 4135 (VP1 GII.4\_P80S+S90L hCod)

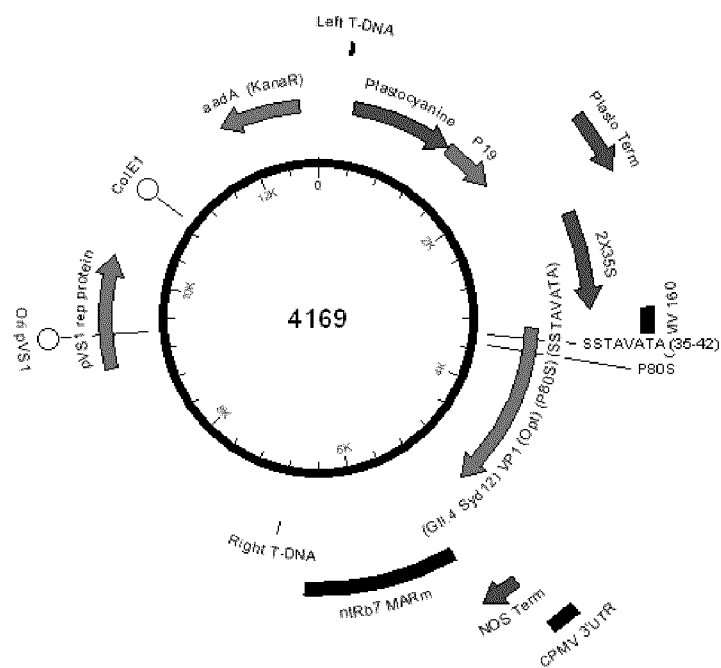
**Figure 44M**

Construct 4168 (GII.4\_P80S+Δ35-42 hCod)

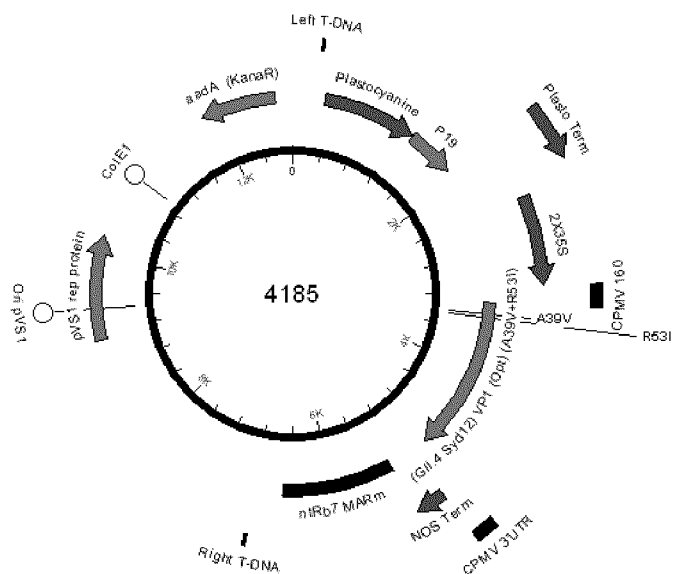


**Figure 44N**

Construct 4169 (VP1 GII.4\_P80S+SSTAVATA hCod)

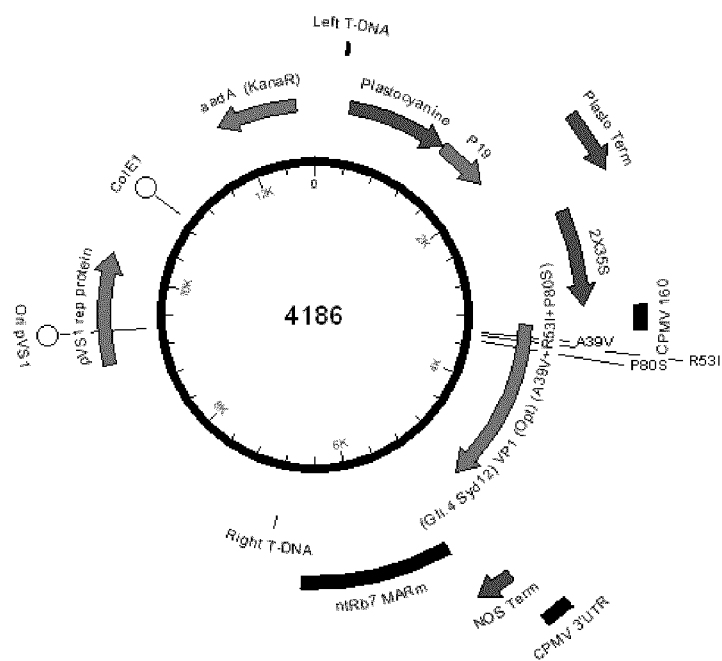
**FIGURE 44O**

Construct 4185 (VP1 GII.4\_A39V+R53I hCod);

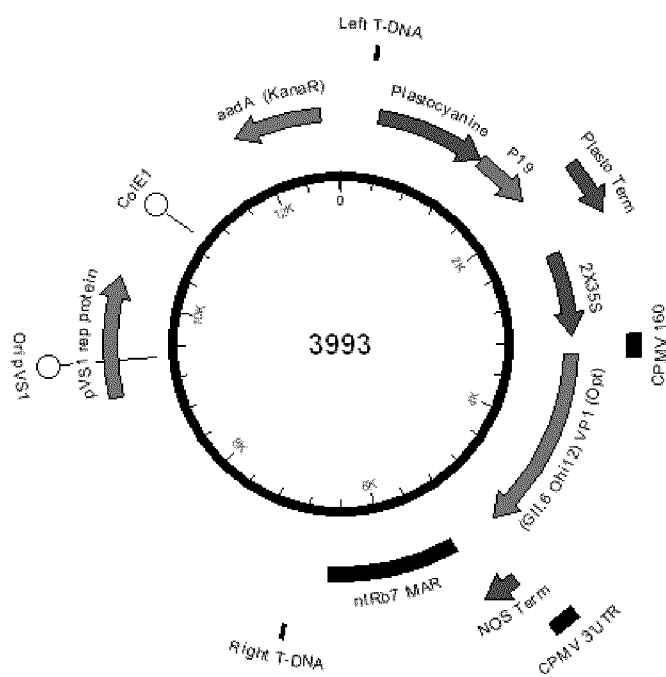


**FIGURE 44P**

Construct 4186Y (VP1 GII.4\_A39V+R53I+P80S hCod)

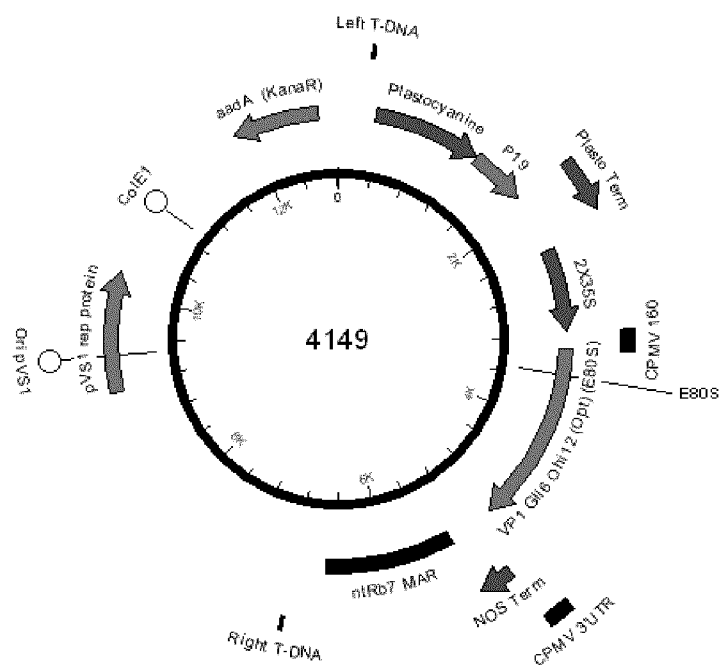
**Figure 45A**

Construct 3993 (Wt VP1 GII.6 hCod)

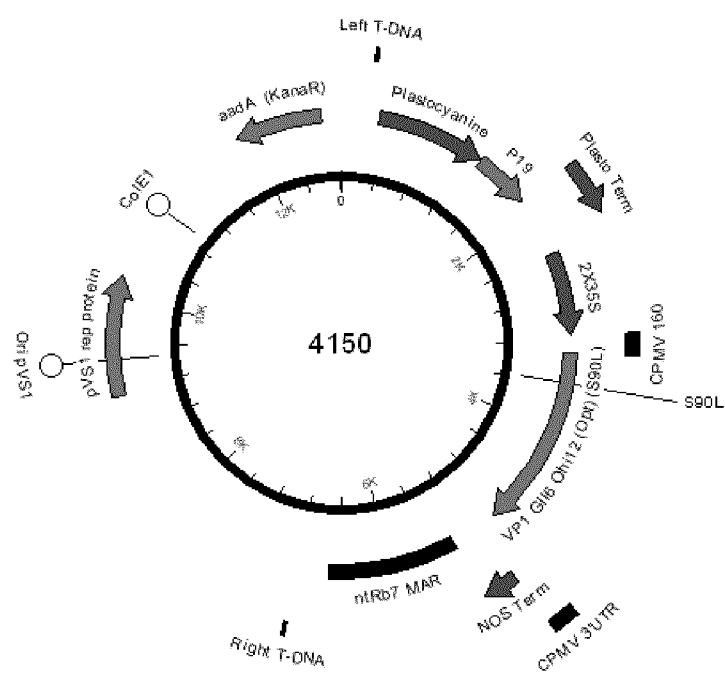


**Figure 45B**

Construct 4149 (VP1 GII.6\_E80S hCod)

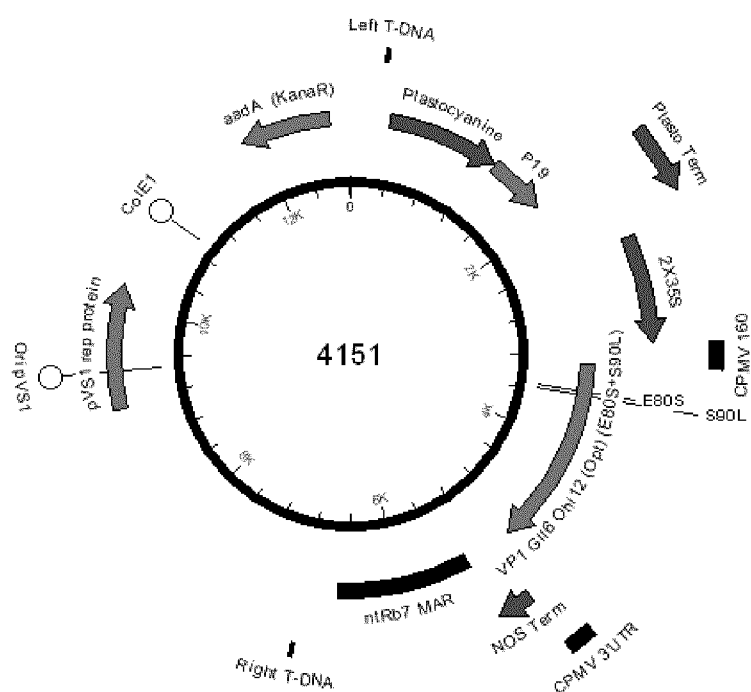
**Figure 45C**

Construct 4150 (VP1 GII.6\_S90L hCod)

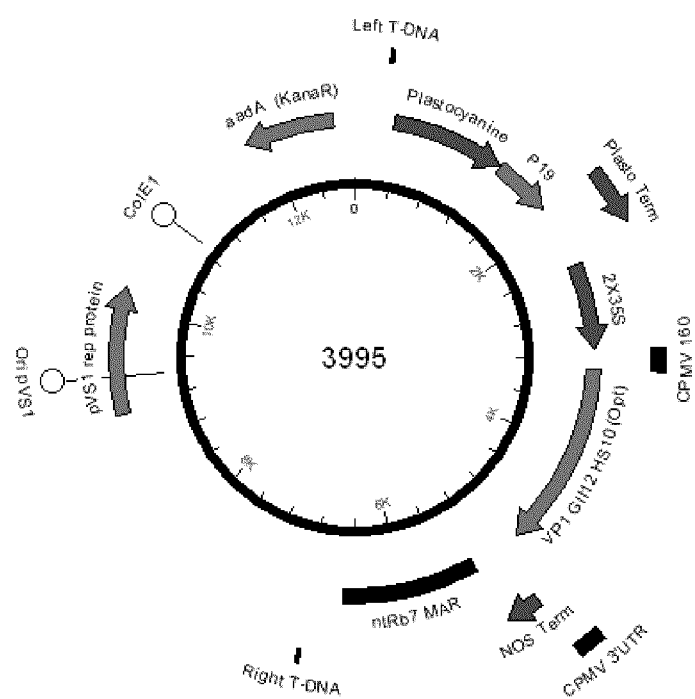


**Figure 45D**

Construct 4151 (VP1 GII.6\_E80S+S90L)

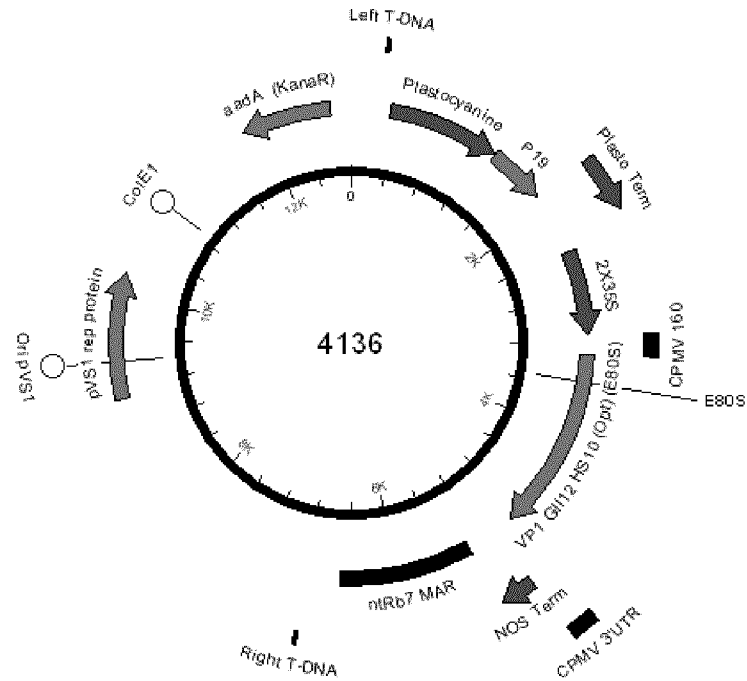
**Figure 46A**

Construct 3995 (Wt VP1 GII.12 hCod)

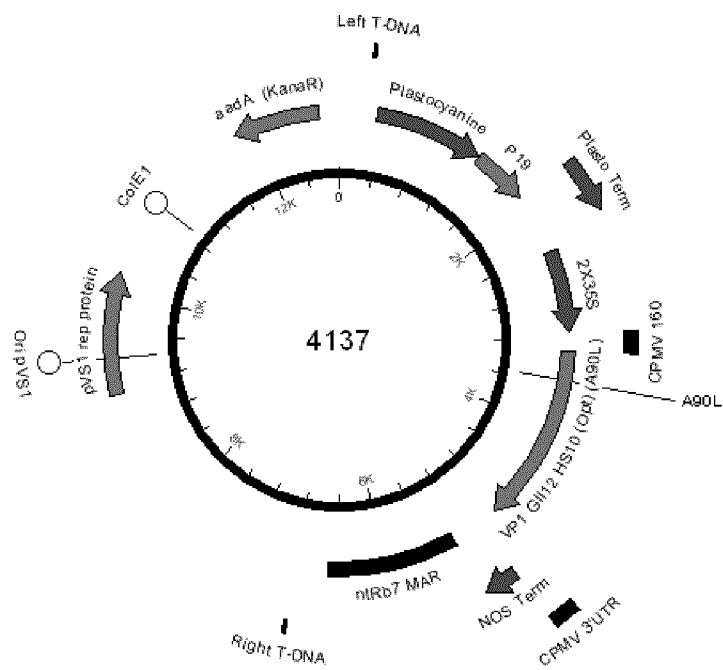


**Figure 46B**

Construct 4136 (VP1 GII.12\_E80S hCod)

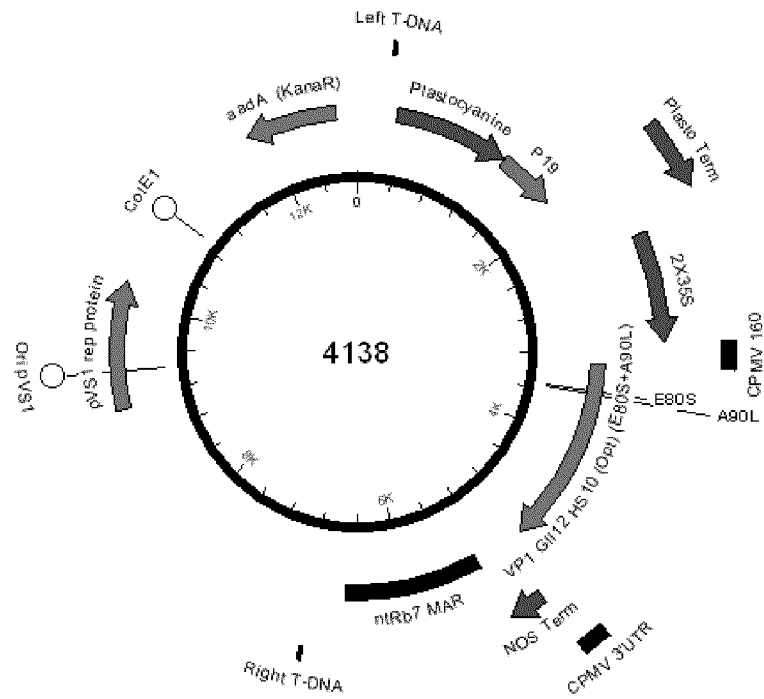
**Figure 46C**

Construct 4137 (VP1 GII.12\_A90L hCod)

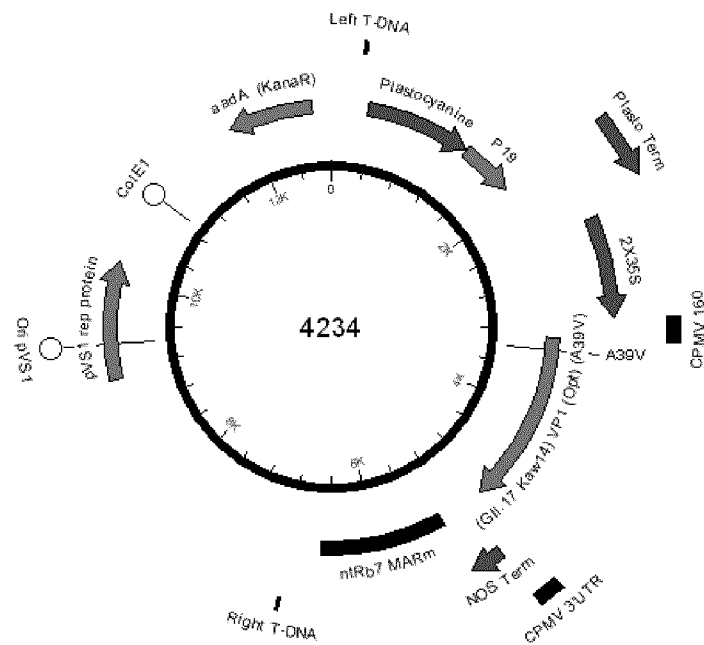


**Figure 46D**

Construct 4138 (VP1 GII.12\_E80S+A90L)

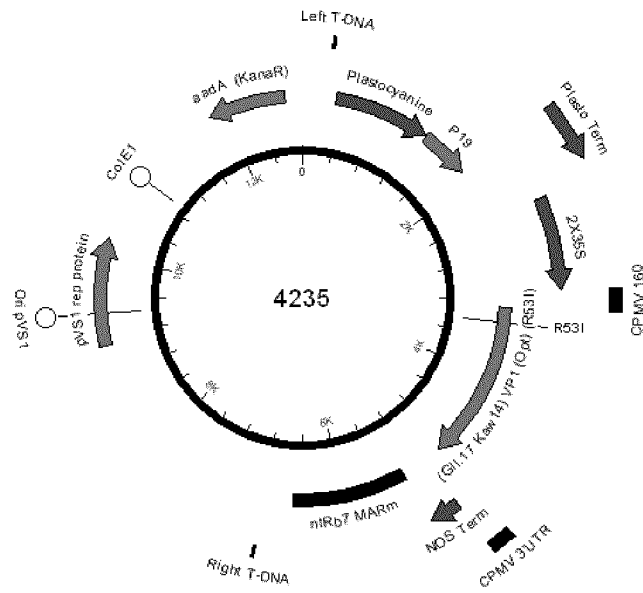
**FIGURE 46E**

Construct 4234 (VP1 GII.17\_A39V hCod)

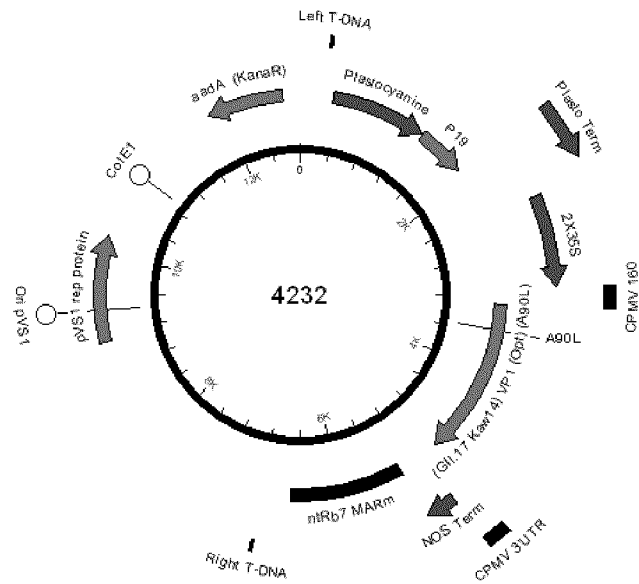


**FIGURE 46F**

Construct 4235 (VP1 GII.17\_R53I hCod)

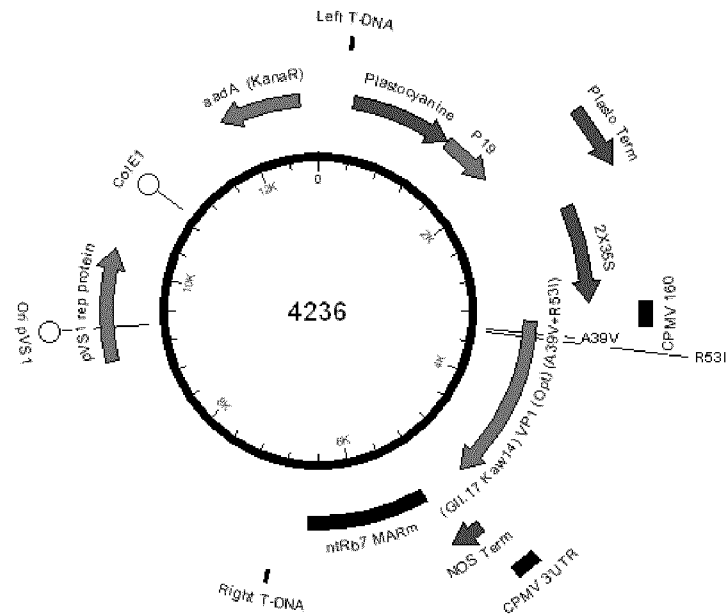
**FIGURE 46G**

Construct 4232 (VP1 GII.17\_A90L hCod)



**FIGURE 46H**

Construct 4236 (VP1 GII.17\_A39V+R53I hCod)

**FIGURE 46I**

Construct 4233 (VP1 GII.17\_E80S+A90L hCod)

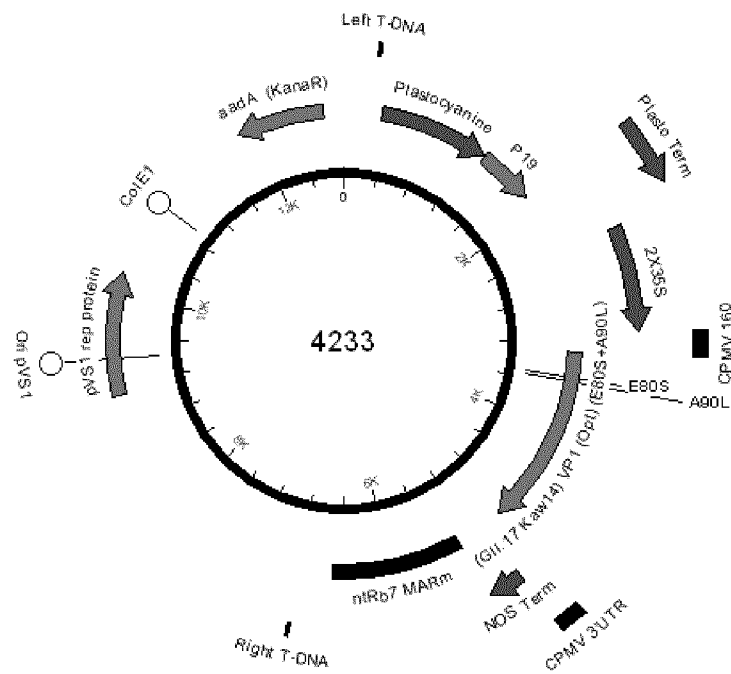


Figure 47A

Construct 2725 (Wt VP2 GI.1)

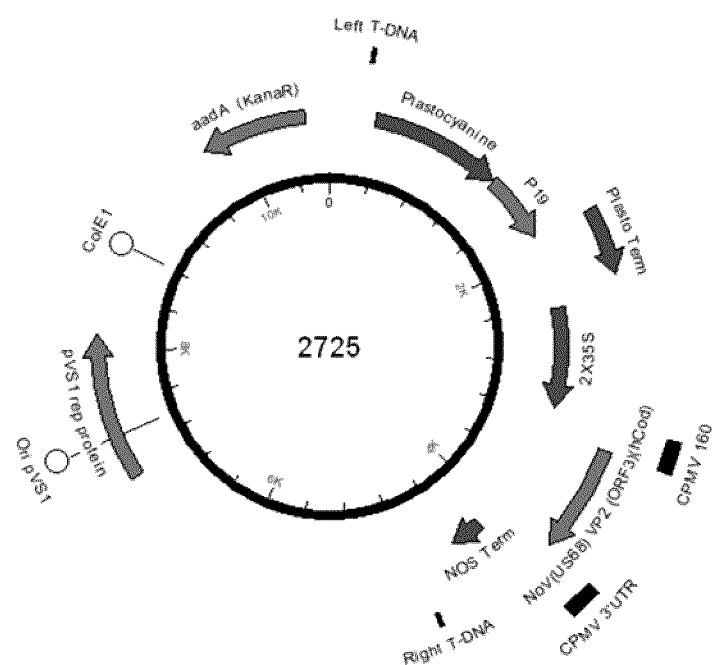


Figure 47B

Construct 3303 (Wt VP2 GI.3 hCod)

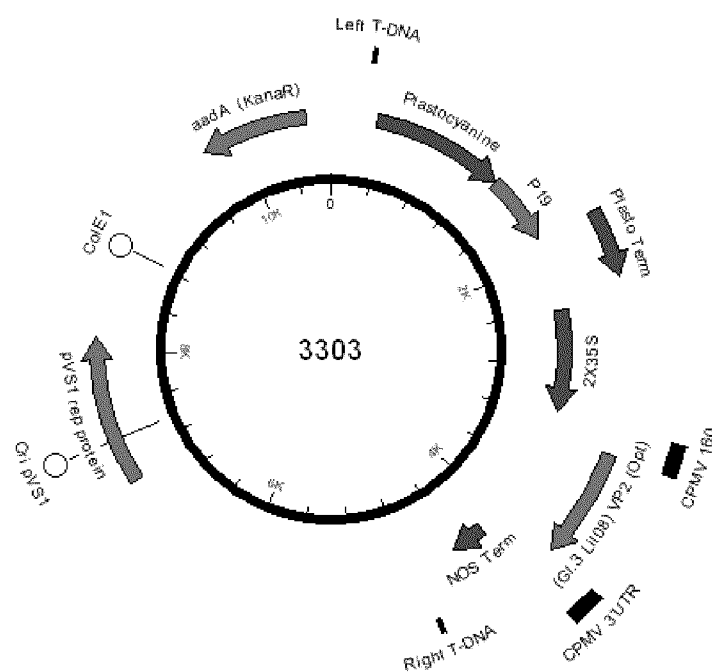


Figure 47C

Construct 3307 (Wt VP2 GII.6)

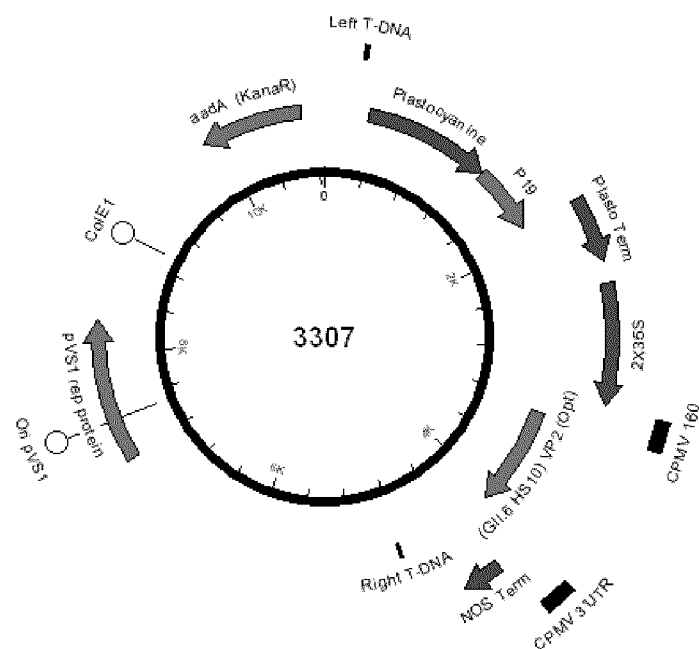
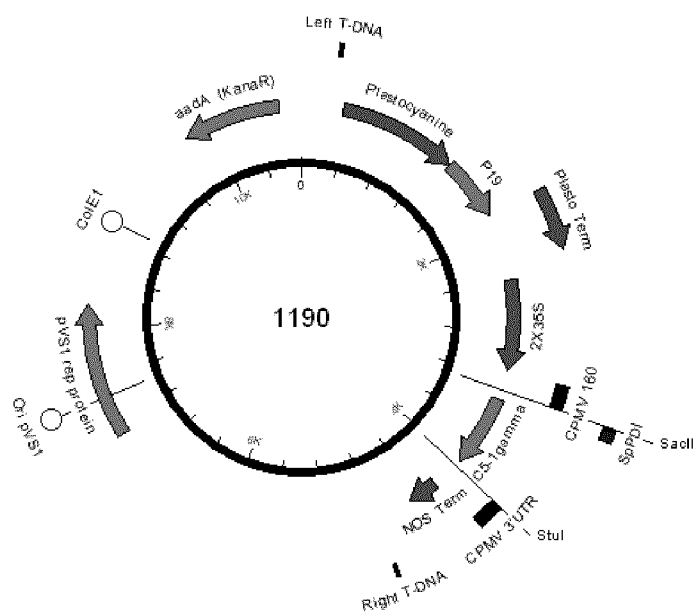


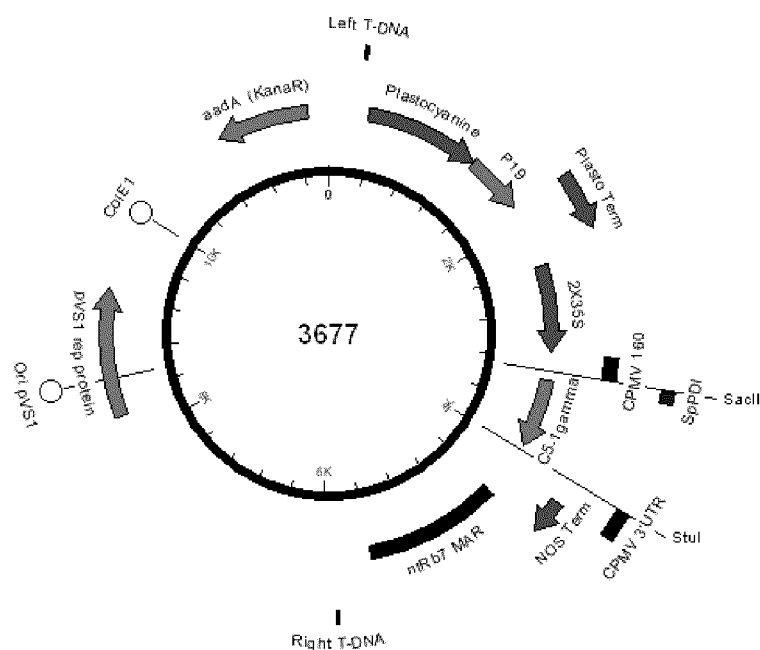
Figure 48

Construct 1190 (Cloning vector 1190)



**Figure 49**

Construct 3677 (Cloning vector 3677)

**Figure 50A**

GII.4 P80X constructs (cloning vectors), wherein X=A (4281); X=N (4285); X=K (4286); X=H (4287)

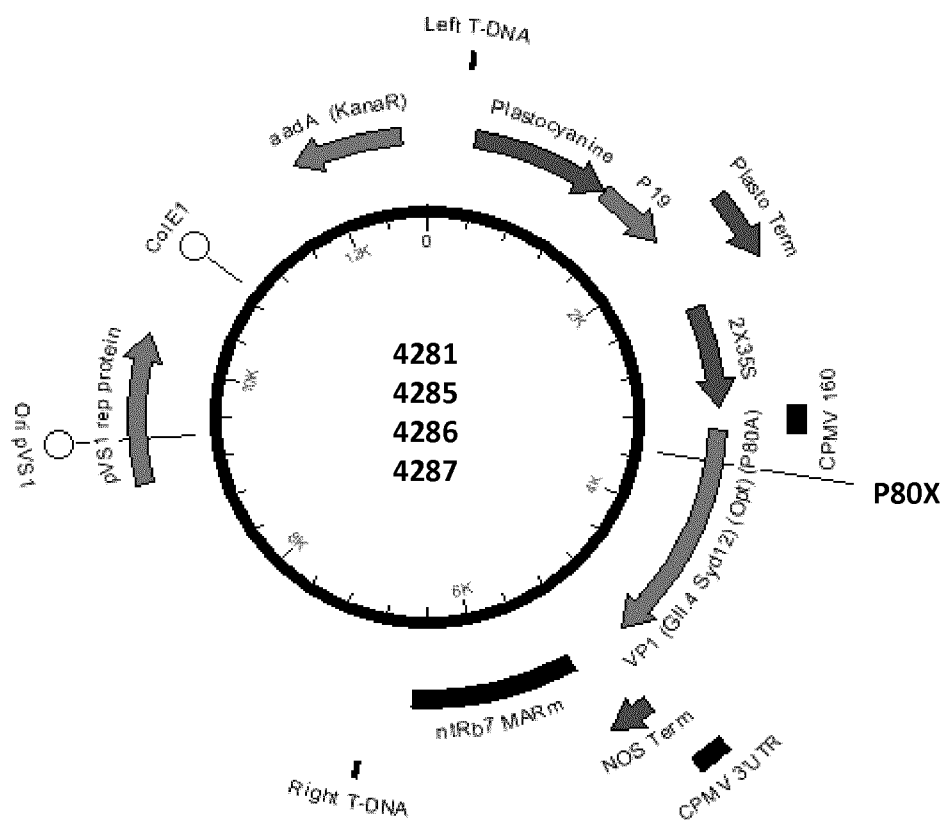


Figure 50B

GII.4 P80s+A39X constructs (cloning vectors), wherein X=I (4256); X=M (4257); X=G (4258); X=S (4259); X=E (4260); X=D (4261); X=N (4262); X=Q (4263); X=K (4264); X=H (4265)

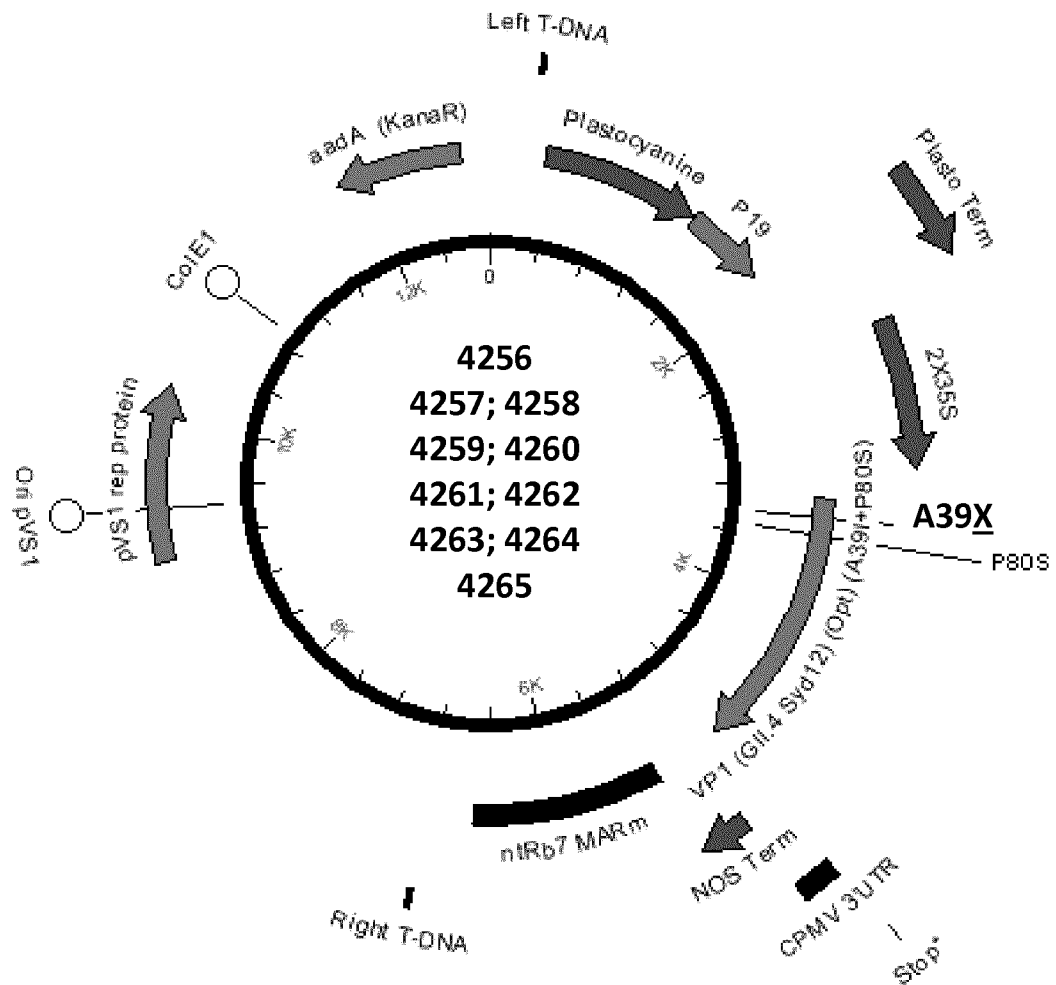
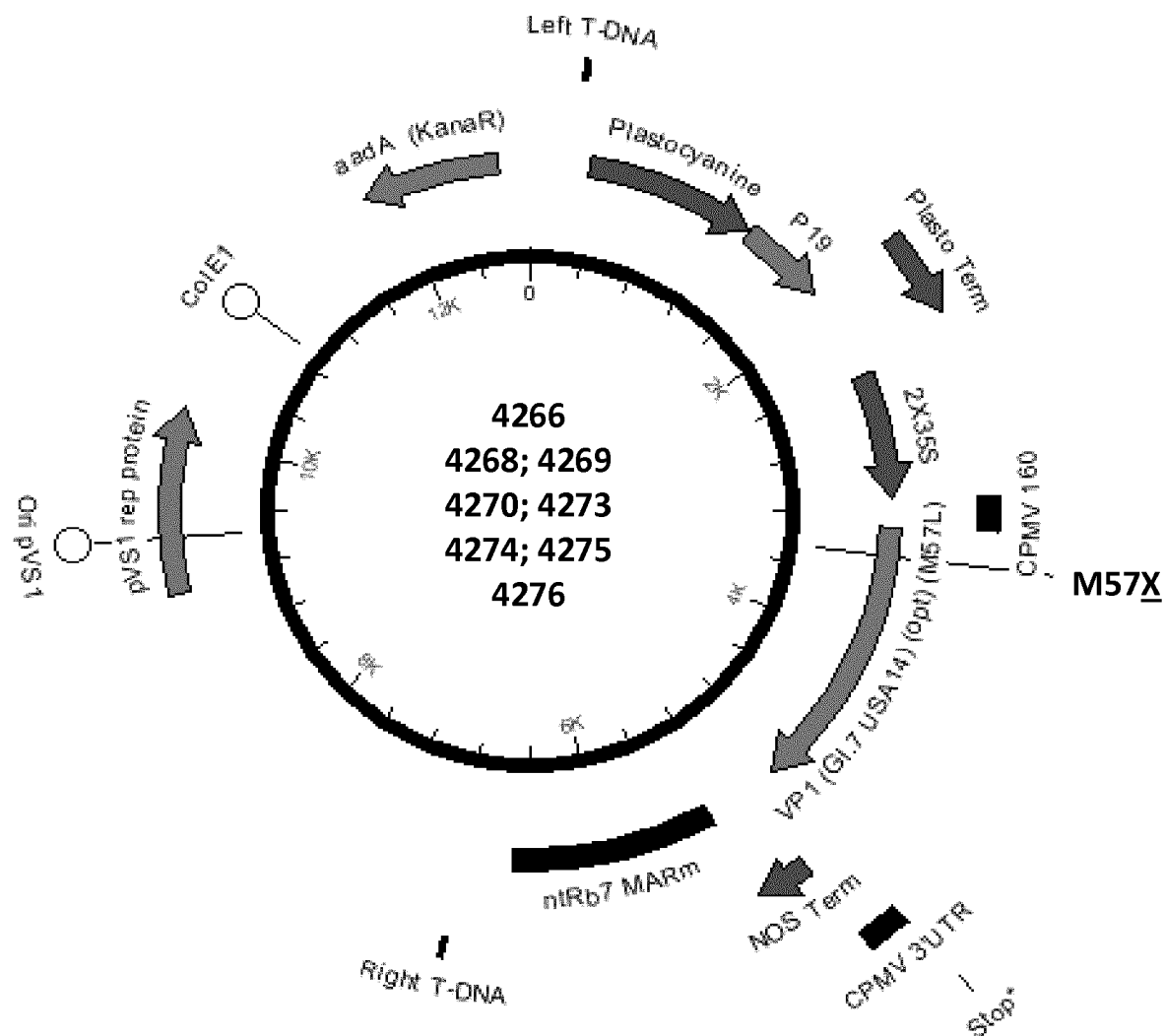


Figure 51

Gl.7 M57X constructs (cloning vectors), wherein X= L (4266); G (4268); S (4269); T (4270); N (4273); Q (4274); K (4275); or H (4276).



**Figure 52**

Gl.3 S94X constructs (cloning vectors), wherein X=V (4288); I (4289); M (4290); T (4292); E (4293); D (4294); N (4295); Q (4296); K (4297); or H (4298).

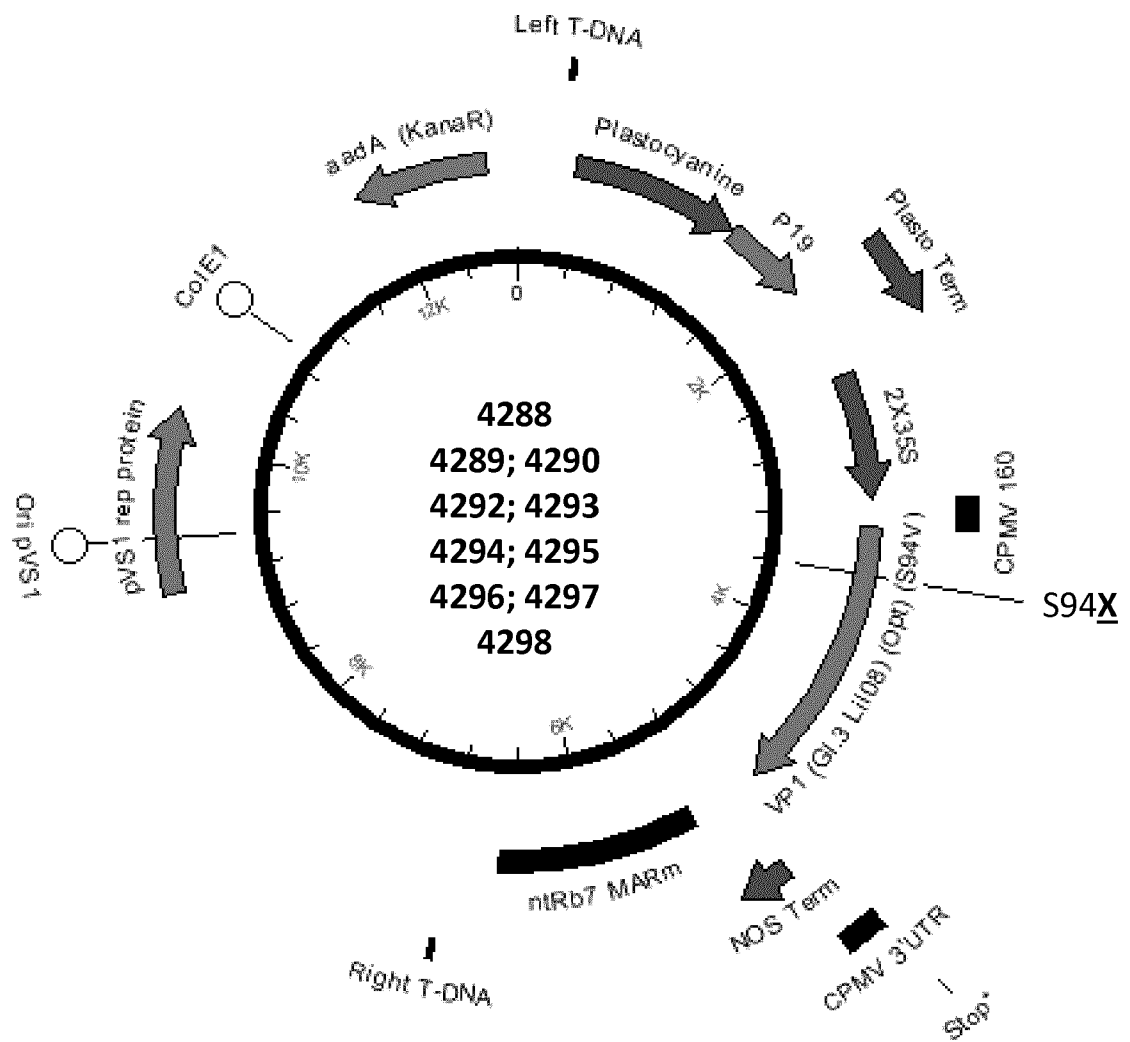


Figure 1A

