

Figures

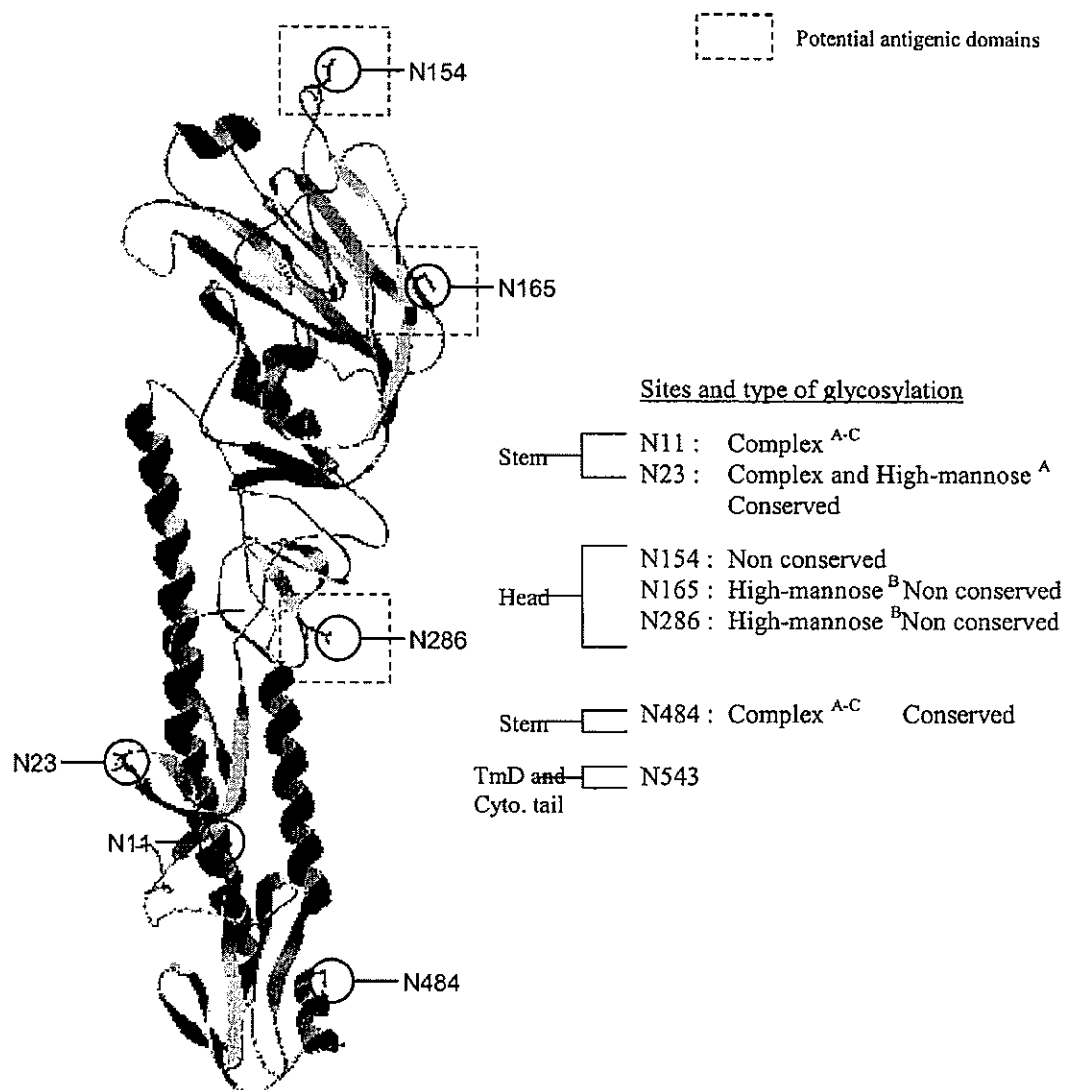


Figure 1A
Representation of the localisation of glycosylation sites on the structure of a monomer from influenza virus HA H5 A/Indonesia/5/05.

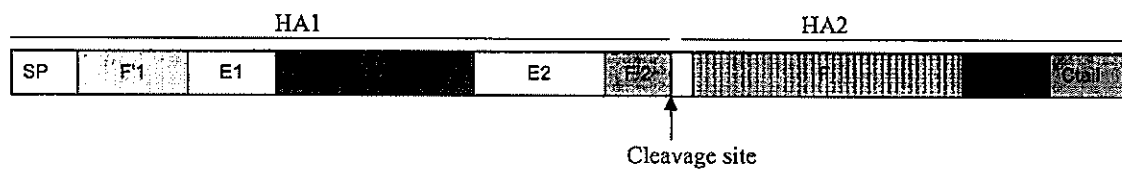


Figure 1B

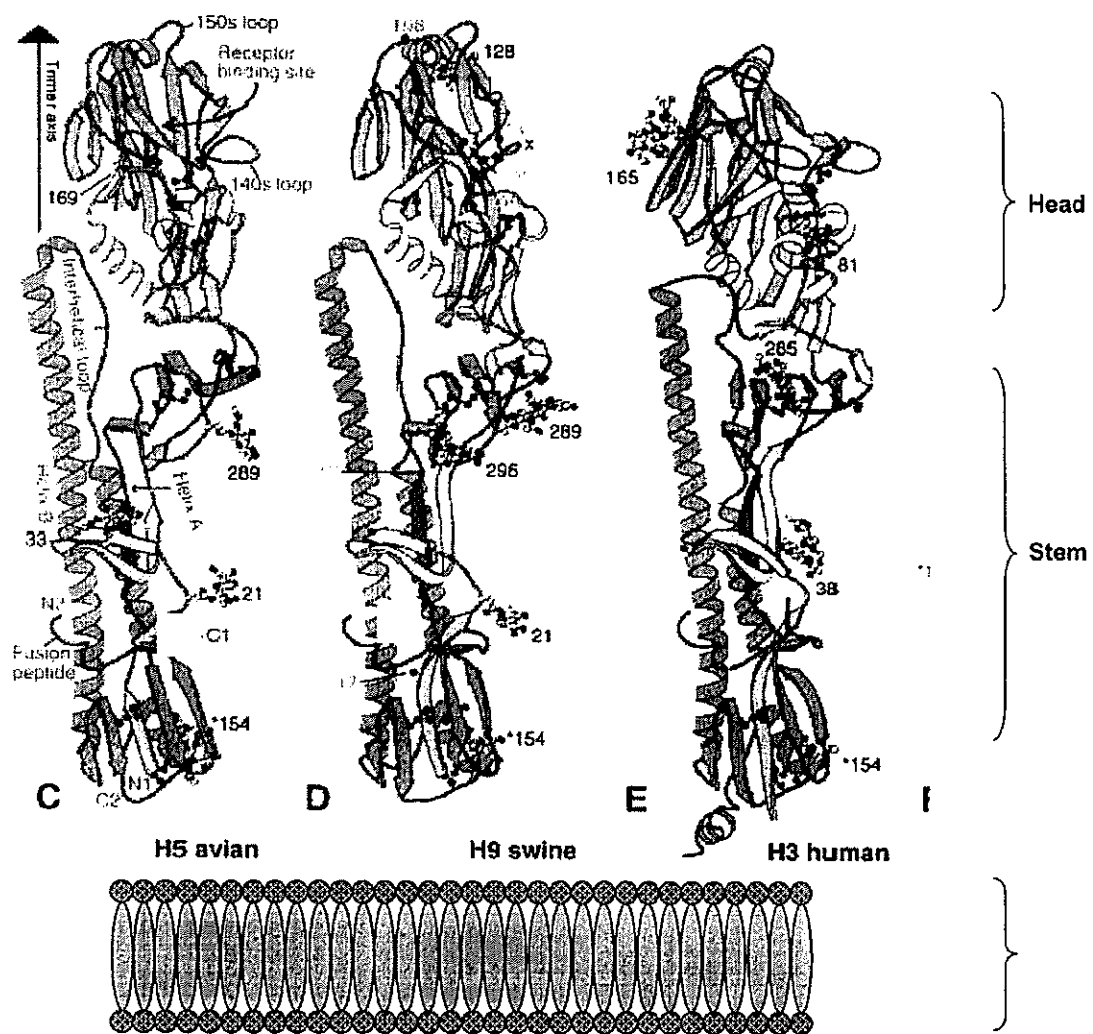


Figure 2

AGAGGTACCCCGGGCTGGTATATTTATATGTTGTCAAATAACTCAAAAACCATA
AAAGTTTAAGTTAGCAAGTGTGTACATTTTTACTTGAACAAAAATATTCACCTAC
TACTGTTATAAATCATTATTAACATTAGAGTAAAGAAATATGGATGATAAGAAC
AAGAGTAGTGATATTTTGACAACAATTTTGTGCAACATTTGAGAAAATTTTGT
GTTCTCTCTTTTCATTGGTCAAAAACAATAGAGAGAGAAAAAGGAAGAGGGAG
AATAAAAACATAATGTGAGTATGAGAGAGAAAGTTGTACAAAAGTTGTACCAA
ATAGTTGTACAAATATCATTGAGGAATTTGACAAAAGCTACACAAATAAGGGTT
AATTGCTGTAAATAAATAAGGATGACGCATTAGAGAGATGTACCATTAGAGAAT
TTTTGGCAAGTCATTAAAAAGAAAGAATAAATTATTTTTAAAATTTAAAGTTGAG
TCATTTGATTAAACATGTGATTATTTAATGAATTGATGAAAGAGTTGGATTAAAG
TTGTATTAGTAATTAGAATTTGGTGTCAAATTTAATTTGACATTTGATCTTTTCT
ATATATTGCCCATAGAGTCAGTTAACTCATTTTTATTTTCATAGATCAAATAA
GAGAAATAACGGTATATTAATCCCTCCAAAAAACGGTATATTTACTAAA
AAATCTAAGCCACGTAGGAGGATAACAGGATCCCCGTAGGAGGATAACATCCA
ATCCAACCAATCACAACAATCCTGATGAGATAACCCACTTTAAGCCCACGCATC
TGTGGCACATCTACATTATCTAAATCACACATTCTTCCACACATCTGAGCCACA
CAAAAACCAATCCACATCTTTATCACCCATTCTATAAAAAATCACACTTTGTGAG
TCTACACTTTGATTCCCTTCAAACACATACAAAGAGAGAGACTAATTAATTAAT
TAATCATCTTGAGAGAAAATGGCGAAAAACGTTGCGATTTTCGGCTTATTGTT
TCTCTTCTTGTTGGTTCCTTCTCAGATCT

GAGCTCTAAGTTAAATGCTTCTTCGTCTCCTATTTATAATATGGTTTGTTATTG
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TGTATGAGATGAACTGGTGTAAATGAATTCATTTACATAAGTGGAGTCAGAATC
AGAATGTTTCCTCCATAACTAACTAGACATGAAGACCTGCCGCGTACAATTGTC
TTATATTTGAACAACATAAATTGAACATCTTTTGCCACAACCTTTATAAGTGGTTA
ATATAGCTCAAATATATGGTCAAGTTCAATAGATTAATAATGGAAATATCAGTTA
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CTTTGATAAATGATAGTACA

Figure 3

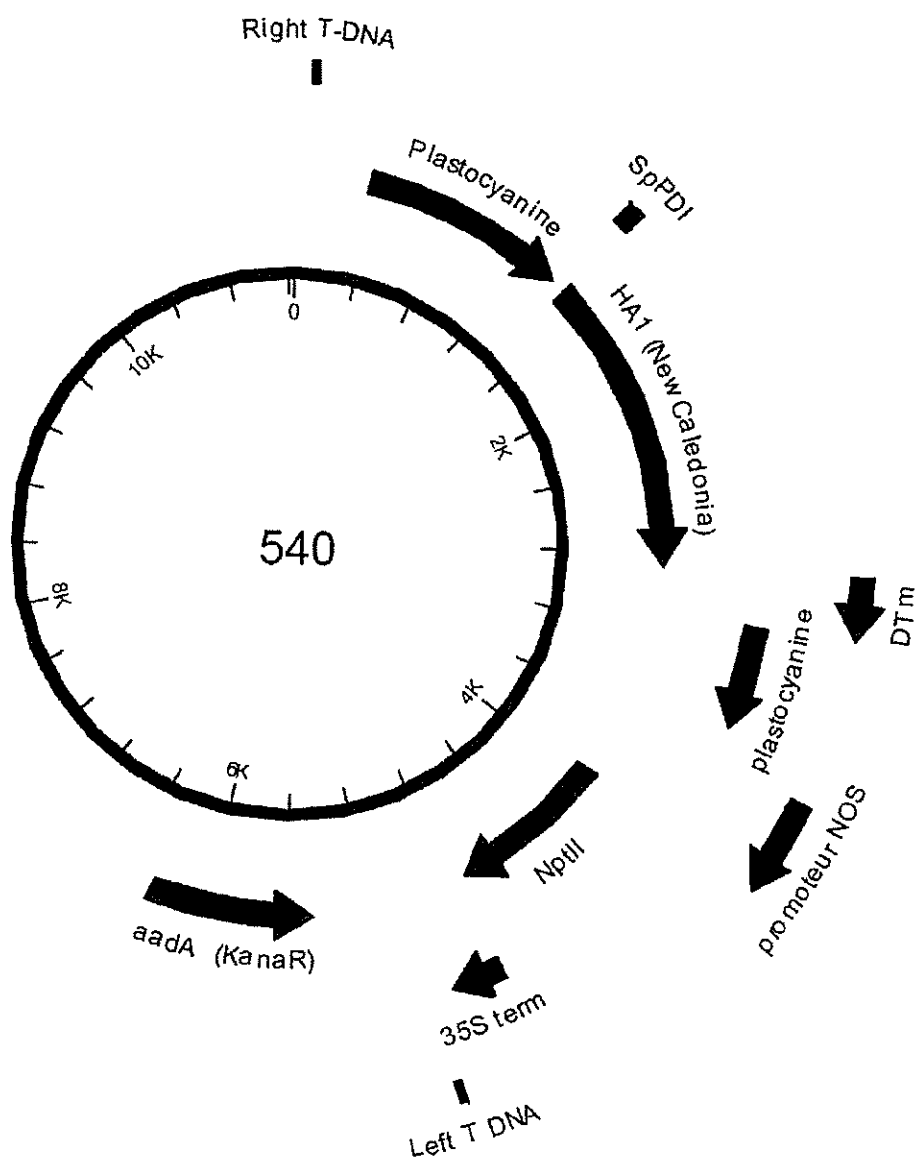


Figure 4

f

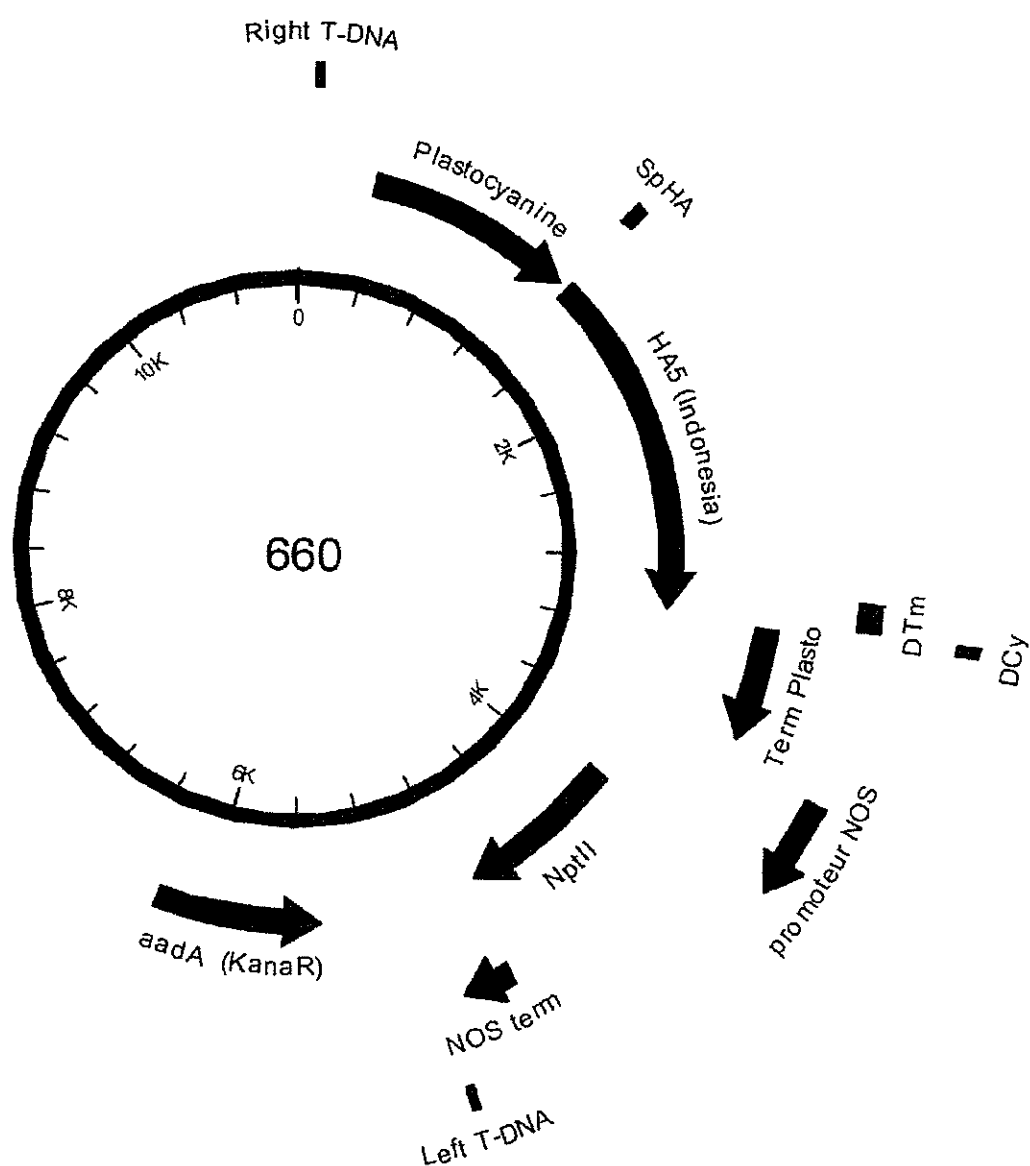


Figure 5

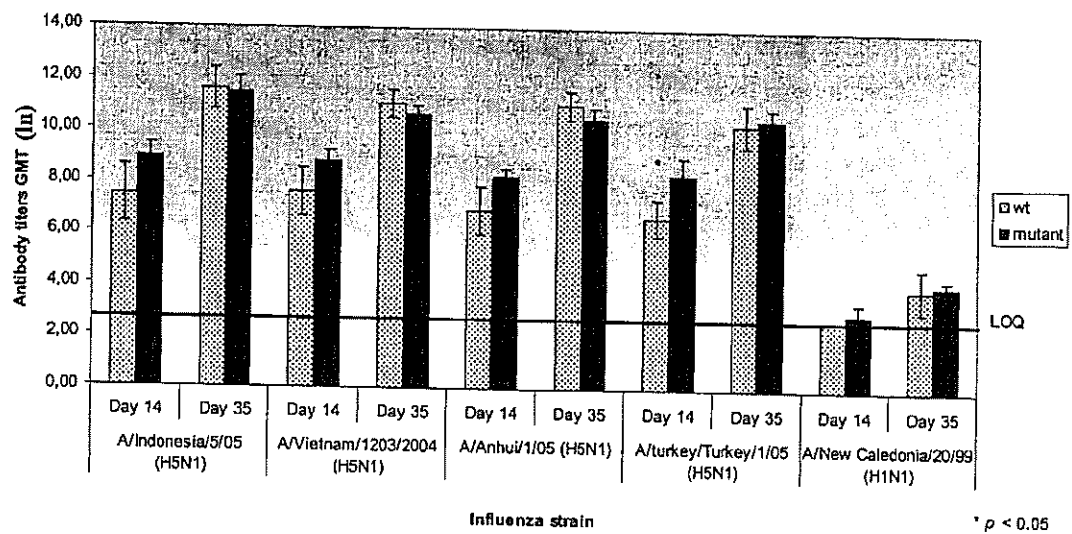


Figure 6
Antibody Titers against Whole Inactivated Viruses (WIV) after first and second dose.

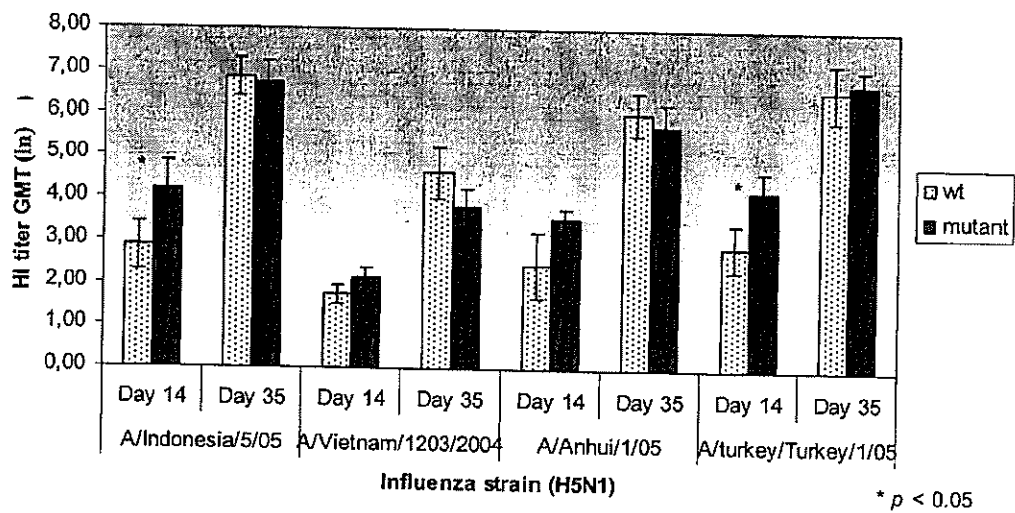


Figure 7
Hemagglutination-inhibition (HI) antibody titers after first and second dose.

SEQ ID NO. 1. HA0 from H1

AGATCTTCGCTGACACAATATGTATAGGCTACCATGCCAACAACCTCAACCGACACTGTTGACA
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GGATCTTAGGAAACCCAGAATGCGAATTACTGATTTCCAAGGAATCATGGTCCTACATTGTAG
AAACACCAAAATCCTGAGAATGGAACATGTTACCCAGGGTATTTGCGCGACTATGAGGAACTGA
GGGAGCAATTGAGTTCAGTATCTTCATTTGAGAGATTGCGAAATATTTCCCAAAGAAAGCTCAT
GGCCCAACCACACCGTAACCGGAGTATCAGCATCATGCTCCCATATGGGAAAAGCAGTTTTT
ACAGAAATTTGCTATGGCTGACGGGGAAGAATGGTTTGTACCCAAACCTGAGCAAGTCCTATG
TAAACAACAAAGAGAAAGAAGTCCTTGTACTATGGGGTGTTTCATCACCCGCCTAACATAGGGA
ACCAAAGGGCACTCTATCATACAGAAAATGCTTATGTCTCTGTAGTGTCTTCACATTATAGCAG
AAGATTCACCCCAAGAAATAGCCAAAAGACCCAAAGTAAGAGATCAGGAAGGAAGAATCAACTA
CTACTGGACTCTGCTGGAACCTGGGGATACAATAATTTGAGGCAATGGAAATCTAATAGC
GCCATGGTATGCTTTTGCCTGAGTAGAGGCTTTGGATCAGGAATCATCACCTCAAATGCACC
AATGGATGAATGTGATGCGAAGTGTCAAACACCTCAGGGAGCTATAAACAGCAGTCTTCCTTT
CCAGAATGTACACCCAGTCACAATAGGAGAGTGTCCAAAGTATGTCAGGAGTGCAAAATTAAG
GATGGTTACAGGACTAAGGAACATCCCATCCATTCAATCCAGAGGTTTGTGGAGCCATTGC
CGGTTTCATTGAAGGGGGGTGGACTGGAATGGTAGATGGGTGGTATGGTTATCATCATCAGA
ATGAGCAAGGATCTGGCTATGCTGCAGATCAAAAAAGTACACAAAATGCCATTAACGGGATTA
CAACAAGGTCAATTCTGTAATTGAGAAAAATGAACACTCAATTCACAGCTGTGGGCAAGAGT
TCAACAAATTGGAAAGAAGGATGGAAAACCTTAAATAAAAAAGTTGATGATGGGTTTCTAGACAT
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GAAACGGGTGTTTTGAGTTCATCACAAGTGTAAACAATGAATGCATGGAGAGTGTGAAAAATG
GTACCTATGACTATCCAAAATATTCGAAGAATCAAAGTTAAACAGGGAGAAAATTGATGGAG
TGAAATTGGAATCAATGGGAGTATACCAGATTCTGGCGATCTACTCAACTGTGCGCAGTTCCC
TGTTCTTTTGGTCTCCCTGGGGGCAATCAGCTTCTGGATGTGTTCCAATGGGTCTTTGCAGT
GTAGAATATGCATCTAAGAGCTCAGGCCT

Figure 8

SEQ ID NO. 2. subtype H2
 >gi|408516|gb|L11132.1|FLADE88HA Influenza A virus (A/herring gull/DE/677/88 (H2N8))
 hemagglutinin (HA) gene, complete cds

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AGCAAAAGCAGGGGTTATACCATAGACAACCAAGGCAAGACAATGGCCATCATTTATCTAATTTCTCTG
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CCAGAAATGTGATATACTTCTAACTGTGCCAGAAATGGTCATACATAATAGAAAAGAAAATCCAAGGAACG
GCTTGTGCTACCCAGGCAGTTTCAATGATATGAAGAATGAAGCATCTTATCAGCAGCGTGACACATTT
TGAGAAAGTAAAGATTCGCCAGAAATGATGACACAGCATACAACAACCTGGAGGTTTCACAGGCTTGC
GCAGACTATGCTGGTCCGTCAATCTTCCGGAACATGGTCTGTTGACAAAAGAAAGGTCGAATATATCCAA
TTGCCAAAAGATCTTACAACAATACAAGTGGGGAACAAATGCTGATCATTTGGGGGATACATCACCCCAA
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CGTGGACTATCTTAGATATATGGGACACAAATAAATTTTGAGAGTACTGGCAATCTAATTCACCCAGAATA
TGGTTTCAAAAATATCCAACGAGGTAGTTACAGGGATCATGAAAACAGAGGAAAACCTTGAAAACCTGCGAG
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GATTGAGTCAAGGGGATTGTTTGGGGCAATAGCTGGTTTATAGAGGGTGGATGGCAAGGAATGGTTGAT
GGTTGGTATGGGTATCATCACAGCAATGACCAGGGATCTGGGTATGCAAGAGATGAACACCCAAATTCGGAGCTGT
AGGCATTTGATGGAATCACCACAAGGTAAATTTCTGTGATCGAAAAGATGAACACCCAAATTCGGAGCTGT
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TTAAAAACACCCCTTGTCTTCTACT

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Figure 9

SEQ ID No. 3.
subtype H3

>BHB2107299|gb:EF473574|Symbol:HA|Name:hemagglutinin|Organism:Influenza A
virus A/Texas/32/2003|Segment:4|Subtype:H3|Host:Human
CAAAAACCTCCCGGAAATGACAACAGCACGGCAACGCTGTGCCTTGGGCACCATGCAGTACCAACGGAA
CGATAGTGAAACAATCACGAATGACCAAAATTGAAGTTACTAATGCTACTGAGCTGGTACAGAGTTCCTC
AACAGTGGAAATATGGGACAGTCCCTCATCAGATCCTTGATGGAGAAAACTGCACACACTAATAGATGCTCTA
TTGGGAGACCCCTCAGTGTGATGGCTTCCAAAATAAGAAAATGGGACCCTTTTGTGACGAGCAAAAGCCT
ACAGCAACTGTTACCCCTTATGATGTCCGGATTATGCCCTTCCCTTAGGTCACTAGTTGCCCTCATCCGGCAC
ACTGGAGTTTAAACAATGAAAGCTTCGATTGGACTGGAGTCACCTCAGAATGGAACAAGCTCTGCTTGCAAA
AGGAGATCTAATAAAAGTTTCTTTAGTAGATTGAATTGGTTGACCCACTTAAAAATACAAATACCCAGCAT
TGAACGTGACTATGCCAAACAATGAAAAATTTGACAAATTGTACATTTGGGGGGTTTACCACCCCGGTAC
GGACAGTGACCAAAATCAGCCTATATGCTCAAGCATCAGGAAGAATCACAGTCTCTACCAAAAGAGCCAA
CAAACTGTAAATCCCGAATATCGGATCTAGACCCAGGGTAAGGGATGTCTCCAGCCCGAAATAAGCATCTATT
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CTTCAAAAATACGAAGTGGGAAAAGCTCAATAATGAGATCAGATGCACCCCATTTGGCAAAATGCCAATTCCGAA
TGCATCACTCCAAATGGAAGCATTTCCAAATGACAAAACCATTTCAAAAATGTAAACAGGATCACATATGGGG
CCTGTCCAGATATGTTAAGCAAAACACTCTGAAATTTGGCAACAGGATGCGAAATGTACCAGAGAAACA
AACTAGAGGCATATTTGGCCCAATCGCGGGTTTCATAGAAAAATGGTTGGGAGGGAATGGTGGACGGTTGG
TACGGTTTCAGGCATCAAAAATTTCTGAGGGGCACAGGA

Figure 10

SEQ ID NO. 4.
 subtype H4
 >BHB1050162|qb:DQ021859|Symbol:HA|Name:hemagglutinin|Organism:Influenza A Virus
 A/mallard/MN/33/00|Segment:4|Subtype:H4|Host:Avian

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 CAGAAATGGGATGCTTTCATAGAACGACCCACTGCTGTGGACACTTGTATCCATTGATGTGCCGGATTA
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 ACAGTCAAAACAAATGGGAAATCCGGAGCATGCAAAAGAGCAAAATGTGAATGACTTTTTTCAACAGATTGA
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 AACCTGGGAGAGTAACCTGTTTCCACCAAAACCAAGTCAACAAAGTGTGGTACCAACACATTGGCAGTAGAC
 CATGGGTAAGAGGCCAAAGCGGCAGGATTAGCTTCTATTGGACAATTTGTGGAGCCAGGAGACCTTCATAGT
 CTTCAACACCATAGGGAATTTAATTGCTCCGAGAGTCAATACAGCTTAAACAGTCAAAAAGAGAGCACA
 ATTCTGAATACTGCAATTCCCATAGGATCTTGTGTAGTAAATGTCAACAGATAGGGGTTCAATCTCTA
 CAACCAAAACCCTTTCAGAACATCTCAAGAAATATCAATTGGGGACTGTCCCAAGTATGTCAAAACAGGGATC
 CTTGAAACTAGCTACAGGAATGAGGAAATATCCCTGAGAAAGCAACAGAGGCCTGTTTGGTGCAATTG

Figure 11

SEQ ID NO. 5.**subtype H5**

>BHB950029|gb:AF501235|Symbol:HA|Name:hemagglutinin|Organism:Influenza A Virus
A/duck/Shanghai/1/2000|Segment:4|Subtype:H5|Host:Avian

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TGTAAGTGTAGCTGGATGGCTCCTCGGAAACCTATGTGTGACGAATTCATCAATGTGCCGAATGGTCTT
ACATAGTGGAGAAGGCCAGTCCAGCCAATGACCTCTGTTACCCAGGGGATTTCACGACTATGAAGAACT
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CATGAAGCCTCATCAGGGGTGAGCGCAGCATGTCCATACCATGGGAAGCCCTCCTTTTTCAGAAATGTGG
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TTCTGGTTCTCATGGAAATGAGAGAACTCTAGACTTTCATGATTCAAATGTCAAGAACCTTTACAACAA
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GATAATGAATGTATGGAAAGTGTAAAAACGGGACGTATGACTACCCGAGTATTCAGAAGAAGCAAGAC
TAAACAGAGAGGAAATAAGTGGAGTAAATTTGGAATCAATGGGAACCTTACCAATACTGTCAATTTATTC
AACAGTGGCGAGTTCCTAGCACTGGCAATCATGGTAGCTGGTCTATCTTTATGGATGTGCTCAATGGG
TCGTTACAATGCAGAATTTGCATTTAA

Figure 12

SEQ ID NO. 6.
 subtype H6
 >BHB1049778|gb:DQ021667|Symbol:HA|Name:hemagglutinin|Organism:Influenza A Virus
 A/northern pintail/TX/828189/02|Segment:4|Subtype:H6|Host:Avian

ATGATTGCAATCATTTGTAATAGCGATACTGGCAGCAGCCGGAAAGTCAGACACAAGATCTGCATTTGGGTATC
 ATGCCAACAAATTCACAACACACAGGTGGATACGATACCTTGAGAAGAATGTAAACCGTCACACACTCAGTTGA
 ATTGCTGGAGAAATCAGAAAGGAAGAAAGATTCTGCAAGATCTTGAACAAGGCCCTCTCGACCTAAAGGGA
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 CCGCTGTGAATGCCAAAGAGGTGCAATTGATTATTACTGGTCTGTTTAAACCAGGAGAAACCTTGAA
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Figure 13

SEQ ID NO. 7.
subtype H7

>BHB940420|gb:AF071776|Symbol:HA|Name:hemagglutinin precursor|Organism:Influenza A
Virus A/chicken/New York/1995|Chromosome:4|Subtype:H7|Host:Avian

GACAAATATATGCTTTGGGCACCATGCTGTGGCAATGGAACAAAAAGTGAACACATTAAACAGAGAGGGGA
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GAGTTTACTCTGATTTGATAATTGAGCGAAGAGAACCGATGTGTGCTATCCCGGTAAATTCACAA
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CGGCCACAAGTGAATGGACAAATCAGGGAGAAATCGATTTTCACTGGCTACTCCTTGATCCCAATGACACAG
TGACCTTCACTTTCAATGGGGCATTCATAGCCCTGACAGGGCAAGTTTCTTTAGAGGAGAAATCACTAGG
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GCCCTCCTTTTGGCTACAGGAATGAGAAATGTTCCAGAGAAATCCAAAGCCAGAGGCCCTTTTGGAGCAAT
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CAAGGGGAAGGAATGCAGCTGACTACAAAGCAGCCCAATCTGCAATAGATCAGATCAGAGCAAAATTTGA
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AATAGGAAATGTCTAATTTGGACACGAGACGCAATGACTGAGGTATGTTCTGTAATGCTGAGCTGTTG
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GTGCACCATTTGATATAA

Figure 14

SEQ ID NO. 8.**subtype H8**

>gi|221317|dbj|D90304.1|FLAH8N4 Influenza A virus
(A/Turkey/Ontario/6118/68(H8N4)) gene for hemagglutinin precursor, complete
cds

ATGGA AAAAATTCATCGCAATAGCAACCTTGGCGAGCACAAATGCATACGATAGGATATGCATTGGGTACC
AATCAACAACCTCCACAGACACAGTGAACACTCTCATAGAACAGAATGTACCAGTCACCCAAACAATGGA
GCTCGTGGAAACAGAGAAACATCCCGCTTATTGTAACTGATTTAGGTGCCCCATTGGAAGTGGGAGAC
TGCAAGATTGAGGCAGTAATCTATGGGAACCCCAAGTGTGACATCCATCTGAAGGATCAAGGTTGGTCAT
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GAGGTTTGTCTTCTCCAGTGTGCATCTTACAAGAGAATAAGACTATTTGACTATTCCAGGTGGAATGTG
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GGTTGACCAAAAAGGAACAGACACTTATGACTTCAATGAAGGAGCTTATGTTAATAATGAAGATGGAGA
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AACACTTTGAGTAGTGTACTACTAACAATAAACAAGGCTTTCAACCAATATTTGGTCCCAGACCAT
TAGTAAGAGGACAGCAAGGGAGGATGGATTACTATTGGGGCATTCTGAAAAGAGGGGAGACTCTGAAGAT
CAGGACCAACGGAAATTTAATCGCACCTGAATTTGGCTATCTGCTCAAAGGTGAAAGCTACGGCAGAATA
ATTCAAAATGAGGATATACCCATCGGGAAGTGTAAACACAAAATGTCAAACATATGCGGGAGCAATCAATA
GCAGCAAACCCCTTTCAGAATGCAAGTAGGCATTACATGGGAGAATGTCCCAAATATGTGAAGAAGGCAAG
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TATAGTTGACAAGATGAACAGGGAGTTTGAAGTTGTGAATCATGAGTTCTCTGAAGTTGAAAAAGAATA
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GAGACTGTCAGCCAATGCAATAGATGCTGGGAACGGTTGCTTTGACATACTTCACAAATGCGACAATGAG
TGTATGGAACTATAAAGAACGGAACCTTACGATCATAAGGAATATGAAGAGGAGGCTAAACTAGAAAGGA
GCAAGATAAATGGAGTAAACTAGAAGAGAACACCACTTACAAAATCTTAGCATTACAGTACAGTGGC
GGCCAGTCTTTGCTTGGCAATCCTGATTGCTGGAGGTTTAACTCCTGGGCATGCAAAATGGATCTTGTAGA
TGCATGTTCTGTATTTGA

Figure 15

SEQ ID NO. 9.**subtype H9**

>BHB954830|gb:AM087218|Symbol:HA|Name:hemagglutinin|Organism:Influenza A Virus
A/shoveler/Iran/G54/03|Segment:4|Subtype:H9|Host:Avian

ATGGAAACAGTATCACTAATGACTATACTACTAGTAGCAACAGCAAGCAATGCAGACAAAATCTGCATCG
GCCACCAGTCAACAACTCCACAGAACTGTGGACACGCTAACAGAAACCAATGTTCTGTGACACATGC
CAAAGAATTGCTCCACACAGAGCACAATGGAATGCTGTGTGCAACAAATCTGGGACATCCCCTAATCTTA
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GGTCTACATCGTCGAAAGGTCATCAGCTGTAAATGGAACGTGTTACCCTGGGAATGTAGAGAACCCTAGA
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AGCGTGACAACAGAAGACTTAAATAGGATCTTCAAACCGATGGTAGGGCCAAGGCCCTTGTCATATGGTC
TGCAGGGAAGAATTAATTATTATTGGTCGGTACTAAAACCGAGCCAGACACTGCGAGTAAGATCCAATGG
GAATCTAATTGCTCCATGGTATGGACACATTCTTTCGGGAGGGAGCCATGGAAGAATCCTGAAGACTGAT
TTAAAAAGTAGTAATTGCGTAGTGCAATGTCAGACTGAAAAAGCGCGCTTAAACAGTACATTGCCGTTCC
ACAATATCAGTAAATATGCATTTGGAACTGTCCCAAATATGTTAGAGTTAAAGTCTCAAACCTGGCAGT
AGGGTTGAGGAACGTGCCTGCTAGATCAAGTAGAGGACTATTCCGAGCCATAGCTGGATTATAGAAGGA
GGTTGGCCAGGACTAGTCGCTGGTTGGTATGGTTTCCAGCATTCAAATGATCAAGGGGTTGGTATTGCGG
CAGATAGGGATTCAACTCAAAGGCAATTGATAGAATAACAACCAAGGTGAATAATATAGTCGACAAAAT
GAACAAACAATATGAAATAATTGATCATGAATTCAGTGAGGTTGAACTAGGCTCAACATGATCAATAAT
AAGATTGATGACCAAATACAAGACATATGGGCATATAATGCAGAGTTGCTAGTACTACTTGAAAACCAGA
AAACACTCGATGAGCATGACGCAAATGTGAAGA

Figure 16

SEQ ID NO. 10.
subtype H10

>gi|324365|gb|M21647.1|FLAMS84HA Influenza A virus
(A/chicken/Germany/N/1949 (H10N7)) hemagglutinin precursor, gene,
complete cds

AGCAAAAGCAGGGGTCAATGTACAAAGTAGTAGTAATAATGCGCTCCTTGGAGCAGTGAAAGGTCTT
GACAGAATCTGCCCTAGGACACCATGCGGTGGCCAAATGGAACCATTTGTGAAGACCTTTACAAATGAACAAG
AGGAAGTGACCAATGCTACTGAGACGGTAGAGAGCACAATTTGAATMAATTTGTGTATGAAAGCAAGAAG
CTACAAGGACTTGGGCAATGTACACCGGTAGGAATGTTGATAGGAACACCTGTTTGTGATCCGCACCTTG
ACCGGACCTGGGACACTCTCATTTGAGCGAGAGAATGCCATTTGCCACTGTTTATCCAGGGCAACCATAA
ATGAAGAAGCATTTGAGCAGAAAATAATGGAAGTGGAGGAATCAGCAAGATGAGCACTGGCTTCACCTTA
TGGTCTTCCATCACTCAGCTGGGACCACTAAGGCATGCATGAGAAATGGAGGAGATAGTTTCTATGCA
GAGTCAATGGCTAGTTCAAAGACAAAGGGACAAAATTTCCCTCAGACAAACACCATTCGGAATA
CGGACACAGCAGAACATCTCATATAATGSGGAATTCATCACCTTCCAGCACACAGGAAAAGAAATGACTT
ATACGGAATCAGTCACTATCTATATCATGTTGAGAGTTCTACATATCAGAACAACTTTGTTCCAGTTGTT
GGGCAAGACCTCAGTCAATGGACAAAGTGGGGAATTGACTTTCATGGACACTAGTACAGCCGGTG
ACAACATACTTCTCAGACAAATGGAGGTCTAATAGCACCAAGTCGAGTTAGCAAAATTAACCTGGAAGGGA
TTTGGGAATCCAAATCAGAAAGCGTTGATAGACAAACAGTTGTGAATCCAAATGCTTTTGGAGAGGGGTTCT
ATAATACAAAGTCCCTTTTCAAAATCTGTACCCAGAACAGTAGTCAATGCCCAAAATACGTAATC
AGAGAGTTTACTGCTTGCAACASGGATGAGGAATGTGCCAGAAGTGGTGCAGGGAAGGGTCTGTTGG
TGCAATAGCAGGGTTCATAGAAAACGGATGGGAAGGAATGGTAGACGGCTGGTATGGTTTCAGACACCAA
AATGCCAGGGCACAGGCCAAGCTGCTGATTACAGAGTACTCAAGCAGCTATTGACCAAAATCACAGGGA
AACTGAACAGGTTGATTGAGAAGACCAACTGAGTTTGAGTCAATAGAACTGAAATTCAGTGAGACTGA
GCATCAAAATGGTAACTGTCATTAATTTGGACCAAGATTCAAATACCGACATTTGGACTTACACCGCAGAG
CTATTAGTGGCAATGGAGAAATCAGCACACAATTTGACATGGCTGANTCAGAGATGCTAAATCTGTATGAA
GGTAAAGAAAGCAACTCAGACAGAAATGCAGAGAAGACGGAAGGGAATGTTTGGATATATCATACACTG
TGATGATTCGTGCATGGAGAGTATAAGGAACAATACTTATGACCAATTCACAAATCAGAGAGGAGGCTCTT
CTGAATAGACTGAACATCAACCACTGAACTTTCTTGGGGTACAAAGACATCATCTTTGGTTTAGCT
TCGSGGAATCATGCTTGTCTTCTAGCCGTTGTTATGGGTCTTGTCTTCTGCTGCAAAAATGGAAA
CATGCGATGCACAAATCTGTATTTAGTTTAAAAACACCTTGTCTTCTACT

Figure 17

SEQ ID NO. 11.
subtype H11

>gi|221307|dbj|D90306.1|FLA/HAH1N Influenza A virus (A/duck/England/56(H1N6)) gene for hemagglutinin precursor, complete cds

ATGGAGAAAAACACCTGCTATTTGACGCTATTTTCCCTIIIGTGTAAGCAGATGAGATCTGTATCGGGTATT
 TAAGCAACAACCTCGACAGACAAAGTTGACACAATAATTTGAGAACAAATGTCACGGTCACCTAGCTCAGTGGA
 ACTGGTTGAGACAGAACACACTGGATCATTCIGTTCAATCAATGGAATAACCAATTAAGCCTTGGAGAT
 TGTTCATTTGCTGGATGGATATTAGGAACCCCTATGTTGATGAACTTAATTTGAAAGACTTCATGGTCTT
 ACATTTGTGGAATAACCCCAATCCAACAATGGAATCTGTTACCCAGGAACCTTAGAGAGTGAAGAAGAACT
 AAGACTGAAATTCAGTGGAGTTTGTAGAATTTAACAATTCGAAGTATTCACATCAAAATGGATGGGTGCT
 GTAAATTCAGGAGTAGGAGTAACCGCTGCATGCAAAATTCGGGGTCTTAATTCCTTTTGAACATGG
 TATGGCTGATACACCAATCAGGAACATATCCTGTATAAAGAGAACCCTTAACAACACCAAGGGAGAGA
 TGTACTGATTTGTTGGGAATTCATCATCCIGTACACTGACAGAACATCAAGATCTGTATAAAAAGGAC
 AGCTCCTATGTAGCAGTGGTTTCAGAGACCTACAACAGAGATTCACTCCAGAAATCAACACTAGGCCCA
 GAGTCAATGGACAGGCCGGAACGATGACATTCCTACTGGAAGATAGTCAAAACAGGAGAAATCAATAACATT
 CGAATCTAATGGGGCGTTCCTAGCTCCTAGATAATGCTTTTGGAGATTGCTCTGTTGGAATGGGAACTG
 TTCAGGAGCGAACTGAACATTTGAATCATGCTCTACCAAAATGTCAAAACAGAPATAGGAGGAATTAATACGA
 ACAAAAGCTTCCACAATGTTCAACAGAAACACIATCGGGGATTCGCCAAGTATGTGAATGTCAAAATCCTT
 AAAGCTTGCAACAGGACCTAGAAATGTCCAGCAATAGCATCGAGAGGCTTGTGGAGCAATAGCTGGA
 TTCATAGAAGGGGATGGCTGGACTGATCAATGGATGGTATGGTTCCAACACAGGGACGAAGAAGAA
 CAGGCATTCAGCAGACAAAGGAGTCRACTCAAAAGGCAATAGACCAGATAACATCCAAGGTAAATAACAT
 CGTTGACAGGATGAATACAACTTTGAGTCTGTGCAACACGAATTCAGTGAATAGAGGAAAGAAATAAT
 CAATTTACAAACACGTAGATGATTCGTGGTTGACATCTGGTCATATAATGCACAGCTTCTCGTTTAC
 TTGAAAATGAGAAGACACTGGACCTCCATGACTCAAAATGTCAAGGAACCTCCATGAGAAAAGTCAGAAGAAT
 GCTAAAGGACAAATGCCAAAGATGAGGGGAACGGATGCTTCACTTTTACCATAAGTGTGACAAATAATGC
 ATTGAACGAGTTAGAAACGGAACATAATGATCATAAAGAAATTCAGGAGGAATCAAAATCAATCGCCAGG
 AGATTGAAGGGTGAACCTAGATTCCTAGTGGAAATGTATAAATACTGTCAATTTACAGCTGCATTGC
 AAGCAGTCTTTGATTGGCAGCACTCATCATGGGCTTCATGTTTGGGCATGCAGTAATGGATCATGTAGA
 TGTACCAATTTGCATTAG

Figure 18

SEQ ID NO. 12.**subtype H12**

>gi|221309|dbj|D90307.1|FLAHAH12N Influenza A virus (A/duck/Alberta/60/76(H12N5)) gene for hemagglutinin precursor, complete cds

ATGGAAAAATTCATCATTTTGAGTACTGTCTTGGCAGCAAGCTTTGCATATGACAAAATTTGCATTGGAT
ACCAAACAAACAACCTCGACTGAAACGGTAAACACACTAAGTGAACAAAACGTTCCGGTGACGCAGGTGGA
AGAACTTGTACATCGTGGGATTGATCCGATCCTGTGTGGAACGGAAC TAGGATCACCCTAGTGCTTGAT
GACTGTTTCATTAGAGGGTCTAATCCTAGGCAATCCCAAATGTGATCTTTATTTTGAATGGCAGGGAATGGT
CATACATAGTAGAGAGGCCCAAAGAGATGGAAGGAGTTTGCTATCCAGGGTCAATTGAAAACCAGGAAGA
GCTAAGATCTCTGTTTCTTCCATCAAAAAATATGAAAGAGTGAAGATGTTTGAATTCACCAAATGGAAT
GTCACATACACTGGGACCAGCAAGGCCTGCAATAATACATCAAACCAAGGCTCATTCTATAGGAGCATGA
GATGGTTGACCTTAAATCAGGACAATTTCCAGTCCAAACAGATGAGTACAAGAACACCAGAGATTGAGA
CATTGTATTACCTGGGCCATTACCAACCCACCAACATCTGATGAACAAGTAAATTTATACAAAAATCCT
GATACTCTCTCTTCAGTCACCAACCGTAGAAATCAATAGGAGCTTCAAGCCTAATATAGGGCCAAGACCAC
TCGTGAGAGGACAACAAGGGAGAATGGATTACTACTGGGCTGTTCTTAAACCTGGACAAACAGTCAAAAT
ACAAACCAATGGTAATCTTATTGCACCTGAATATGGTCACTTAATCACAGGGAAATCACATGSCAGGATA
CTCAAGAATAATTTGCCCATGGGACAGTGTGTGACTGAATGTCAATTGAACGAGGGTGTAAATGAACACAA
GCAAACCTTTCCAGAACACTAGTAAGCACTATATTGGGAAATGCCCCAAATACATACCATCAGGGAGTTT
AAAATTGGCAATAGGGCTCAGGAATGTCCACAAAGTTCAAGATCGGGGGCTCTTTGGAGCAATTGCAGGT
TTCATAGAAGGCGGATGGCCAGGGCTAGTGGCTGGTTGGTACGGATTTGAGCATCAAAATGCGGAGGGGA
CAGGCATAGCTGCAGACAGAGACAGCACCCAAAGGGCAATAGACAATATGCAAAACAACTCAACAATGT
CATCGACAAAATGAATAAACAAATTTGAAGTGGTGAATCATGAGTTTTCAGAAGTGGAAGCAGAATAAAC
ATGATTAATTCCAAAATTGATGATCAGATACTGACATATGGGCATACAATGCTGAATTGCTTGCTCTAT
TGGAAAATCAGAAGACATTAGATGAGCATGACGCTAATGTAAGGAATCTACATGATCGGGTCAGAAGACT
CCTGAGGGAAAATGCAATTGACACAGGAGACGGCTGCTTTGAGATTTTACATAAATGTGACACAAATTGT
ATGGACACGATTAGAAACGGGACATACAATCACAAAGAGTATGAGGAAGAAAGCAAAATCGAACGACAGA
AAGTCAATGGTGTGAACTTGAGGAGAATTCTACATATAAAATTCTGAGCATCTACAGCAGTGTTCCTC
AAGCITAGTTCTACTGCTCATGATTATTGGGGGTTTCATTTTCGGGTGTCAAAATGGAAATGTTCTGTGT
ACTTTCTGTATTTAA

Figure 19

SEQ ID NO. 13.**subtype H13**

```
>gi|221311|dbj|D90308.1|FLAH13N Influenza A virus  
(A/Gull/Maryland/704/77(H13N6)) gene for hemagglutinin precursor, complete cds  
ATGGCTCTAAATGTCATTGCAACTTTGACACTTATAAGTGTATGTGTACATGCAGACAGAATATGCGGTGG  
GGTATCTGAGCACCAATTCATCAGAAAGGGTCGACACGCTCCTTGAAAATGGGGTCCCAGTCACCAGCTC  
CATTGATCTGATTGAGACAAACCACACAGGAACATACTGTTCTCTAAATGGAGTCAGTCCAGTGCATTTG  
GGAGATTGCAGCTTTGAAGGATGGATTGTAGGAAACCCAGCCTGCACCAGCAACTTTGGGATCAGAGAGT  
GGTCATACCTGATTGAGGACCCCGCGCCCCCTCATGGGCTTTGCTACCCTGGAGAATTAAACAACAATGG  
TGAATCAGACACTTGTTCAGTGAATCAGGTCATTAGTAGAACGGAATTGATCCACCTACCTCCTGG  
GGGGAAGTACTTGACGGTACAACATCTGCTTGCAGAGATAACACGGGAACCAACAGCTTCTATCGAAATT  
TAGTTTGGTTTATAAAGAAGAATACTAGATATCCAGTTATCAGTAAGACCTACAACAATACAACGGGAAG  
GGATGTTTTAGTTTTATGGGGAATACATACCCAGTGTCTGTGGATGAGACAAAGACTCTGTATGTCAAT  
AGTGATCCATACACACTGGTTTCCACCAAGTCTTGGAGCGAGAAATATAAACTAGAAACGGGAGTCCGAC  
CTGGCTATAATGGACAGAGGAGCTGGATGAAAATTTATTGGTCTTTGATACATCCAGGGGAGATGATTAC  
TTTCGAGAGTAATGGTGGATTTTTCAGCCCCAAGATATGGGTACATAATTGAAGAATATGGAAAAGGAAGG  
ATTTTCAGAGTGCATCAGAAATGTCTAGGTGCAACACCAAGTGCCAGACTTCGGTTGGAGGGATAAACA  
CAAACAGAACGTTCCAAAACATCGATAAGAATGCTCTTGGTGACTGTCCCAAATACATAAACTCTGCCCA  
ACTCAAGCTAGCCACTGGACTCAGAAATGTGCCAGCTATATCGAATAGAGGATTGTTTCGGAGCAATTGCA  
GGGTTCATAGAAGGAGGCTGGCCAGGTTTAATCAATGGTTGGTACGGTTTTTCAGCATCAAAATGAACAGG  
GAACAGGAATAGCTGCAGACAAAGAATCAACACAGAAAGCTATAGACCAGATAACAACCAAAATAAATAA  
CATTATTGATAAAATGAATGGGAATATGATTCAATTAGGGGTGAATTCAATCAAGTTGAGAAGCGTATA  
AACATGCTTGCAGACAGAATAGATGATGCCGTGACGGACATTTGGTCATACAATGCCAAACTTCTTGAT  
TGCTGAAAATGATAAACTTTAGATATGCATGATGCTAATGTAAAGAATTTACATGAGCAAGTACGAAG  
AGAATTGAAGGACAATGCAATTGACGAAGGAAATGGCTGTTTTGAACTCCTTCATAAATGCAATGACTCC  
TGATGGAAACTATAAGAAATGGAACGTATGACCACACTGAGTATGCAGAGGAGTCAAAGTTAAAGAGGC  
AAGAAATCGATGGGATCAAATCAAATCAGAAGACAACGTTTACAAAGCATTATCAATATACAGTTGCAT  
TGCAAGTAGTGTGTACTAGTAGGACTCATACTCTCTTTCATCATGTGGGCCTGTAGTAGTGGGAATTGC  
CGATTCAATGTTTGTATATAA
```

Figure 20

SEQ ID NO. 14.**subtype H14**

>gi|324045|gb|M35997.1|FLAH1424 Influenza A/Mallard/Gurjev/263/82
hemagglutinin subtype H14 gene

AGCAAAAGCAGGGGAAAATGATTGCACTCATATTGGTTGCACTGGCTCTGAGCCACACTGCTTATTCTCA
GATCACAATGGGACAACAGGAAACCCATTATATGCTTGGGGCATCATGCAGTGGAAAACGGCACATCT
GTTAAAACACTAACAGACAATCAGTAGAAGTTGTGTGCTAGCTAAAGAATTAGTTGAGACGAACCACACTG
ATGAACTGTGCCAAGCCCCTTGAAGCTTGTGACGGGCAAGACTGCCACCTCATCAATGGTGCATTGGG
GAGTCCAGGCTGTGACCGTTTGCAGGACACCACTTGGGATGTCTTCATTGAAAGGCCCACTGCAGTAGAC
ACATGTTATCCATTGACGTCCCAGATTACCAGAGTCTCAGAAGCATCCTAGCAAGCAGTGGGAGTTTGG
AGTTCATCGCCGAACAATTCACCTGGAATGGTGTCAAAGTTGACGGATCAAGCAGTGCTTGTTTGAGGGG
CGGTCGCAACAGCTTCTTCTCCCGACTAACTGGCTAACCAAAGCAACAATGGAACTATGGACCTATT
AACGTCCTAAAGAAAATACGGGCTCTTATGTGACGGCTCTATCTCTGGGGAGTGCATCACCCATCAAGCG
ATAATGAGCAAACGGATCTCTACAAGGTGGCAACAGGGAGAGTAACAGTATCTACCCGCTCGGACCAAAT
CAGTATTGTTCCCAATATAGGAAGTAGACCGAGGGTAAGGAATCAGAGCGGCAGGATAAGCATCTACTGG
ACCCTAGTAACCCAGGGGACTCCATCATTTTCAACAGTATTGGGAATTTGATTGCACCAAGAGGCCACT
ACAAAATAAGCAAATCTACTAAGAGCACAGTGCTTAAAGTGACAAAAGGATTGGGTGATGCACAAGCCC
TTGCTTAACTGATAAAGGTTGATCCAAAGTGACAAACCTTTTCAGAATGTATCAAGGATTGCTATAGGA
AACTGCCCCGAAATATGTAAAGCAAGGGTCCCTGATGTTAGCAACTGGAATGCGCAACATCCCTGGCAAAC
AGGCAAAGGGCTTATTTGGGGCAATTGCTGGATTCAATTGAAAATGGTTGGCAAGGCCTGATTGATGGGTG
GTATGGATTGAGGCACCAAAATGCTGAAGGAACAGGAACTGCTGCAGACCTGAAGTCAACTCAGGCAGCC
ATTGATCAGATAAATGGCAAGCTGAACAGATTGATAGAGAAGACAAATGAAAATATCACCAAATAGAAA
AGGAATTGCAACAGGTGGAAGGAAGAATACAAGACCTTGAGAAGTACGTTGAGGACACTAAGATTGATTT
GTGGTCATACAATGCTGAATTGCTAGTAGCACTAGAGAATCAGCACACAATAGATGTCACAGACTCCGAA
ATGAACAAGCTTTTTGAAAGAGTAAGAAGGCAATTAAGAGAGAATGCAGAAGATCAAGGCAACGGTTGTT
TCGAGATATTCCATCAGTGTGACAACAATTGTATAGAAAGCATTAGAAACGGAACCTTATGACCACAACAT
CTACAGGGATGAAGCCATCAACAATCGAATCAAAATAAATCCTGTCACTTTGACGATGGGGTACAAGGAC
ATAATCCTGTGGATTCTTTCTCCATGTCATGCTTTGTCTTCGTGGCACTGATTCTGGGATTTGTTCTAT
GGGCTTGTCAAACGGGAATATCCGATGCCAAATCTGTATATAAAGAAAAAACACCCCTTGTCTTCTACTC

Figure 21

SEQ ID NO. 15.**subtype H15**

>gi|1226068|gb|L43916.1|FLAHEMAC Influenza A/duck/Australia/341/83 (H15N8) hemagglutinin mRNA, complete cds

AGCAAAAGCAGGGGATACAAAATGAACACTCAAATCATCGTCATTCTAGTCCTCGGACTGTCGATGGTGA
GATCTGACAAGATTTGTCTCGGGCACCATGCCGTAGCAAATGGGACAAAAGTCAACACACTAACTGAGAA
AGGAGTGGAAGTGGTCAATGCCACGGAGACAGTGGAGATTACAGGAATAAATAAAGTGTGCACAAAAGGG
AAGAAAGCGGTGGACTTGGGATCTTGTGGAATACTGGGAACTATCATTGGGCCTCCACAATGTGACTCTC
ATCTTAAATTCAAAGCTGATCTGATAATAGAAAAGAAGAAATTCAAGTGACATCTGTTACCCAGGGAAATT
CACTAATGAGCAAGCACTGAGACAAATAATCAGAGAATCTGGTGGAAATTGACAAAGAGCCAAATGGGATTT
AGATATTGAGGAATAAAACAGACGGGGCAACCACTGCGTGTAAAGAGAACAGTGTCTCTTTCTACTCAG
AAATGAAATGGCTTTTATCCAGCAAGGCTAACCAAGTGTTCACCAACTGAATCAGACATACAGGAACAA
CAGAAAAGAACCAGCCCTAATTGTTTGGGGAGTACATCATTCAAGTTCCTTGGATGAGCAAAATAAGCTA
TATGGAGCTGGGAACAAGCTGATAACAGTAGGAAGCTCAAAATACCAACAATCGTTTTCACCAAGTCCAG
GGGACAGGCCCAAAGTGAATGGTCAGGCCGGGAGGATCGACTTTCATTGGATGCTATTGGACCCAGGGGA
TACAGTCACTTTACCTTCAATGGTGCATTATAGCCCCAGATAGAGCCACCTTTCTCCGCTCTAATGCC
CCATCGGGAGTTGAGTACAATGGGAAGTCACTGGGAATACAGAGTGATGCACAAATTGATGAATCATGTG
AAGGGGAATGCTTCTACAGTGGAGGGACAATAAACAGCCCTTTGCCATTTCAAACATCGATAGTTGGGC
TGTCCGAAGGTGCCCCAGATATGTAAAGCAATCAAGCCTGCCGCTGGCCTTAGGAATGAAAAATGTACCA
GAGAAAATACATACTAGGGGACTGTTCCGGTGCAATTGCAGGATTCATCGAGAATGGATGGGAAGGACTCA
TTGATGGATGGTATGGATTTAGGCATCAAAATGCACAGGGGCAGGGAACAGCTGCTGACTACAAGAGTAC
TCAGGCTGCAATTGACCAGATAACAGGGAACTTAATAGATTAATTGAAAAAACCAACACAGTTTGAA
CTCATAGACAATGAGTTCAGTGAAGTGGAGCAGCAGATAGGCAATGTAATAAACTGGACAAGGGACTCCT
TGACTGAGATCTGGTCATACAATGCTGAACTTCTAGTAGCAATGGAAAATCAGCATACAATTGACCTTGC
AGATTCTGAAATGAACAACTCTATGAGAGAGTGAGAAGACAGCTAAGGGAGAATGCCGAGGAGGATGGA
ACTGGATGTTTTGAGATTTTCCACCGATGTGACGATCAATGTATGGAGAGCATACGAAATAATACTTACA
ATCACACTGAATATCGACAGGAAGCCTTACAGAATAGGATAATGATCAATCCGGTAAAGCTTAGTGGTGG
GTACAAAGATGTGATACTATGGTTTAGCTTCGGGGCATCATGTGTAATGCTTCTAGCCATTGCTATGGGT
CTTATTTTCATGTGTGTGAAAAACGGGAATCTGCGGTGCACTATCTGTATATAATTATTTGAAAAACACC
CTTGTTTCTACT

Figure 22

SEQ ID NO. 16.**subtype H16**

>gi|56425020|gb|AY684891.1| Influenza A virus (A/black-headed gull/Sweden/5/99(H16N3)) hemagglutinin (HA) gene, complete cds

AGCAAAAGCAGGGGATATTGTCAAAACAACAGAATGGTGATCAAAGTGCTCTACTTTCTCATCGTATTGT
TAAGTAGGTATTCGAAAGCAGACAAAATATGCATAGGATATCTAAGCAACAACGCCACAGACACAGTAGA
CACACTGACAGAGAACGGAGTTCCAGTGACCAGCTCAGTTGATCTCGTTGAAACAAACCACACAGGAACA
TACTGCTCACTGAATGGAATCAGCCCAATTCATCTTGGTGACTGCAGCTTTGAGGGATGGATCGTAGGAA
ACCCCTTCCTGTGCCACCAACATCAACATCAGAGAGTGGTCTGATCTAAITGAGGACCCCAATGCCCCAA
CAAACCTCTGCTTCCCAGGAGAGTTAGATAATAATGGAGAATTACGACATCTCTCAGCGGAGTGAACTCT
TTTAGCAGAACAGAATTAATAAGTCCCAACAAATGGGGAGACATTCTGGATGAGAGTCACCGCTTCTTGCC
GCGATAATGGGGCAAGCAGTTTTTACAGAAATTTGGTCTGGATAGTGAAGAATAAAAATGGAAAATACCC
TGTCATAAAGGGGGATTACAATAACACAACAGGCAGAGATGTTCTAGTACTCTGGGGCATTACCATCCG
GATACAGAAACAACAGCCATAAACTTGTACGCAAGCAAAAACCCCTACACATTAGTATCAACAAAGGAAT
GGAGCAAAAGATATGAACTAGAAATTGGCACCAGAATAGGTGATGGACAGAGAAGTTGGATGAAACTATA
TTGGCACCTCATGCGCCCTGGAGAGAGGATAATGTTTGAAAGCAACGGGGGCCCTTATAGCGCCAGATAC
GGATACATCATTGAGAAGTACGGTACAGGACGAATTTTCCAAAGTGGAGTGAGAATGGCCAAATGCAACA
CAAAGTGTCAAACATCATTAGGTGGGATAAACACCAACAAAACCTTTCCAAAACATAGAGAGAAATGCTCT
TGGAGATTGCCCAAAGTACATAAAGTCTGGACAGCTGAAGCTTGCAACTGGGCTGAGAAATGTCCCATCC
GTTGGTGAAAGAGGTTTGTGTTGGTGCAATTGCAGGCTTCATAGAAGGAGGGTGGCCTGGGCTAATTAATG
GATGGTATGGTTTCCAGCATCAGAATGAACAGGGGACTGGCATTGCTGCAGACAAAGCCTCCACTCAGAA
AGCGATAGATGAAATAACAACAAAAATTAACAATATAATAGAGAAGATGAACGGAAACTATGATTCAATA
AGAGGGGAATTCAATCAAGTAGAAAAGAGGATCAACATGCTCGCTGATCGACTGATGATGCAGTAACG
ACATATGGTTCGTACAATGCTAAACTTCTTGTACTGCTTGAAAATGGGAGAACATTGGACTTACACGACGC
AAATGTCAGGAACCTTACACGATCAGGTCAAGAGAATATTGAAAAGTAATGCTATTGATGAAGGAGATGGT
TGCTTCAATCTTCTTCACAAATGTAATGACTCATGCATGGAACTATTAGAAATGGGACCTACAATCATG
AAGATTACAGGGAAGAATCACAACTGAAAAGGCAGGAAATTGAGGGAATAAAATTGAAGTCTGAAGACAA
TGTGTATAAAGTACTGTCGATTTATAGCTGCATTGCAAGCAGTATTGTGCTGGTAGGTCTCATACTTGCG
TTCATAATGTGGGCATGCAGCAATGGAAATTGCCGGTTTAATGTTTGTATATAGTCGGAAAAAATACCC
TGTTTCTACT

Figure 23

SEQ ID NO. 17.

Sequence "wild type"660

GATCAGATTTGCATTGGTTACCATGCAAACAATTCAACAGAGCAGGTTGACACAATCATGGAA
 AAGAACGTTACTGTTACACATGCCCAAGACATACTGGAAAAGACACACAACGGGAAGCTCTGC
 GATCTAGATGGAGTGAAGCCTCTAATTTTAAGAGATTGTAGTGTAGCTGGATGGCTCCTCGGG
 AACCCAATGTGTGACGAATTCATCAATGTACCGGAATGGTCTTACATAGTGGAGAAGGCCAAT
 CCAACCAATGACCTCTGTTACCCAGGGAGTTTCAACGACTATGAAGAACTGAAACACCTATTG
 AGCAGAATAAACCATTTTGAGAAAATTCAAATCATCCCCAAAAGTTCTTGGTCCGATCATGAA
 GCCTCATCAGGAGTTAGCTCAGCATGTCCATACCTGGGAAGTCCCTCCTTTTTAGAAATGTGG
 TATGGCTTATCAAAAAGAACAGTACATACCCAACAATAAAGAAAAGCTACAATAATACCAACC
 AAGAGGATCTTTTGGTACTGTGGGGAATTCACCATCCTAATGATGCGGCAGAGCAGACAAGGC
 TATATCAAAACCCAACCACTATATTTCCATTGGGACATCAACACTAAACCAGAGATTGGTAC
 CAAAAATAGCTACTAGATCCAAAGTAAACGGGCAAAAGTGGAAGGATGGAGTTCTTCTGGACA
 ATTTTAAAACCTAATGATGCAATCAACTTCGAGAGTAATGGAAATTTTCATTGCTCCAGAATAT
 GCATACAAAATTGTCAAGAAAGGGGACTCAGCAATTATGAAAAGTGAATTGGAATATGGTAA
 CTGCAACACCAAGTGTCAAACTCCAATGGGGGCGATAAACTCTAGTATGCCATTCCACAACAT
 ACACCCTCTCACCATCGGGGAATGCCCAAATATGTGAAATCAAACAGATTAGTCCTTGCAAC
 AGGGCTCAGAAATAGCCCTCAAAGAGAGAGCAGAAGAAAAAGAGAGGACTATTTGGAGCTA
 TAGCAGGTTTTATAGAGGGAGGATGGCAGGGAATGGTAGATGGTTGGTATGGGTACCACCAT
 AGCAATGAGCAGGGGAGTGGGTACGCTGCAGACAAAGAATCCACTCAAAGGCAATAGATGG
 AGTCACCAATAAGGTCAACTCAATCATTGACAAAATGAACACTCAGTTTGAGGCCGTTGGAAG
 GGAATTTAATAACTTAGAAAGGAGAATAGAGAATTTAAACAAGAAGATGGAAGACGGGTTTC
 TAGATGTCTGGACTTATAATGCCGAACCTCTGGTTCTCATGGAAAATGAGAGAACTCTAGACT
 TTCATGACTCAAATGTAAAGAACCTCTACGACAAGGTCCGACTACAGCTTAGGGATAATGCAA
 AGGAGCTGGGTAACGGTTGTTTCGAGTTCTATCACAAATGTGATAATGAATGTATGGAAAGTA
 TAAGAAACGGAACGTACAACATATCCGCAGTATTCAGAAGAAGCAAGATTAAAAAGAGAGGAA
 ATAAGTGGGGTAAAATTGGAATCAATAGGAACTTACCAAATACTGTCAATTTATTCAACAGTG
 GCGAGTTCCCTAGCACTGGCAATCATGATGGCTGGTCTATCTTTATGGATGTGCTCCAATGGAT
 CGTTACAATGCAGAATTTGCATT

Figure 24Plast-443c (25 mers) **SEQ ID NO. 18**

5'- GTATTAGTAATTAGAATTTGGTGTGTC-3'

Figure 25AHA5-T156A.r (50-mers) **SEQ ID NO. 19**

5'-TTGTAGCTTTTCTTTATTGTTGGGTATGCACTGTTCTTTTGGATAAGCCA-3'

Figure 25BHA5-T167A.c (50-mers) **SEQ ID NO. 20**

5'-ACCCAACAATAAAGAAAAGCTACAATAATGCCAACCAAGAGGATCTTTTG-3'

Figure 25C

HA5-S288A.r (50 mers) **SEQ ID NO. 21**

5'-GTGAGAGGGTGTATGTTGTGGAATGGCATAGCAGAGTTTATCGCCCCCAT-
3'

Figure 25D

HA5-S288A.c (50 mers) **SEQ ID NO. 22**

5'-ATGGGGGCGATAAACTCTGCTATGCCATTCCACAACATACACCCTCTCAC-
3'

Figure 25E

HA(Ind)-SacI.r (38 mers) **SEQ ID NO. 23**

5'-ACTTTGAGCTCTTAAATGCAAATTCTGCATTGTAACGA-3'

Figure 25F

SEQ ID NO. 24.

5'-AGTTCCCCGGGCTGGTATATTTATATGTTGTC-3'

Figure 25G

SEQ ID NO. 25.

5'-AATAGGAGCTCCATTTTCTCTCAAGATGATTAATTAATTAATTAGTC-3

Figure 25H

SEQ ID NO. 26.

5'-AATAGGAGCTCGTAAATGCTTCTTCGTCTCCTATTTATAATATGG-3'

Figure 25I

SEQ ID NO. 27.

5'-
TTACGAATTCTCCTTCCTAATTGGTGTACTATCATTTATCAAAGGGGA-3'

Figure 25J

SEQ ID. NO. 28

AAGCTTATGGAGAAATAGTGCTCTCTTGAATAGTCAGTCTTGTAAAGTGATCAGATTTGCATTGG
 TTACCATGCAACAATTCAACAGAGCAGGTTGACACAATCATGGAAGAACGTTACTGTTACACATGCC
 CAAGACATACTGGAAAGACACACACGGAAGCTCTGCGATCTAGATGGAGTGAAGCCTCTAATTTTA
 AGAGATTGTAGTAGCTGGATGGCTCTCGGAACCCCAATGTGTACGAATTCATCAATGTACCGGAA
 TGGCTTACATAGTGGAGAGGCCAATCCAACCAATGACCTCTGTTACCCAGGGAGTTTCAACGACTAT
 GAAGAACTGAAACACCTATTGAGCAGAAATAACCAATTTGAGAAATTCAAATCATCCCCAAAAGTTCTTG
 GTCCGATCATGAAGCCTCATCAGGAGTTAGCTCAGCATGTCCATACCTGGGAAGTCCCTCTTTTITAGA
 AATGTGTATGGCTTATCAAAAAGAACAGTACATACCCAACAATAAGAAAGCTACAATAATACCAACCA
 AGAGGATCTTTTGGTACTGTGGGAATTCACCATCTTAATGATCGGCAGAGCAGACAAGGCTATATCA
 AAACCCAAACCACTATATTCCATTGGGACATCAACACTAAACCAGAGATTGGTACCAAAATAGCTACT
 AGATCCAAAGTAAACGGGCAAGTGAAGGATGGAGTTCTTCTGGACAATTTTAAACCTAATGATGCAA
 TCAACTTCGAGAGTAATGGAAATTTTCATTGCTCCAGAAATATGCATACAAAATTTGTCAAGAAAGGGGACTC
 AGCAATTATGAAAAGTGAATTGGAATATGGTAATGTAAGTCAACACCAAGTGTCAAACTCCAATGGGGCGATA
 AACTCTAGTAGCCATTCCACAACATACACCCTCTCACCATCGGGGAATGCCCCAAATATGTGAATCAA
 ACAGATTAGTCCITGCAACAGGGCTCAGAAATAGCCCTCAAGAGAGAGAGCAGAAAGAAAGAGAGGAC
 TATTTGGAGCTATAGCAGGTTTTATAGAGGGAGGATGGCAGGGAATGGTAGATGGTTGGTATGGTACC
 ACCATAGCAATGAGCAGGGGAGTGGTACGCTGCAGACAAGAAATCCACTCAAAAGGCAATAGATGGA
 GTCACCAATAAGGTCAACTCAATCATTGACAAAATGAACACTCAGTTTGAGGCCGTTTGAAGGGAATTTA
 ATAACCTAGAAAAGGAGAAATAGAGAAATTTAAACAAGAAAGATGGAAGACGGGTTTCTAGATGTCTGGACTTA
 TAATGCCGAACCTTCTGGTTCTCATGGAAAATGAGAGAACTCTAGACTTTTCATGACTCAATGTTAAGAAC
 CTCACGACAAGGTCCGACTACAGCTTAGGGATAATGCAAGGAGCTGGGTAAACGGTTGTTTCGAGTTC
 TATCACAATGTGTAATGAATGTATGGAAAGTATAGAAACGGAACGTACAACACTCCGCAAGTATTCAG
 AAGAAGCAAGATTAAAAGAGAGGAAATAGTGGGGTAAATTTGGAATCAATAGGAACCTACCAAACTACT
 GTCAATTTATCAACAGTGGCGAGTCCCTAGCACTGGCAATCATGATGGCTGGTCTAICTTTATGGATG
 TGCTCCAAATGGATCGTTACAAATGCAGAAATTTGCATTAAAGAGCTC

Figure 26

SEQ ID No.29.

« Triple Mutant » sequence 680 (modifications with respect to sequence 660 appear in bold-underlined)

GATCAGATTTGCATTGGTTACCATGCAAACAATTCAACAGAGCAGGTTGACA
CAATCATGGAAAAGAACGTTACTGTTACACATGCCCCAAGACATACTGGAAAA
GACACACAACGGGAAGCTCTGCGATCTAGATGGAGTGAAGCCTCTAATTTTA
AGAGATTGTAGTGTAGCTGGATGGCTCCTCGGGAACCCAATGTGTGACGAAT
TCATCAATGTACCGGAATGGTCTTACATAGTGGAGAAGGCCAATCCAACCAA
TGACCTCTGTTACCCAGGGAGTTTCAACGACTATGAAGAACTGAAACACCTA
TTGAGCAGAATAAACCATTTTGAGAAAAATTCAAATCATCCCCAAAAGTTCTT
GGTCCGATCATGAAGCCTCATCAGGAGTTAGCTCAGCATGTCCATACCTGGG
AAGTCCCTCCTTTTTTAGAAATGTGGTATGGCTTATCAAAAAGAACAGT**GCAT**
ACCCAACAATAAAGAAAAGCTACAATAAT**GCCA**ACCAAGAGGATCTTTTGGT
ACTGTGGGGAATTCACCATCCTAATGATGCGGCAGAGCAGACAAGGCTATAT
CAAAACCCAACCACCTATATTTCCATTGGGACATCAACACTAAACCAGAGAT
TGGTACCAAAAATAGCTACTAGATCCAAAGTAAACGGGCAAAGTGGAAGGA
TGGAGTTCTTCTGGACAATTTTAAACCTAATGATGCAATCAACTTCGAGAGT
AATGGAAATTTCAATTGCTCCAGAATATGCATACAAAATTGTCAAGAAAGGGG
ACTCAGCAATTATGAAAAGTGAATTGGAATATGGTAACTGCAACACCAAGTG
TCAAACTCCAATGGGGGCGATAAACTCT**GCT**ATGCCATTCCACAACATACAC
CCTCTCACCATCGGGGAATGCCCCAAATATGTGAAATCAAACAGATTAGTCC
TTGCAACAGGGCTCAGAAATAGCCCTCAAAGAGAGAGCAGAAGAAAAAAGA
GAGGACTATTTGGAGCTATAGCAGGTTTTATAGAGGGAGGATGGCAGGGAAT
GGTAGATGGTTGGTATGGGTACCACCATAGCAATGAGCAGGGGAGTGGGTAC
GCTGCAGACAAAGAATCCACTCAAAAGGCAATAGATGGAGTCACCAATAAG
GTCAACTCAATCATTGACAAAATGAACACTCAGTTTGAGGCCGTTGGAAGGG
AATTTAATAACTTAGAAAGGAGAATAGAGAATTTAAACAAGAAGATGGAAG
ACGGGTTTCTAGATGTCTGGACTTATAATGCCGAACCTCTGGTTCTCATGGAA
AATGAGAGAACTCTAGACTTTTCATGACTCAAATGTTAAGAACCTCTACGACA
AGGTCCGACTACAGCTTAGGGATAATGCAAAGGAGCTGGGTAACGGTTGTTT
CGAGTTCTATCACAAATGTGATAATGAATGTATGGAAAGTATAAGAAACGGA
ACGTACAACCTATCCGCAGTATTCAGAAAGCAAGATTAAGAAAGAGAGGAA
ATAAGTGGGGTAAAATTGGAATCAATAGGAACTTACCAAATACTGTCAATTT
ATTCAACAGTGGCGAGTTCCCTAGCACTGGCAATCATGATGGCTGGTCTATCT
TTATGGATGTGCTCCAATGGATCGTTACAATGCAGAATTTGCATT

Figure 27

SEQ ID NO. 30.

5'-GTATTAGTAATTAGAATTTGGTGTC-3'

Figure 28A

SEQ ID NO. 31.

5'-GCAAGAAGAAGCACTATTTTCTCCATTTTCTCTCAAGATGATTA-3'

Figure 28B

SEQ ID NO. 32.

5'-TTAATCATCTTGAGAGAAAATGGAGAAAATAGTGCTTCTTCTTGC-3'

Figure 28C

SEQ ID NO. 33.

5'-ACTTT**GAGCTC**TTAAATGCAAATTCTGCATTGTAACGA-3'

Figure 28D

SEQ ID NO.34

Amino acid sequence of H5 from A/Vietnam/1194/04

DQICIGYHANNSTEQVDTIMEKNVTVTTHAQDILEKTHNGKLCDLDGVKPLILRDC
SVAGWLLGNPMCDEFINPEWSYIVEKANPVNDLCYPGDFNDYEELKHLLSRIN
HFEKIQHPKSSWSSHEASLGVSSACPYQGKSSFFRNVVWLIKKNSTYPTIKRSYNN
TNQEDLLVLWGIHPNDAAEQTKLYQNPTTYISVGTSTLNQRLVPRIATRSKVNG
QSGRMEFFWTILKPNDAINFESNGNFIAPYAYKIVKKGDSTIMKSELEYGNCNTK
CQTPMGAINSSMPFHNIHPLTIGECPKYVKSNRLVLATGLRNSPQRERRRKKRGLF
GAAGFIEGGWQGMVDGWYGYHHSNEQSGYAADKESTQKAIDGVTNKVNSII
DKMNTQFEAVGREFNNLERRIENLNKKMEDGFLDVWTYNAELLVLMENERTLD
FHDSNVKNLYDKVRLQLRDNAKELGNGCFEFYHKCDNECMESVRNGTYDYPQY
SEEARLKREEISGVKLESIGIYQILSIYSTVASSLALAIMVAGLSLWMCNGLQCRI
CI

Figure 29

SEQ ID NO.35

Nucleotide sequence of a gene coding for HA from strain B/Florida/4/2006

ATGAAGGCAATAATTGTACTACTCATGGTAGTAACATCCAATGCAGATCGAA
TCTGCACTGGAATAACATCTTCAAACCTCACCTCATGTGGTCAAAACAGCCACT
CAAGGGGAGGTCAATGTGACTGGTGTGATACCACTAACAACAACACCAACAA
AATCTTATTTTGCAAATCTCAAAGGAACAAGGACCAGAGGGAAACTATGCCC
AGACTGTCTCAACTGCACAGATCTGGATGTGGCTTTGGGCAGACCAATGTGT
GTGGGGACCACACCTTCGGCGAAGGCTTCAATACTCCACGAAGTCAAACCTG
TTACATCCGGGTGCTTTCCTATAATGCACGACAGAACAAAAATCAGGCAACT
ACCCAATCTTCTCAGAGGATATGAAAATATCAGGCTATCAACCCAAAACGTC
ATCGATGCGGAAAAGGCACCAGGAGGACCCTACAGACTTGGAACCTCAGGA
TCTTGCCCTAACGCTACCAGTAAGAGCGGATTTTTTCGCAACAATGGCTTGGGC
TGTCCCAAAGGACAACAACAAAAATGCAACGAACCCACTAACAGTAGAAGT
ACCATACATTTGTACAGAAGGGGAAGACCAAAATCACTGTTTGGGGGTTCCAT
TCAGATAACAAAACCCAAATGAAGAACCTCTATGGAGACTCAAATCCTCAAA
AGTTCACCTCATCTGCTAATGGAGTAACCACACACTATGTTTCTCAGATTGGC
AGCTTCCAGATCAAACAGAAGACGGAGGACTACCACAAAGCGGCAGGATT
GTTGTTGATTACATGATGCAAAAACCTGGGAAAAACAGGAACAATTGTCTACC
AAAGAGGTGTTTTGTTGCCTCAAAAGGTGTGGTGC GCGAGTGGCAGGAGCAA
AGTAATAAAAGGGTCCTTGCTTTAATTGGTGAAGCAGATTGCCTTCATGAAA
AATACGGTGGATTAAACAAAAGCAAGCCTTACTACACAGGAGAACATGCAA
AAGCCATAGGAAATTGCCCAATATGGGTGAAAACACCTTTGAAGCTCGCCAA
TGGAACCAATATAGACCTCCTGCAAAACTATTAAAGGAAAGGGGTTTCTTC
GGAGCTATTGCTGGTTTCCTAGAAGGAGGATGGGAAGGAATGATTGCAGGCT
GGCACGGATACACATCTCACGGAGCACATGGAGTGGCAGTGGCGGCGGACCT
TAAGAGTACGCAAGAAGCTATAACAAGATAACAAAAAATCTCAATTCTTTG
AGTGAGCTAGAAGTAAAGAATCTTCAAAGACTAAGTGGTGCCATGGATGAAC
TCCACAACGAAATACTCGAGCTGGATGAGAAAGTGGATGATCTCAGAGCTGA
CACTATAAGCTCGCAAATAGAACTTGCAGTCTTGCTTTCCAACGAAGGAATA
ATAAACAGTGAAGATGAGCATCTATTGGCACTTGAGAGAAAACTAAAGAAA
ATGCTGGGTCCCTCTGCTGTAGAGATAGGAAATGGATGCTTCGAAACCAAAC
ACAAGTGCAACCAGACCTGCTTAGACAGGATAGCTGCTGGCACCTTTAATGC
AGGAGAATTTTCTCTCCCCACTTTTGATTCACTGAACATTACTGCTGCATCTTT
AAATGATGATGGATTGGATAACCACTATACTGCTCTATTACTCAACTGCTG
CTTCTAGTTTGGCTGTAACATTGATGCTAGCTATTTTTATTGTTTATATGGTCT
CCAGAGACAACGTTTCATGCTCCATCTGTCTA

Figure 30A

SEQ ID NO.36

Amino acid sequence of mature HA from strain B/Florida/4/2006

DRICTGITSSNSPHVVKTATQGEVNVTGVIPLTTTPTKSYFANLKGTRTRGKLCPD
CLNCTDLVALGRPMC VGTTPSAKASILHEVKPVTSGCFPIMHDRTKIRQLPNLL
RGYENIRLSTQNVIDAEKAPGGPYRLGTSGSCP NATSKSGFFATMAWAVPKDNN
KNATNPLTVEVPYICTEGEDQITVWGFHSDNKTQMKNLYGDSNPQKFTSSANGV
TTHYVSQIGSFDPDQTEDGGLPQSGRIVVDYMMQKPGKTGTIVYQRGVLLPQKVW
CASGRSKVIKGSPLIGEADCLHEKYGGLNKS KPYTGEHAKAIGNCPIWVKTPL
KLANGTKYRPPAKLLKERGFFGAIAGFLEGGWEGMIAGWHGYTSHGAHGVA
ADLKSTQEAINKITKNLSLSELEVKNLQRLSGAMDELHNEILELDEKVDDL RAD
TISSQIELAVLLSNEGIINSEDEHLLALERKLKMLGPSAVEIGNGCFETKHKCNQT
CLDRIAAGTFNAGEFSLPTFDSL NITAASLNDDGLDNHTILLYYSTAASSLAVTLM
LAIFIVYMVSRDNVSCSICL

Figure 30B