SEQUENCE LISTING

<110> NOVARTIS AG

<120> VACCINATION WITH MULTIPLE CLADES OF H5 INFLUENZA A VIRUS

<130> P04976BW0

<140> PCT/IB2008/_____
<141> 2008-11-25

<150> US 61/004334
<151> 2007-11-26

<150> GB 0810305.3
<151> 2008-06-05

<160> 16

<170> SeqWin99, version 1.02

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<212> DNA
<213> Influenza A virus (A/Hong Kong/213/03)

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ggagtaaaat tggagtcaat aggaacttac caaatactgt caatttattc tacagtggcg 1620
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tcgttacaat gcagaatttg catttaa 1707

<210> 2
<211> 1707
<212> DNA
<213> Influenza A virus (A/Indonesia/5/05)

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actgttacac atgcccaaga catactggaa aagacacaca acgggaagct ctgcgatcta 180

gatggagtga agcctctaat tttaagagat tgtagtgtag ctggatggct cctcgggaac 240
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tcgttacaat gcagaatttg catttaa 1707

<210> 3
<211> 1654
<212> DNA
<213> Influenza A virus (A/Chicken/Hong Kong/SF219/01)

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acctatattt ccgttggaac atcaacacta aaccagagat tggtaccaaa aatagctact 660
agatccaaag taaacgggca aagtggaaga atggagttct tctggacaat tttaaagccg 720
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cctctcacca tcggggaatg ccccaaatat gtgaaatcaa acagattagt ccttgcgact 960
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atactgtcaa tttattcaac agtggcgagt tccctagcac tggcaatcat ggtagctggt 1620
ctatctttat ggatgtgctc caatggatcg ttac 1654

<210> 4
<211> 1668
<212> DNA

<213> Influenza A virus (A/chicken/Guiyang/441/2006)

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gatggagtga agcctctaat tttaagagat tgtagtgtag ctggatggct cctcggaaac 240
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catgaagcct cactaggggt gagctcagca tgtccatacc tgggggagtc ctccttttc 480
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aataatacca accaagaaga tcttttagta ttgtggggga tccatcaccc taatgatgcg 600
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ggagtaaaat tggaatcaat gggaacctac caaatactgt caatttactc aacagtggcg 1620
agttccctag cactggcaat catggtagct ggtctatctt tatggatg 1668

<210> 5
<211> 1698
<212> DNA
<213> Influenza A virus (A/duck/Guangxi/1681/2004)

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tcgttacaat gcagaatt 1698

<210> 6
<211> 1707
<212> DNA
<213> Influenza A virus (A/tree sparrow/Henan/4/2004)

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tcgttacaat gcagaatttg catttaa 1707

<210> 7
<211> 1707
<212> DNA
<213> Influenza A virus (A/chicken/Shanxi/2/2006)

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<210> 8
<211> 1707
<212> DNA
<213> Influenza A virus (A/Chicken/Henan/12/2004)

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ggaacgtatg actacccgca gtattcagaa gaagcaagac taaaaagaga ggaaataagt 1560
ggagtaaaat tggaatcaat aggaacttac caaatactgt caatttattc aacagtggcg 1620
agttccctag cactggcaat catggtagct ggtctatctt tatggatgtg ctccaatgga 1680
tcgttacaat gcagaatttg catttaa 1707

<210> 9
<211> 1695
<212> DNA
<213> Influenza A virus (A/duck/Guangxi/2775/2005)

<400> 9
atggagaaaa tagtgcttct tcttgcaata gtcagtcttg ttaaaagtga tcagatttgc 60
attggttacc atgcaaacaa ctcgacagag caggttgaca caataatgga aaagaacgtt 120
actgttacac atgcccaaga catactggaa aagacacaca atgggaagct ctgcgaccta 180
gatggggtga agcctctaat tttgagagat tgtagtgtag ctggatggct cctcgggaac 240
ccaatgtgtg acgaattcat caatgtaccg gaatggtctt acatagtgga gaaggccagt 300
ccagccaatg acctctgtta cccaggtgat ttcaacgatt atgaagaact gaaacaccta 360
ttgagcagaa taaaccattt tgagaaaatt cagatcatcc ccaaaagttc ttggcccaac 420
catgaagcct catcaggggt gagctcagca tgtccatacc tgggaaagcc ctccttttc 480
agaaatgtgg tatggcttat caaaaagaac agtgcatacc caacaataaa gaggagctac 540
aataatacca accaagaaga tcttttggta ctgtggggga ttcaccatcc taatgatgag 600
acagagcaga caaagctcta tcaaaaccca accacttata tttccgttgg aacatcaaca 660
ctaaaccaga gattggtacc aaaaatagct accagatcca aagtaaacgg gcaaagtgga 720
aggatggagt tcttctggac aattttaaaa ccgaatgatg caatcaactt cgagagtaat 780

ggaaatttca ttgctccaga atatgcctac aaaattgtca agaaagggga ctcagcaatt 840
atgaaaagtg aattggaata tggtaactgc aacaccaaat gtcaaactcc aatgggggcg 900
ataaactcta gtatgccatt ccacaacata caccctctca ccatcgggga atgccccaaa 960
tatgtgaaat caaacagatt agtccttgcg actgggctca gaaatagccc tcaaagggag 1020
agaagaagaa aaaagagagg actatttgga gctatagcag gttttataga gggaggatgg 1080
cagggaatgg tagatggttg gtacggatac caccatagca atgagcaggg gagtggatac 1140
gctgcagaca aagaatccac tcaaaaggca atagatggag tcaccaataa ggtcaactcg 1200
atcattgaca aaatgaacac tcagtttgag gccgttggaa gggaatttaa taacttagaa 1260
aggagaatag agaatttaaa caagaagatg gaagacgggt tcctagatgt ctggacttat 1320
aatgctgaac ttctggttct catggaaaat gagcgaactc tagactttca tgactcaaat 1380
gtcaagaacc tttacgacaa ggtccgacta cagcttaggg ataatgcaaa agagctgggt 1440
aacggttgtt tcgagttcta tcacaaatgt gataatgaat gcatggaaag tgtaagaaac 1500
ggaacgtatg actacccgca ttattcagaa gaagcaaggc taaaaagaga ggaaataagt 1560
ggagtaaaat tggaatcaat aggaacttac caaatactgt caatttattc aacagtggca 1620
agttccctag cgctggcaat catggtagct ggtctatctt tatggatgtg ctccaatggt 1680
tcgttacaat gcaga 1695

<210> 10
<211> 1707
<212> DNA
<213> Influenza A virus (A/Hong Kong/156/97)

<400> 10
atggaaagaa cagtgcttct tcttgcaaca gtcagtcttg ttaaaagtga tcagatttgc 60
attggttacc atgcaaacaa ctcgacagag caggttgaca caataatgga aaagaatgtt 120
actgttacac atgcccaaga catactggaa aggacacaca acgggaagct ctgcgatcta 180
aatggagtga agcctctcat tttgagggat tgtagtgtag ctggatggct cctcggaaac 240
cctatgtgtg acgaattcat caatgtgccg gaatggtctt acatagtgga gaaggccagt 300
ccagccaatg acctctgtta tccagggaat ttcaacgact atgaagaact gaaacaccta 360
ttgagcagaa taaaccattt tgagaaaatt cagatcatcc ccaaaagttc ttggtccaat 420
catgatgcct catcaggggt gagctcagca tgtccatacc ttgggaggtc ctccttttc 480
agaaatgtgg tatggcttat caaaaagaac agtgcatacc caacaataaa gaggagctac 540
aataatacca accaagaaga tcttttggta ctgtgggggg ttcaccatcc taatgatgcg 600
gcagagcaga caaagctcta tcaaaatcca accacctaca tttccgttgg aacatcaaca 660
ctgaaccaga gattggttcc agaaatagct actagaccca aagtaaacgg gcaaagtgga 720
agaatggagt tcttctggac aattttaaag ccgaatgatg ccatcaattt cgagagtaat 780
ggaaatttca ttgctccaga atatgcatac aaaattgtca agaaagggga ctcaacaatt 840
atgaaaagtg aattggaata tggtaactgc aacaccaagt gtcaaactcc aatgggggcg 900
ataaactcta gtatgccatt ccacaacata caccccctca ccatcgggga atgccccaaa 960
tatgtgaaat caaacagatt agtccttgcg actggactca gaaatacccc tcaaagagag 1020
agaagaagaa aaaagagagg actatttgga gctatagcag gttttataga gggaggatgg 1080
cagggaatgg tagatggttg gtatgggtac caccatagca atgagcaggg gagttgctac 1140
tctgcagaca aagaatccac tcaaaaggca atagatggag tcaccaataa ggtcaactcg 1200
atcattaaca aaatgaacac tcagtttgag gccgttggaa gggaatttaa taacttggaa 1260
aggaggatag agaatttaaa caagaagatg gaagacggat tcctagatgt ctggacttac 1320
aatgctgaac ttctggttct catggaaaat gagagaactc tcgactttca tgactcaaat 1380
gtcaagaacc tttacgacaa ggtccgacta cagcttaggg ataatgcaaa ggagctgggt 1440
aatggttgtt tcgaattcta tcacaaatgt gátaatgaat gtatggaaag tgtaaaaaac 1500
ggaacgtatg actacccgca gtattcagaa gaagcaagac taaacagaga ggaaataagt 1560
ggagtaaaat tggaatcaat gggaacttac caaatactgt caatttattc aacagtggcg 1620
agttccctag cactggcaat catggtagct ggtctatctt tatggatgtg ctccaatgga 1680
tcgttacaat gcagaatttg catttaa 1707

<210> 11
<211> 1704
<212> DNA
<213> Influenza A virus (A/Anhui/1/2005)

<400> 11
atggagaaaa tagtgcttct tcttgcaata gtcagccttg ttaaaagtga tcagatttgc 60
attggttacc atgcaaacaa ctcgacagag caggttgaca caataatgga aaagaacgtt 120
actgttacac atgcccaaga catactggaa aagacacaca acgggaagct ctgcgatcta 180
gatggagtga agcctctgat tttaagagat tgtagtgtag ctggatggct cctcggaaac 240
ccaatgtgtg acgaattcat caatgtgccg gaatggtctt acatagtgga gaaggccaac 300
ccagccaatg acctctgtta cccagggaat ttcaacgact atgaagaact gaaacaccta 360

ttgagcagaa taaaccattt tgagaaaatt cagatcatcc ccaaaagttc ttggtccgat 420
catgaagcct catcaggggt gagctcagca tgtccatacc agggaacgcc ctccttttc 480
agaaatgtgg tatggcttat caaaaagaac aatacatacc caacaataaa gagaagctac 540
aataatacca accaggaaga tcttttgata ctgtggggga ttcatcattc taatgatgcg 600
gcagagcaga caaagctcta tcaaaaccca accacctata tttccgttgg gacatcaaca 660
ctaaaccaga gattggtacc aaaaatagct actagatcca aagtaaacgg gcaaagtgga 720
aggatggatt tcttctggac aattttaaaa ccgaatgatg caatcaactt cgagagtaat 780
ggaaatttca ttgctccaga atatgcatac aaaattgtca agaaagggga ctcagcaatt 840
gttaaaagtg aagtggaata tggtaactgc aacacaaagt gtcaaactcc aataggggcg 900
ataaactcta gtatgccatt ccacaacata caccctctca ccatcgggga atgccccaaa 960
tatgtgaaat caaacaaatt agtccttgcg actgggctca gaaatagtcc tctaagagaa 1020
agaagaagaa aaagaggact atttggagct atagcagggt ttatagaggg aggatggcag 1080
ggaatggtag atggttggta tgggtaccac catagcaatg agcaggggag tgggtacgct 1140
gcagacaaag aatccactca aaaggcaata gatggagtca ccaataaggt caactcgatc 1200
attgacaaaa tgaacactca gtttgaggcc gttggaaggg aatttaataa cttagaaagg 1260
agaatagaga atttaaacaa gaaaatggaa gacggattcc tagatgtctg gacttataat 1320
gctgaacttc tggttctcat ggaaaatgag agaactctag acttccatga ttcaaatgtc 1380
aagaaccttt acgacaaggt ccgactacag cttagggata atgcaaagga gctgggtaac 1440
ggttgtttcg agttctatca caaatgtgat aatgaatgta tggaaagtgt aagaaacgga 1500
acgtatgact acccgcagta ttcagaagaa gcaagattaa aaagagagga aataagtgga 1560
gtaaaattgg aatcaatagg aacttaccaa atactgtcaa tttattcaac agttgcgagt 1620
tctctagcac tggcaatcat ggtggctggt ctatctttgt ggatgtgctc caatgggtcg 1680
ttacaatgca gaatttgcat ttaa 1704

<210> 12
<211> 1707
<212> DNA
<213> Influenza A virus (A/turkey/Turkey/1/05)

<400> 12
atggagaaaa tagtgcttct tcttgcaata gtcagccttg ttaaaagtga tcagatttgc 60
attggttacc atgcaaacaa ctcgacagag caggttgaca caataatgga aaagaacgtc 120
actgttacac acgcccaaga catactggaa aagacacaca acgggaaact ctgcgatcta 180
gatggagtga agcctctaat tttaagagat tgtagtgtag ctggatggct cctcgggaac 240
ccaatgtgtg acgaattcct caatgtgccg gaatggtctt acatagtgga gaagatcaat 300
ccagccaatg acctctgtta cccagggaat ttcaacgact atgaagaact gaaacaccta 360
ttgagcagaa taaaccattt tgagaaaatt cagatcatcc ccaaaagttc ttggtcagat 420
catgaagcct cagcaggggt gagctcagca tgtccatacc agggaaggtc ctccttttt 480
agaaatgtgg tatggcttat caaaaaggac aatgcatacc caacaataaa gagaagttac 540
aataatacca accaagaaga tcttttggta ttgtggggga ttcaccatcc aaatgatgcg 600
gcagagcaga caaggctcta tcaaaaccca actacctata tttccgttgg gacatcaaca 660
ctaaaccaga gattggtacc aaaaatagcc actagatcta aggtaaacgg gcaaagtgga 720
aggatggagt tcttttggac aattttaaaa ccgaatgatg caataaactt tgagagtaat 780
ggaaatttca ttgctccaga aaatgcatac aaaattgtca agaaagggga ctcaacaatt 840
atgaaaagtg agttggaata tggtaactgc aacaccaagt gtcaaactcc aataggggcg 900
ataaactcta gtatgccatt ccacaacatc caccctctca ccatcgggga atgccccaaa 960
tatgtgaaat caagcagatt agtccttgct actgggctca gaaatagccc tcaaggagag 1020
agaagaagaa aaaagagagg actatttgga gctatagcag gttttataga gggaggatgg 1080
cagggaatgg tagatggttg gtatgggtac caccatagca acgagcaggg gagtgggtac 1140
gctgcagaca aagaatccac tcaaaaggca atagatggag tcaccaataa ggtcaactcg 1200
atcattgaca aaatgaacac tcagtttgag gctgttggaa gggaatttaa taacttagaa 1260
aggagaatag aaaatttaaa caagaagatg gaagacggat tcctagatgt ctggacttat 1320
aatgctgaac ttctggttct catggaaaat gagagaactc tagactttca tgactcaaat 1380
gtcaagaacc tttacgacaa ggtccgacta cagcttaggg ataatgcaaa ggagcttggt 1440
aacggttgtt tcgagttcta tcacagatgt gataatgaat gtatggaaag tgtaagaaac 1500
ggaacgtatg actacccgca gtattcagaa gaagcaagat taaaaagaga ggaaataagt 1560
ggagtaaaat tggaatcaat aggaacttac caaatactgt caatttattc aacagtggcg 1620
agctccctag cactggcaat catggtggct ggtctatctt tatggatgtg ctccaatgga 1680
tcgttacaat gcagaatttg catttaa 1707

<210> 13
<211> 8
<212> PRT
<213> Influenza A virus

<400> 13
Arg Glu Gly Arg Arg Arg Lys Arg
1 5

<210> 14
<211> 26
<212> DNA
<213> Artificial Sequence

<220>
<223> Adjuvant oligonucleotide

<220>
<221> N
<222> 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25
<223> N is inosine

<400> 14
ncncncncnc ncncncncnc ncncnc 26

<210> 15
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Adjuvant polycationic peptide

<400> 15
Lys Leu Lys Leu Leu Leu Leu Leu Lys Leu Lys
1 5 10

<210> 16
<211> 8
<212> PRT
<213> Influenza A virus

<400> 16
Gly Glu Arg Arg Arg Arg Lys Arg
1 5