SEQUENCE LISTING

<110> POMONA BIOTECHNOLOGIES LLC

<120> Monoclonal antibodies having homosubtype cross-neutralization properties against influenza A viruses subtype H1

<130> E073330-BEE-EC

<160> 9

<170> PatentIn version 3.3

<210> 1
<211> 117
<212> PRT
<213> Artificial

<220>
<223> Human or humanized antibody sequence

<400> 1

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Ser Cys Ala Ala Ser Gly Ile Thr Phe Ser Ser Tyr Ala Met Ser Trp
            20                  25                  30


Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val Ser Thr Val Asn
        35                  40                  45


Ser Gly Gly Gly Ser Thr Tyr Tyr Gly Asp Ser Val Arg Gly Arg Phe
    50                  55                  60


Thr Ile Ser Arg Asp Asn Ser Lys Ser Thr Leu Tyr Leu Gln Leu Asn
65                  70                  75                  80


Ser Leu Arg Ala Glu Asp Thr Ala Ile Tyr Tyr Cys Ala Lys Asp Lys
                85                  90                  95


Gly Arg Pro Ile Phe Gly Leu Val Thr Pro Ser Tyr Tyr Met Asp Val
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Trp Gly Asn Gly Thr
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<210> 2
<211> 100
<212> PRT
<213> Artificial

<220>
<223> Human or humanized antibody sequence

<400> 2

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Val Thr Ile Thr Cys Arg Thr Ser Glu Arg Ile Ser Thr Tyr Leu Asn
            20                  25                  30
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Trp Tyr Gln Gln Lys Pro Gly Lys Ala Pro Arg Leu Leu Val Ser Gly
        35                  40                  45

Ala Ser Thr Leu Gln Gly Gly Val Pro Ser Arg Phe Ser Gly Ser Gly
    50                  55                  60

Ser Gly Thr Ala Phe Thr Leu Thr Ile Asn Ser Leu Gln Pro Glu Asp
65                  70                  75                  80

Phe Ala Thr Tyr Tyr Cys Gln Gln Ser Tyr Ser Thr Pro Leu Thr Phe
                85                  90                  95

Gly Gly Gly Thr
            100
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<210> 3
<211> 351
<212> DNA
<213> Artificial

<220>
<223> Human or humanized antibody cDNA sequence

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ctggagtggg tctcaactgt taacagtggt ggtggtagta catactacgg agactccgtg 180

aggggccggt tcaccatctc cagagacaac tccaagagca cgctgtacct gcaactgaac 240

agcctgagag ccgaggacac ggccatatat tactgtgcga aagataaggg tcgtccgatt 300

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<210> 4
<211> 300
<212> DNA
<213> Artificial

<220>
<223> Human or humanized antibody cDNA sequence

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gcccctaggc tcctggtctc tggtgcatcc actttgcaag gtggggtccc atcaaggttc 180

agtggcagtg gatctgggac agctttcact cttaccatca acagtctgca gcctgaagat 240

tttgcaactt actactgtca acagagttac agtaccccac tcactttcgg cggagggacc 300

<210> 5
<211> 610
<212> DNA
<213> Influenza A virus

<400> 5
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attgagaatt tgaataagaa ggtcgatgat gggtttttgg atgtttggac atataatgct 180

gagttgctcg ttttgctcga gaacgaaagg actctagatt tccatgactt taacgtaaga 240

aatttatatg aaaaggtcaa atcacaattg agaaacaatg ccaaagaaat cgggaatggt 300

tgttttgagt tctatcacaa atgtgatgat gaatgcatgg agagcgtgaa gaatggcaca 360

tataactatc ccaaatattc araagaatcc aaattgaata gagaggaaat agacggtgtg 420

aaactagaat caatgggggt ttaccagatt ttggcgatct actccacagt cgccagttcc 480

ctggtcttgt tagtctccct gggggcaatc agcttctgga tgtgttctaa tgggtcattg 540

caatgcagaa tatgcattta agacttgaat ttcaaaatgt atggaaaaac acccttgttt 600

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<210> 6
<211> 1698
<212> DNA
<213> Influenza A virus

<400> 6
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ttaaaaggaa tagccccact acaattgggg aaatgtaaca tcgccggatg gctcttggga 240

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aactctgaga atggaatatg ttatccagga gatttcatcg actatgagga gctgagggag 360

caattgagct cagtgtcatc attcgaaaga ttcgaaatat ttcccaaaga aagctcatgg 420

cccaaccaca acacaaacgg agtaacggca gcatgctccc atgaggggaa aagcagtttt 480

tacagaaatt tgctatggct gacggagaag gagggcycat acccaaagct gaaaaattct 540

tatgtgaaca aaaaagggaa agaagtcctt gtactgtggg gtattcatca cccgtctaac 600

agtaaggaac aacagaatct ctatcagaat gaaaatgctt atgtctctgt agtgacttca 660

aattataaca ggagatttac cccggaaata gcagaaagac ccaaagtaag agatcaagct 720

gggaggatga actattactg gaccttgcta aaacccggag acacaataat atttgaggca 780

aatggaaatc taatagcacc aatgtatgct ttcgcactga gtagaggctt tgggtccggc 840

atcatcacct caaacgcatc aatgcatgag tgtaacacga agtgtcaaac acccctggga 900

gctataaaca gcagtctccc ttaccagaat atacacccag tcacaatagg agagtgccca 960

aaatacgtca ggagtgccaa attgaggatg gttacaggac taaggaacat tccgtccatt 1020

caatccagag gtctatttgg agccattgcc ggttttattg aaggggggatg gactggaatg 1080

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caaaaaagca cacaaaatgc cattaacggg attacaaaca aggtgaacac tgttatcgag 1200

aaaatgaaca ttcaattcac agctgtgggt aaagaattca acaaattaga aaaaaggatg 1260

gaaaatttaa ataaaaaagt tgatgatgga tttctggaca tttggacata taatgcagaa 1320

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ttgttagttc tactggaaaa tgaaaggact ctggatttcc atgactcaaa tgtgaagaat   1380

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tttgagttct accacaagtg tgacaatgaa tgcatggaaa gtgtaagaaa tgggacttat   1500

gattatccca aatattcaga agagtcaaag ttgaacaggg aaaaggtaga tggagtgaaa   1560

ttggaatcaa tggggatcta tcagattctg gcgatctact caactgtcgc cagttcactg   1620

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<210> 7
<211> 565
<212> PRT
<213> Influenza A virus

<220>
<221> misc_feature
<222> (173)..(173)
<223> Xaa can be any naturally occurring amino acid

<400> 7

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Ala Asp Thr Ile Cys Ile Gly Tyr His Ala Asn Asn Ser Thr Asp Thr
            20                  25                  30

Val Asp Thr Val Leu Glu Lys Asn Val Thr Val Thr His Ser Val Asn
        35                  40                  45

Leu Leu Glu Asp Ser His Asn Gly Lys Leu Cys Arg Leu Lys Gly Ile
    50                  55                  60

Ala Pro Leu Gln Leu Gly Lys Cys Asn Ile Ala Gly Trp Leu Leu Gly
65                  70                  75                  80

Asn Pro Glu Cys Asp Pro Leu Leu Pro Val Arg Ser Trp Ser Tyr Ile
                85                  90                  95

Val Glu Thr Pro Asn Ser Glu Asn Gly Ile Cys Tyr Pro Gly Asp Phe
            100                 105                 110

Ile Asp Tyr Glu Glu Leu Arg Glu Gln Leu Ser Ser Val Ser Ser Phe
        115                 120                 125

Glu Arg Phe Glu Ile Phe Pro Lys Glu Ser Ser Trp Pro Asn His Asn
    130                 135                 140

Thr Asn Gly Val Thr Ala Ala Cys Ser His Glu Gly Lys Ser Ser Phe
145                 150                 155                 160

Tyr Arg Asn Leu Leu Trp Leu Thr Glu Lys Glu Gly Xaa Tyr Pro Lys
                165                 170                 175
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Leu Lys Asn Ser Tyr Val Asn Lys Lys Gly Lys Glu Val Leu Val Leu
            180                 185                 190

Trp Gly Ile His His Pro Ser Asn Ser Lys Glu Gln Gln Asn Leu Tyr
        195                 200                 205

Gln Asn Glu Asn Ala Tyr Val Ser Val Val Thr Ser Asn Tyr Asn Arg
    210                 215                 220

Arg Phe Thr Pro Glu Ile Ala Glu Arg Pro Lys Val Arg Asp Gln Ala
225                 230                 235                 240

Gly Arg Met Asn Tyr Tyr Trp Thr Leu Leu Lys Pro Gly Asp Thr Ile
                245                 250                 255

Ile Phe Glu Ala Asn Gly Asn Leu Ile Ala Pro Met Tyr Ala Phe Ala
            260                 265                 270

Leu Ser Arg Gly Phe Gly Ser Gly Ile Ile Thr Ser Asn Ala Ser Met
        275                 280                 285

His Glu Cys Asn Thr Lys Cys Gln Thr Pro Leu Gly Ala Ile Asn Ser
    290                 295                 300

Ser Leu Pro Tyr Gln Asn Ile His Pro Val Thr Ile Gly Glu Cys Pro
305                 310                 315                 320

Lys Tyr Val Arg Ser Ala Lys Leu Arg Met Val Thr Gly Leu Arg Asn
                325                 330                 335

Ile Pro Ser Ile Gln Ser Arg Gly Leu Phe Gly Ala Ile Ala Gly Phe
            340                 345                 350

Ile Glu Gly Gly Trp Thr Gly Met Ile Asp Gly Trp Tyr Gly Tyr His
        355                 360                 365

His Gln Asn Glu Gln Gly Ser Gly Tyr Ala Ala Asp Gln Lys Ser Thr
    370                 375                 380

Gln Asn Ala Ile Asn Gly Ile Thr Asn Lys Val Asn Thr Val Ile Glu
385                 390                 395                 400

Lys Met Asn Ile Gln Phe Thr Ala Val Gly Lys Glu Phe Asn Lys Leu
                405                 410                 415

Glu Lys Arg Met Glu Asn Leu Asn Lys Lys Val Asp Asp Gly Phe Leu
            420                 425                 430

Asp Ile Trp Thr Tyr Asn Ala Glu Leu Leu Val Leu Leu Glu Asn Glu
        435                 440                 445

Arg Thr Leu Asp Phe His Asp Ser Asn Val Lys Asn Leu Tyr Glu Lys
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```
    450                 455                 460

Val Lys Ser Gln Leu Lys Asn Asn Ala Lys Glu Ile Gly Asn Arg Cys
465                 470                 475                 480

Phe Glu Phe Tyr His Lys Cys Asp Asn Glu Cys Met Glu Ser Val Arg
                485                 490                 495

Asn Gly Thr Tyr Asp Tyr Pro Lys Tyr Ser Glu Glu Ser Lys Leu Asn
            500                 505                 510

Arg Glu Lys Val Asp Gly Val Lys Leu Glu Ser Met Gly Ile Tyr Gln
        515                 520                 525

Ile Leu Ala Ile Tyr Ser Thr Val Ala Ser Ser Leu Val Leu Leu Val
    530                 535                 540

Ser Leu Gly Ala Ile Ser Phe Trp Met Cys Ser Asn Gly Ser Leu Gln
545                 550                 555                 560

Cys Arg Ile Cys Ile
                565
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<210> 8
<211> 1701
<212> DNA
<213> Influenza A virus

<400> 8

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ctaagagggg tagccccatt gcatttgggt aaatgtaaca ttgctggctg gatcctggga    240

aatccagagt gtgaatcact ctccacagca agctcatggt cctacattgt ggaaacacct    300

agttcagaca atggaacgtg ttacccagga gatttcatcg attatgagga gctaagagag    360

caattgagct cagtgtcatc atttgaaagg tttgagatat tccccaagac aagttcatgg    420

cccaatcatg actcgaacaa aggtgtaacg gcagcatgtc ctcatgctgg agcaaaaagc    480

ttctacaaaa atttaatatg gctagttaaa aaaggaaatt catacccaaa gctcagcaaa    540

tcctacatta atgataaagg gaaagaagtc ctcgtgctat ggggcattca ccatccatct    600

actagtgctg accaacaaag tctctatcag aatgcagata catatgtttt tgtggggtca    660

tcaagataca gcaagaagtt caagccggaa atagcaataa gacccaaagt gagggatcaa    720

gaagggagaa tgaactatta ctggacacta gtagagccgg gagacaaaat aacattcgaa    780

gcaactggaa atctagtggt accgagatat gcattcgcaa tggaaagaaa tgctggatct    840

ggtattatca tttcagatac accagtccac gattgcaata caacttgtca aacacccaag    900

ggtgctataa acaccagcct cccatttcag aatatacatc cgatcacaat tggaaaatgt    960

ccaaaatatg taaaaagcac aaaattgaga ctggccacag gattgaggaa tatcccgtct   1020
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gaaaagatga atacacagtt cacagcagta ggtaaagagt tcaaccacct ggaaaaaaga   1260

atagagaatt taaataaaaa agttgatgat ggtttcctgg acatttggac ttacaatgcc   1320

gaactgttgg ttctattgga aaatgaaaga actttggact accacgattc aaatgtgaag   1380

aacttatatg aaaaggtaag aagccagcta aaaaacaatg ccaaggaaat tggaaacggc   1440

tgctttgaat tttaccacaa atgcgataac acgtgcatgg aaagtgtcaa aaatgggact   1500

tatgactacc caaaatactc agaggaagca aaattaaaca gagaagaaat agatggggta   1560

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<210> 9
<211> 566
<212> PRT
<213> Influenza A virus

<400> 9

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Ala Asp Thr Leu Cys Ile Gly Tyr His Ala Asn Asn Ser Thr Asp Thr
            20                  25                  30

Val Asp Thr Val Leu Glu Lys Asn Val Thr Val Thr His Ser Val Asn
        35                  40                  45

Leu Leu Glu Asp Lys His Asn Gly Lys Leu Cys Lys Leu Arg Gly Val
    50                  55                  60

Ala Pro Leu His Leu Gly Lys Cys Asn Ile Ala Gly Trp Ile Leu Gly
65                  70                  75                  80

Asn Pro Glu Cys Glu Ser Leu Ser Thr Ala Ser Ser Trp Ser Tyr Ile
                85                  90                  95

Val Glu Thr Pro Ser Ser Asp Asn Gly Thr Cys Tyr Pro Gly Asp Phe
            100                 105                 110

Ile Asp Tyr Glu Glu Leu Arg Glu Gln Leu Ser Ser Val Ser Ser Phe
        115                 120                 125

Glu Arg Phe Glu Ile Phe Pro Lys Thr Ser Ser Trp Pro Asn His Asp
    130                 135                 140

Ser Asn Lys Gly Val Thr Ala Ala Cys Pro His Ala Gly Ala Lys Ser
145                 150                 155                 160
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Phe Tyr Lys Asn Leu Ile Trp Leu Val Lys Lys Gly Asn Ser Tyr Pro
                165                 170                 175

Lys Leu Ser Lys Ser Tyr Ile Asn Asp Lys Gly Lys Glu Val Leu Val
            180                 185                 190

Leu Trp Gly Ile His His Pro Ser Thr Ser Ala Asp Gln Gln Ser Leu
        195                 200                 205

Tyr Gln Asn Ala Asp Thr Tyr Val Phe Val Gly Ser Ser Arg Tyr Ser
    210                 215                 220

Lys Lys Phe Lys Pro Glu Ile Ala Ile Arg Pro Lys Val Arg Asp Gln
225                 230                 235                 240

Glu Gly Arg Met Asn Tyr Tyr Trp Thr Leu Val Glu Pro Gly Asp Lys
                245                 250                 255

Ile Thr Phe Glu Ala Thr Gly Asn Leu Val Val Pro Arg Tyr Ala Phe
            260                 265                 270

Ala Met Glu Arg Asn Ala Gly Ser Gly Ile Ile Ile Ser Asp Thr Pro
        275                 280                 285

Val His Asp Cys Asn Thr Thr Cys Gln Thr Pro Lys Gly Ala Ile Asn
    290                 295                 300

Thr Ser Leu Pro Phe Gln Asn Ile His Pro Ile Thr Ile Gly Lys Cys
305                 310                 315                 320

Pro Lys Tyr Val Lys Ser Thr Lys Leu Arg Leu Ala Thr Gly Leu Arg
                325                 330                 335

Asn Ile Pro Ser Ile Gln Ser Arg Gly Leu Phe Gly Ala Ile Ala Gly
            340                 345                 350

Phe Ile Glu Gly Gly Trp Thr Gly Met Val Asp Gly Trp Tyr Gly Tyr
        355                 360                 365

His His Gln Asn Glu Gln Gly Ser Gly Tyr Ala Ala Asp Leu Lys Ser
    370                 375                 380

Thr Gln Asn Ala Ile Asp Glu Ile Thr Asn Lys Val Asn Ser Val Ile
385                 390                 395                 400

Glu Lys Met Asn Thr Gln Phe Thr Ala Val Gly Lys Glu Phe Asn His
                405                 410                 415

Leu Glu Lys Arg Ile Glu Asn Leu Asn Lys Lys Val Asp Asp Gly Phe
            420                 425                 430

Leu Asp Ile Trp Thr Tyr Asn Ala Glu Leu Leu Val Leu Leu Glu Asn
        435                 440                 445
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```
Glu Arg Thr Leu Asp Tyr His Asp Ser Asn Val Lys Asn Leu Tyr Glu
    450                 455                 460

Lys Val Arg Ser Gln Leu Lys Asn Asn Ala Lys Glu Ile Gly Asn Gly
465                 470                 475                 480

Cys Phe Glu Phe Tyr His Lys Cys Asp Asn Thr Cys Met Glu Ser Val
                485                 490                 495

Lys Asn Gly Thr Tyr Asp Tyr Pro Lys Tyr Ser Glu Glu Ala Lys Leu
            500                 505                 510

Asn Arg Glu Glu Ile Asp Gly Val Lys Leu Glu Ser Thr Arg Ile Tyr
        515                 520                 525

Gln Ile Leu Ala Ile Tyr Ser Thr Val Ala Ser Ser Leu Val Leu Val
    530                 535                 540

Val Ser Leu Gly Ala Ile Ser Phe Trp Met Cys Ser Asn Gly Ser Leu
545                 550                 555                 560

Gln Cys Arg Ile Cys Ile
                565
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