FIG. 1.

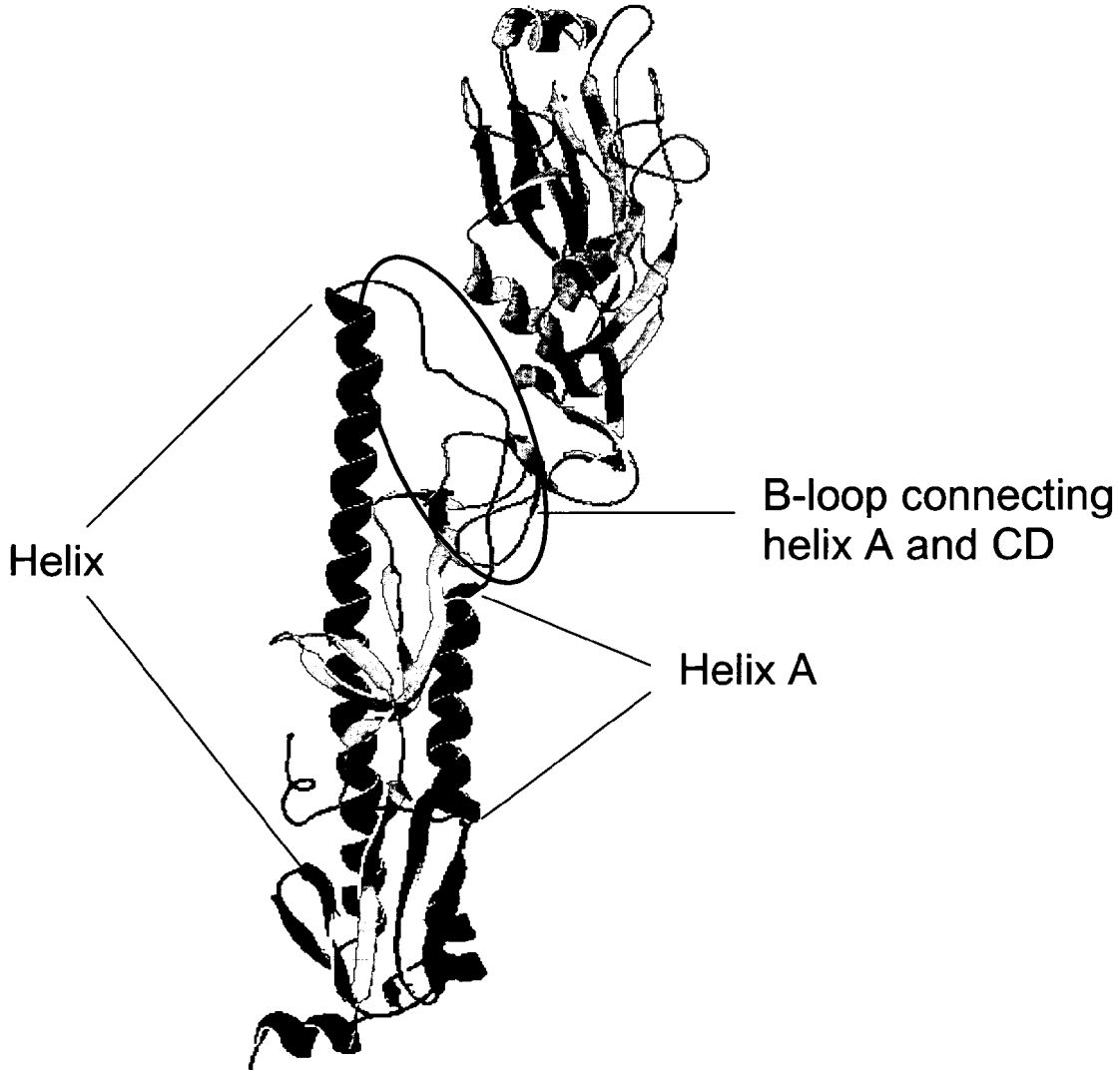
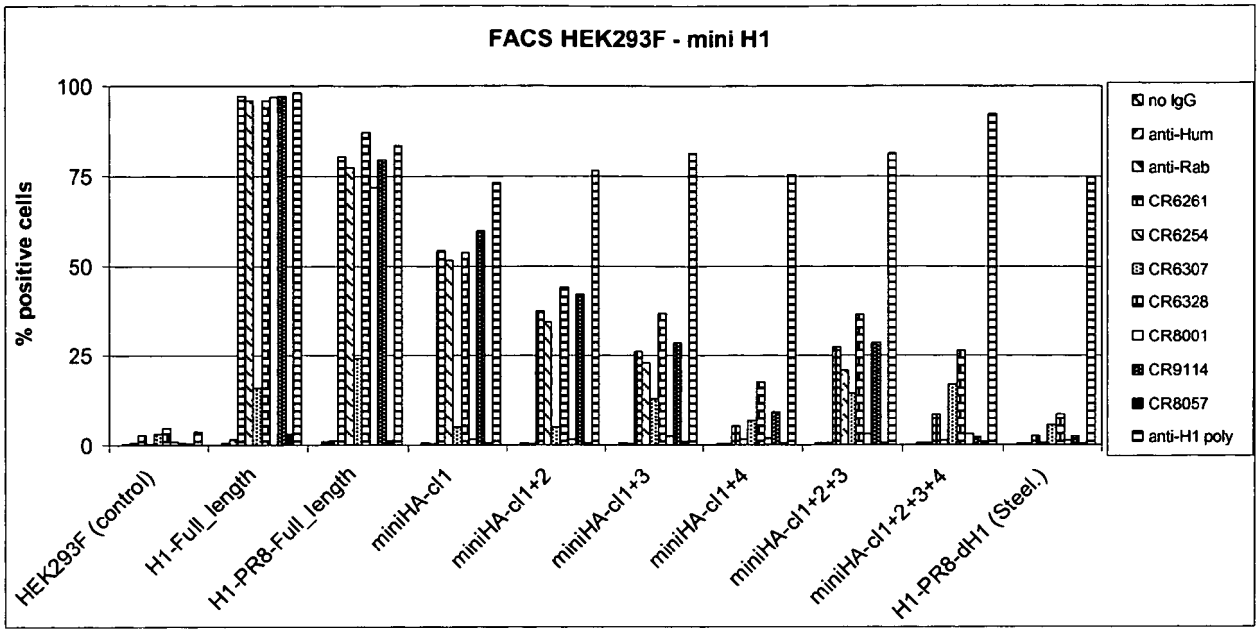


FIG. 2

A.


FACS HEK293F - mini H1
% positive cells
100
75
50
25
0
HEK293F (control)
H1-Full_length
H1-PR8-Full_length
miniHA-cl1
miniHA-cl1+2
miniHA-cl1+3
miniHA-cl1+4
miniHA-cl1+2+3
miniHA-cl1+2+3+4
H1-PR8-dH1 (Steel.)
no IgG
anti-Hum
anti-Rab
CR6261
CR6254
CR6307
CR6328
CR8001
CR9114
CR8057
anti-H1 poly

B.

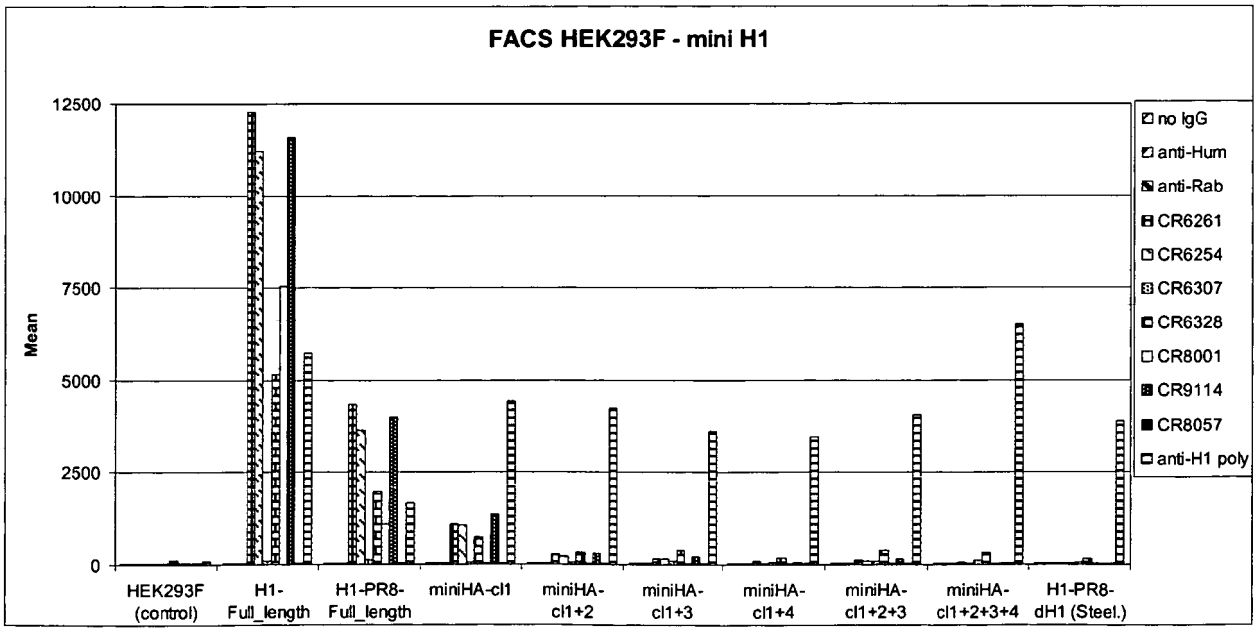
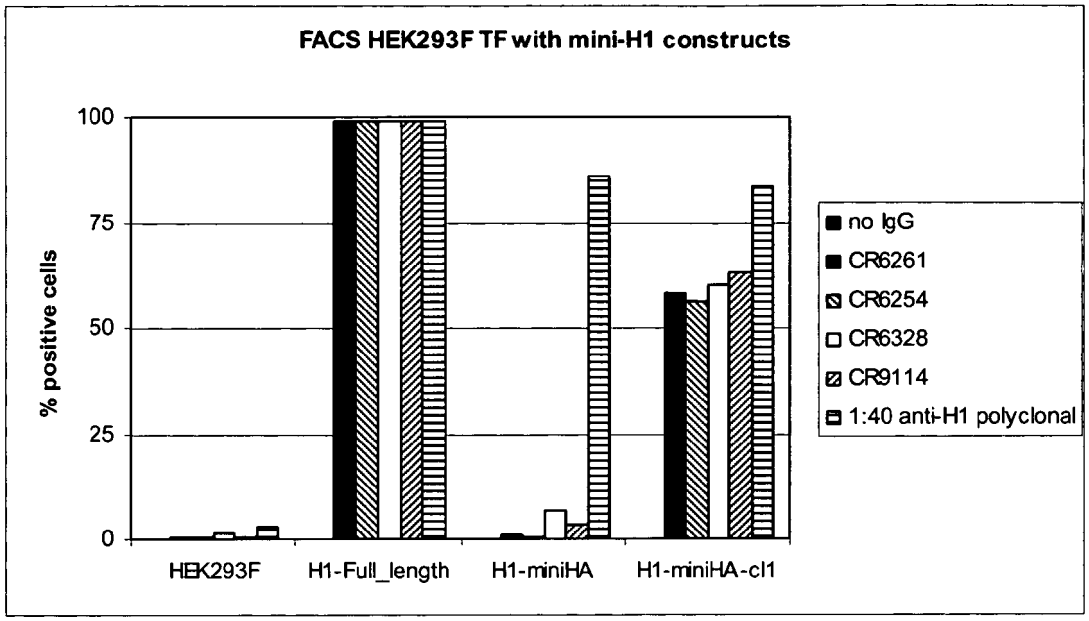

FACS HEK293F - mini H1
Mean
12500
10000
7500
5000
2500
0
HEK293F (control)
H1-Full_length
H1-PR8-Full_length
miniHA-cl1
miniHA-cl1+2
miniHA-cl1+3
miniHA-cl1+4
miniHA-cl1+2+3
miniHA-cl1+2+3+4
H1-PR8-dH1 (Steel.)
no IgG
anti-Hum
anti-Rab
CR6261
CR6254
CR6307
CR6328
CR8001
CR9114
CR8057
anti-H1 poly

FIG. 3

A.


FACS HEK293F TF with mini-H1 constructs
% positive cells
100
75
50
25
0
HEK293F
H1-Full_length
H1-miniHA
H1-miniHA-cl1
no IgG
CR6261
CR6254
CR6328
CR9114
1:40 anti-H1 polyclonal

B.

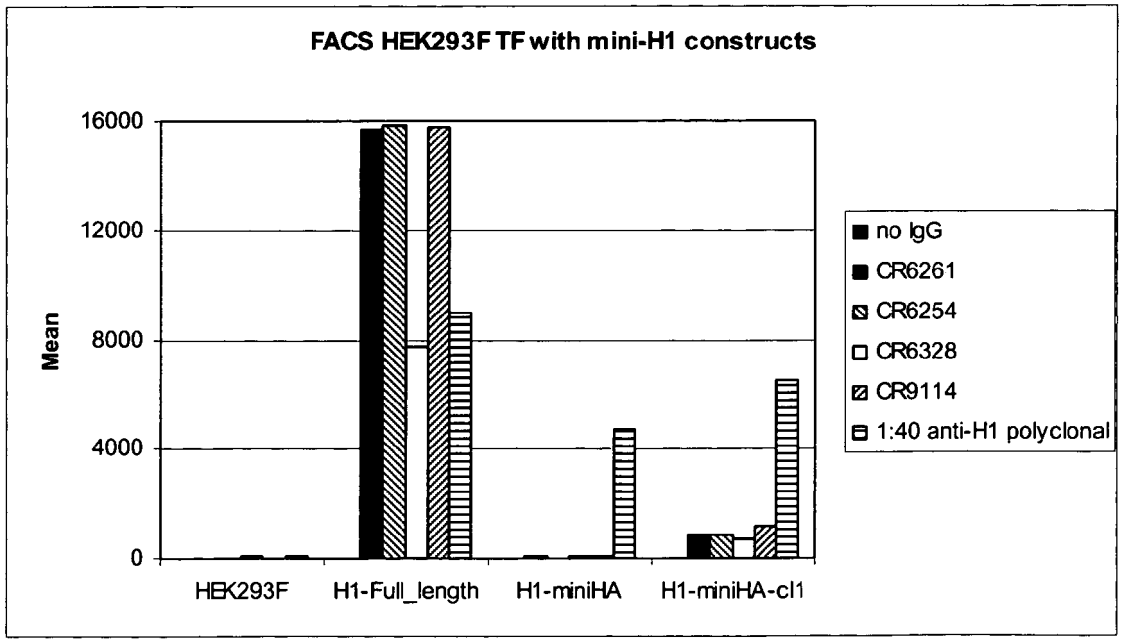

FACS HEK293F TF with mini-H1 constructs
Mean
16000
12000
8000
4000
0
HEK293F
H1-Full_length
H1-miniHA
H1-miniHA-cl1
no IgG
CR6261
CR6254
CR6328
CR9114
1:40 anti-H1 polyclonal

Fig 4A

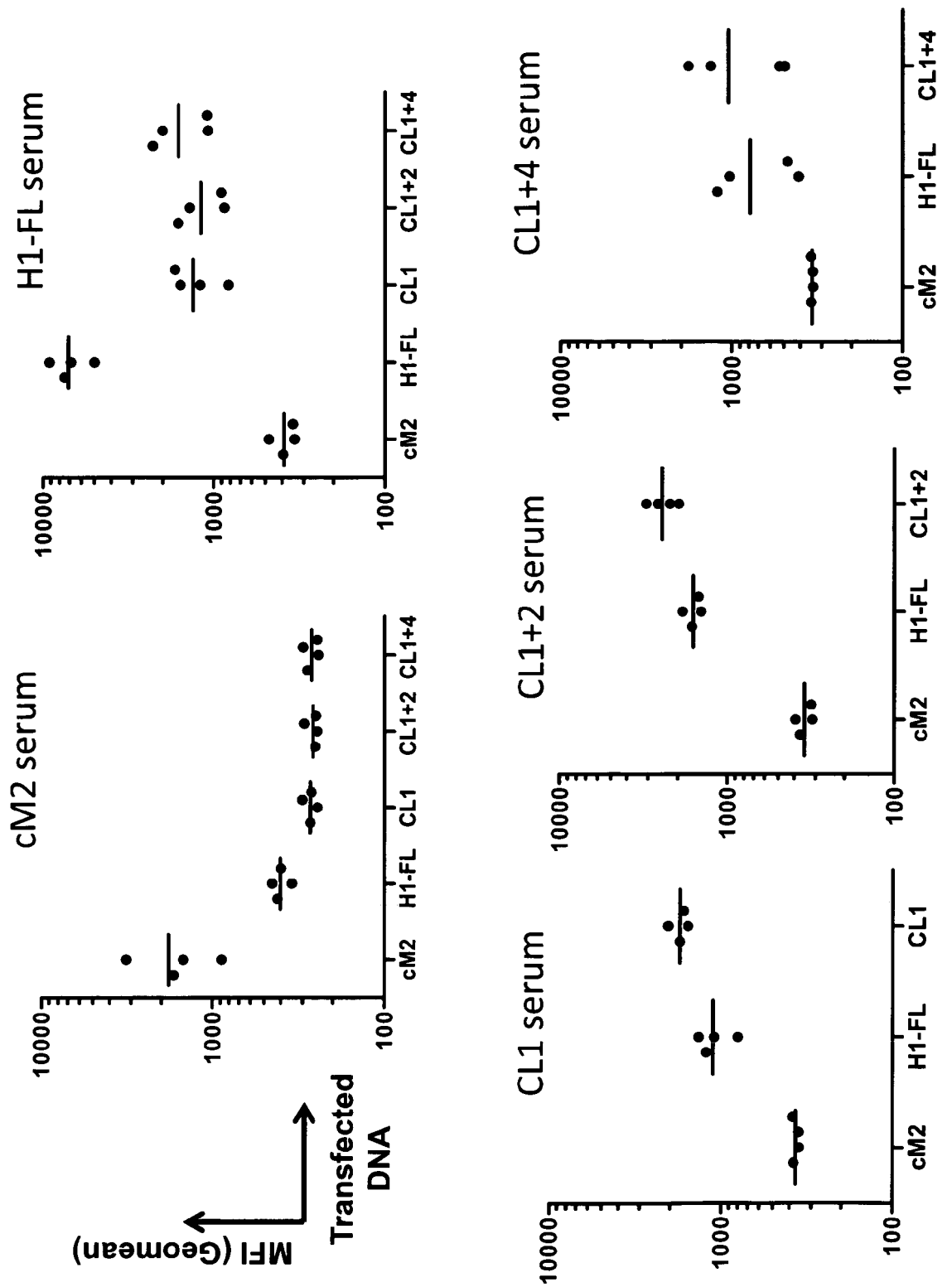

H1-FL serum
cM2 serum
CL1+4 serum
CL1+2 serum
CL1 serum
MFI (Geomean)
Transfected DNA
10000
1000
100
cM2
H1-FL
CL1
CL1+2
CL1+4

FIG. 4B

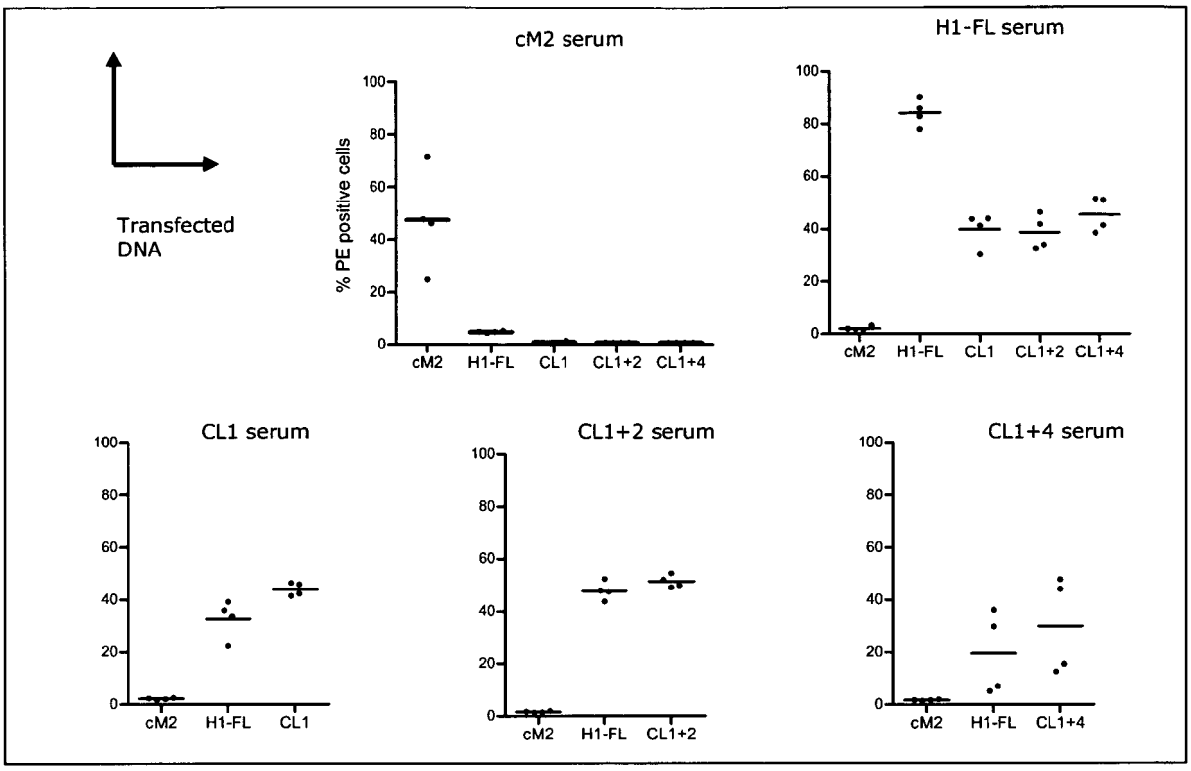
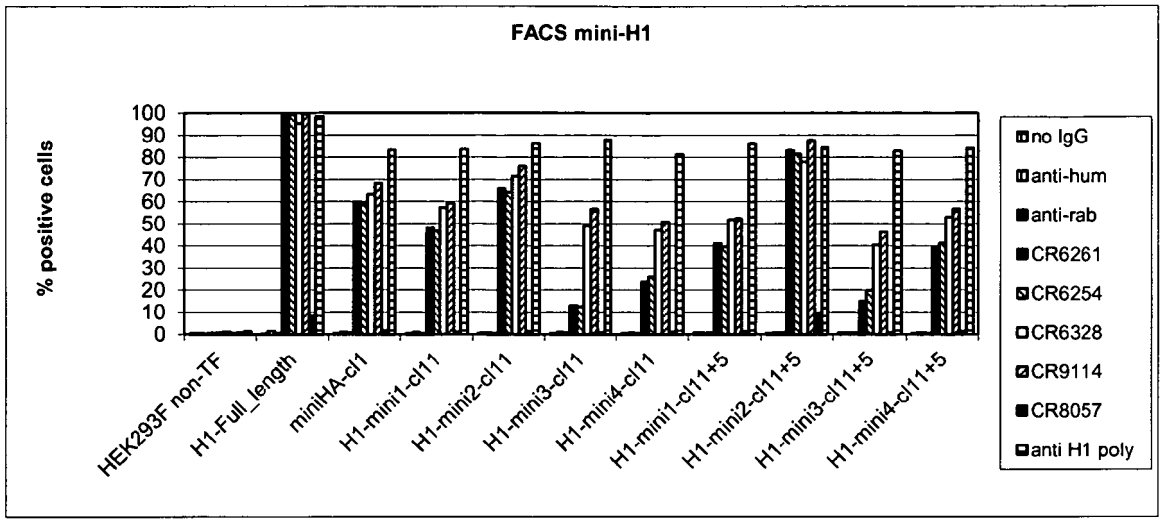

Transfected DNA
cM2 serum
% PE positive cells
cM2
H1-FL
CL1
CL1+2
CL1+4
H1-FL serum
CL1 serum
CL1+2 serum
CL1+4 serum

FIG. 5


FACS mini-H1
% positive cells
100
90
80
70
60
50
40
30
20
10
0
HEK293F non-TF
H1-Full_length
miniHA-cl1
H1-mini1-cl11
H1-mini2-cl11
H1-mini3-cl11
H1-mini4-cl11
H1-mini1-cl11+5
H1-mini2-cl11+5
H1-mini3-cl11+5
H1-mini4-cl11+5
no IgG
anti-hum
anti-rab
CR6261
CR6254
CR6328
CR9114
CR8057
anti H1 poly

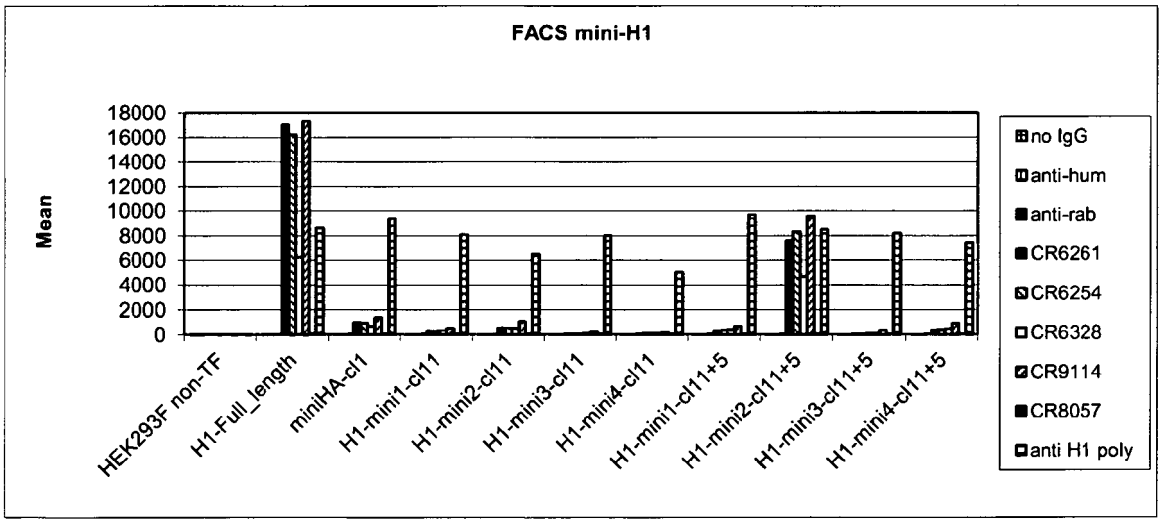

FACS mini-H1
Mean
18000
16000
14000
12000
10000
8000
6000
4000
2000
0
HEK293F non-TF
H1-Full_length
miniHA-cl1
H1-mini1-cl11
H1-mini2-cl11
H1-mini3-cl11
H1-mini4-cl11
H1-mini1-cl11+5
H1-mini2-cl11+5
H1-mini3-cl11+5
H1-mini4-cl11+5
no IgG
anti-hum
anti-rab
CR6261
CR6254
CR6328
CR9114
CR8057
anti H1 poly

FIG. 6A

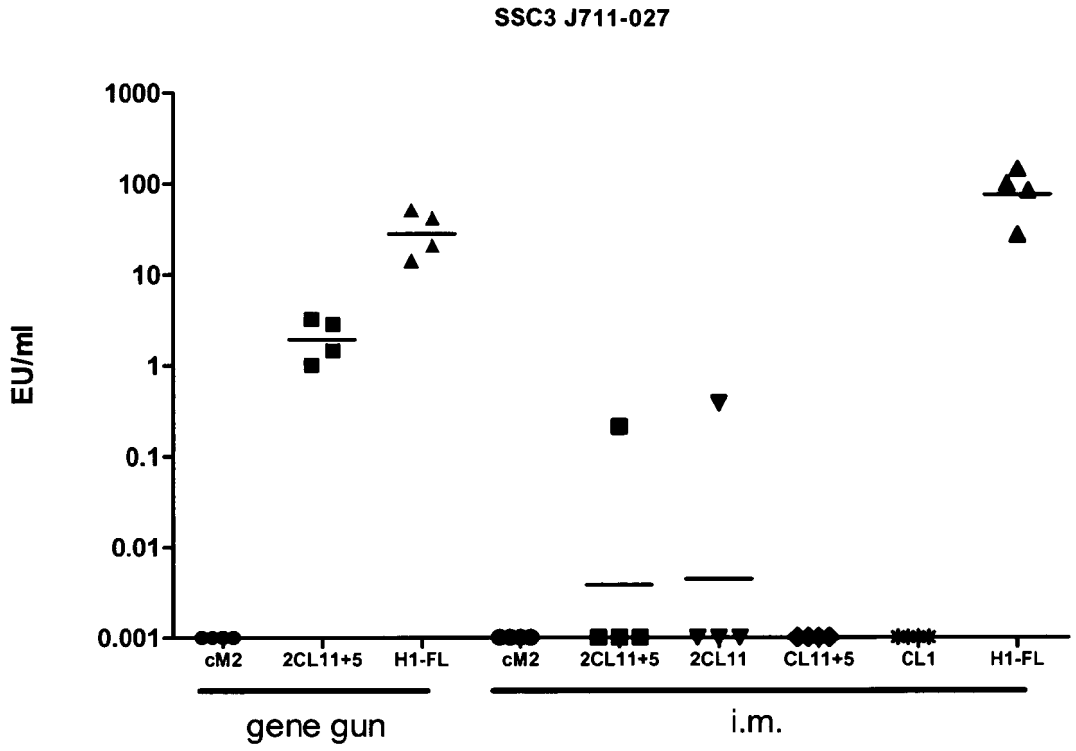

SSC3 J711-027
EU/ml
1000
100
10
1
0.1
0.01
0.001
cM2
2CL11+5
H1-FL
cM2
2CL11+5
2CL11
CL11+5
CL1
H1-FL
gene gun
i.m.

FIG. 6B

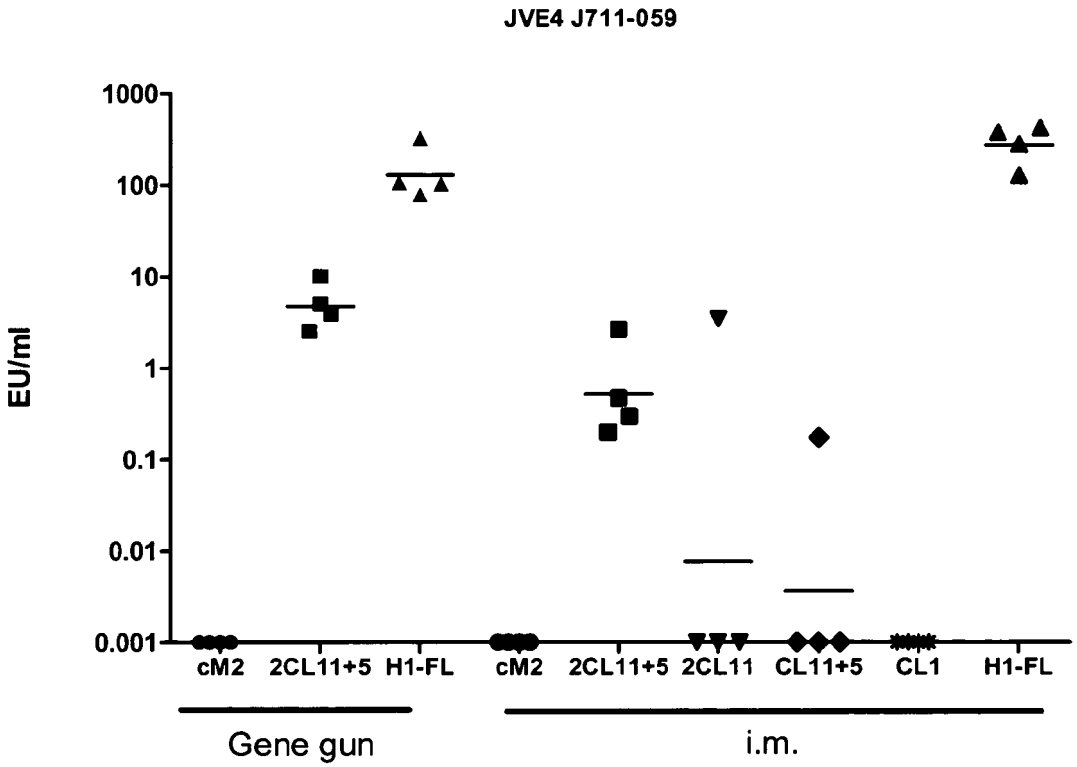

JVE4 J711-059
EU/ml
1000
100
10
1
0.1
0.01
0.001
cM2
2CL11+5
H1-FL
cM2
2CL11+5
2CL11
CL11+5
CL1
H1-FL
Gene gun
i.m.

FIG. 7

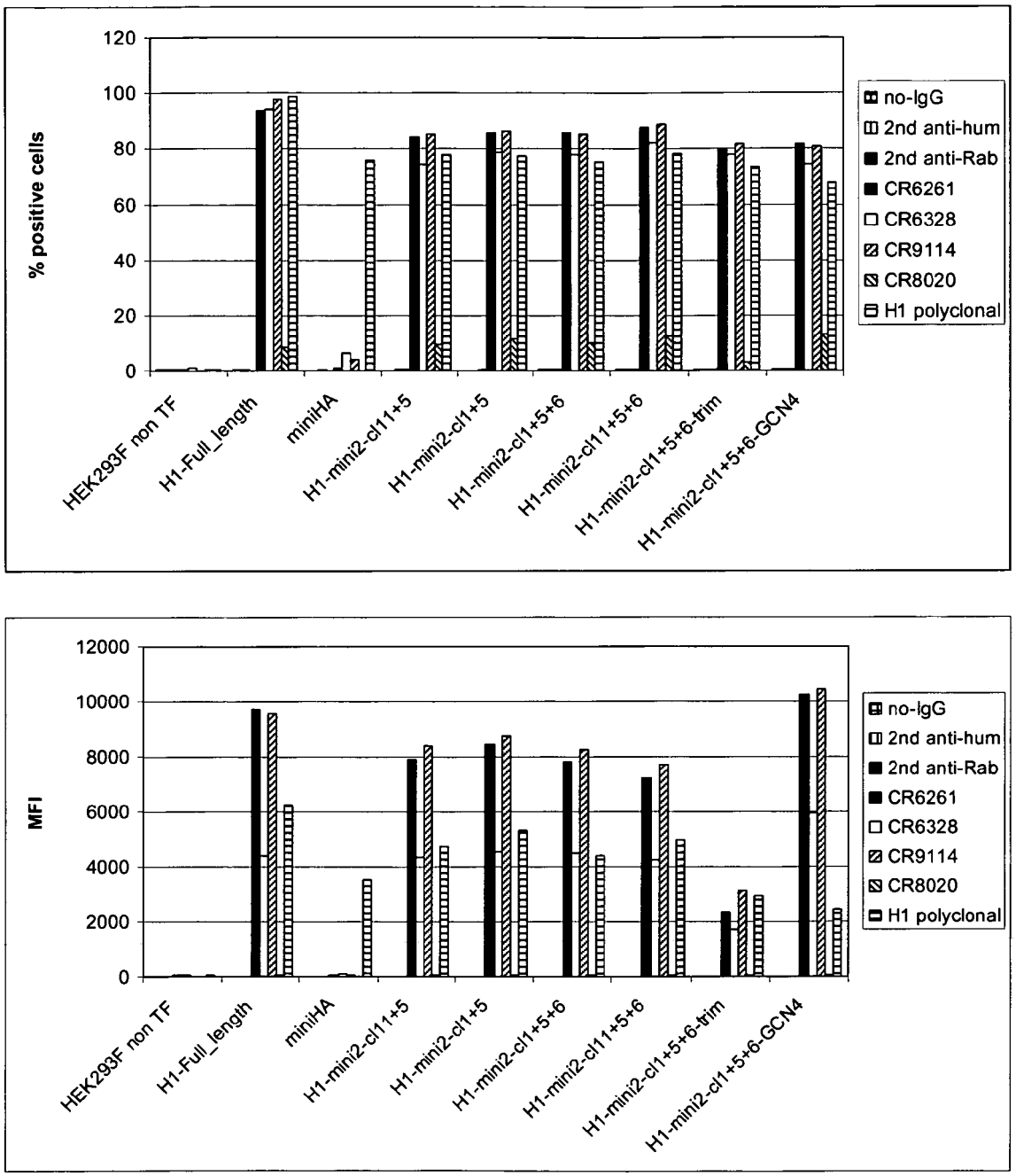

% positive cells
120
100
80
60
40
20
0
HEK293F non TF
H1-Full_length
miniHA
H1-mini2-cl11+5
H1-mini2-cl1+5
H1-mini2-cl1+5+6
H1-mini2-cl11+5+6
H1-mini2-cl1+5+6-trim
H1-mini2-cl1+5+6-GCN4
no-IgG
2nd anti-hum
2nd anti-Rab
CR6261
CR6328
CR9114
CR8020
H1 polyclonal
MFI
12000
10000
8000
6000
4000
2000
0
HEK293F non TF
H1-Full_length
miniHA
H1-mini2-cl11+5
H1-mini2-cl1+5
H1-mini2-cl1+5+6
H1-mini2-cl11+5+6
H1-mini2-cl1+5+6-trim
H1-mini2-cl1+5+6-GCN4
no-IgG
2nd anti-hum
2nd anti-Rab
CR6261
CR6328
CR9114
CR8020
H1 polyclonal

FIG. 8

A.

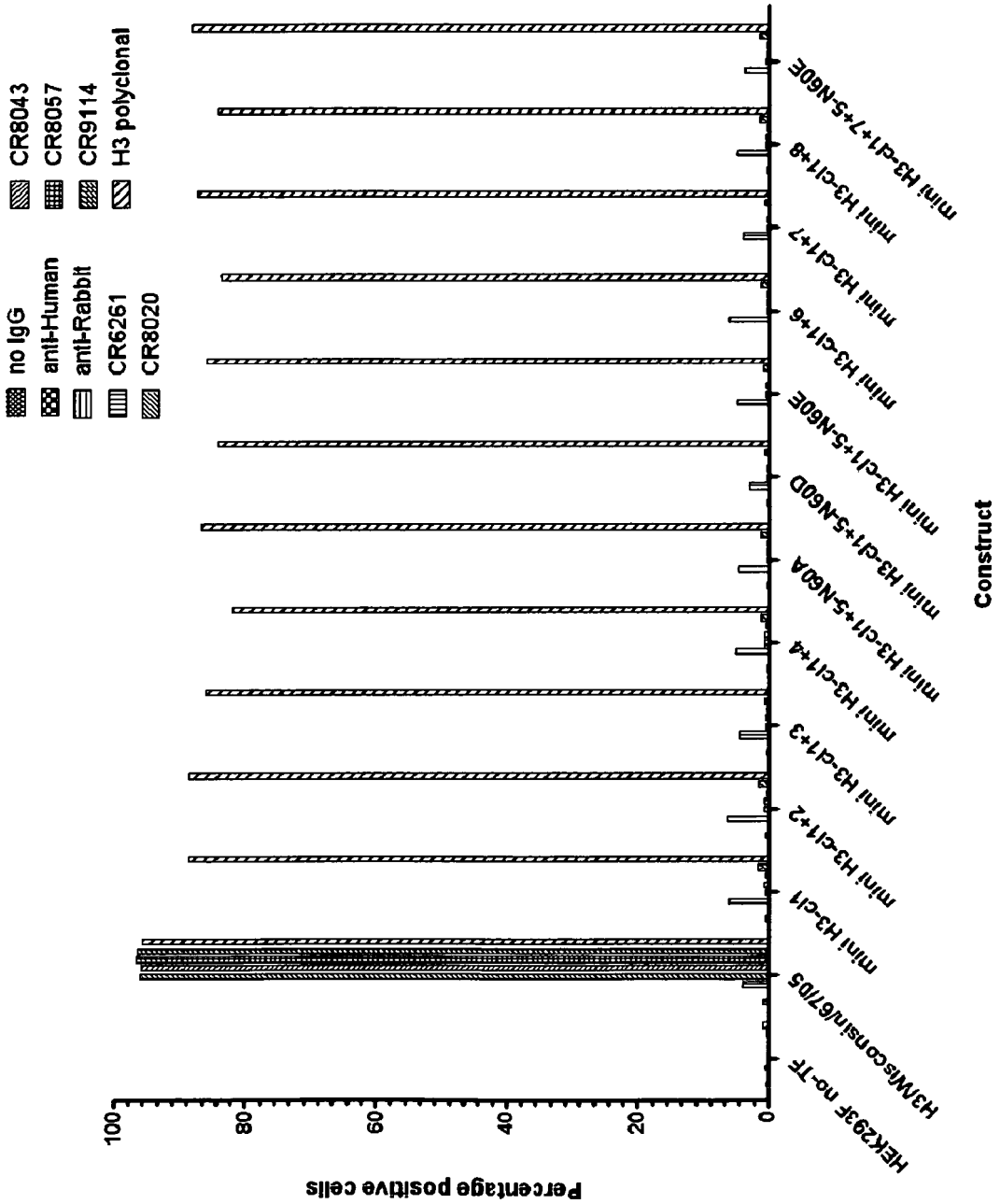

CR8043
CR8057
CR9114
H3 polyclonal
no IgG
anti-Human
anti-Rabbit
CR6261
CR8020
Percentage positive cells
100
80
60
40
20
0
HEK293F no-TF
H3MisConsInf67/05
mini H3-cl1
mini H3-cl1+2
mini H3-cl1+3
mini H3-cl1+4
mini H3-cl1+5-N60A
mini H3-cl1+5-N60D
mini H3-cl1+5-N60E
mini H3-cl1+6
mini H3-cl1+7
mini H3-cl1+8
mini H3-cl1+7+5-N60E
Construct

FIG. 8

B.

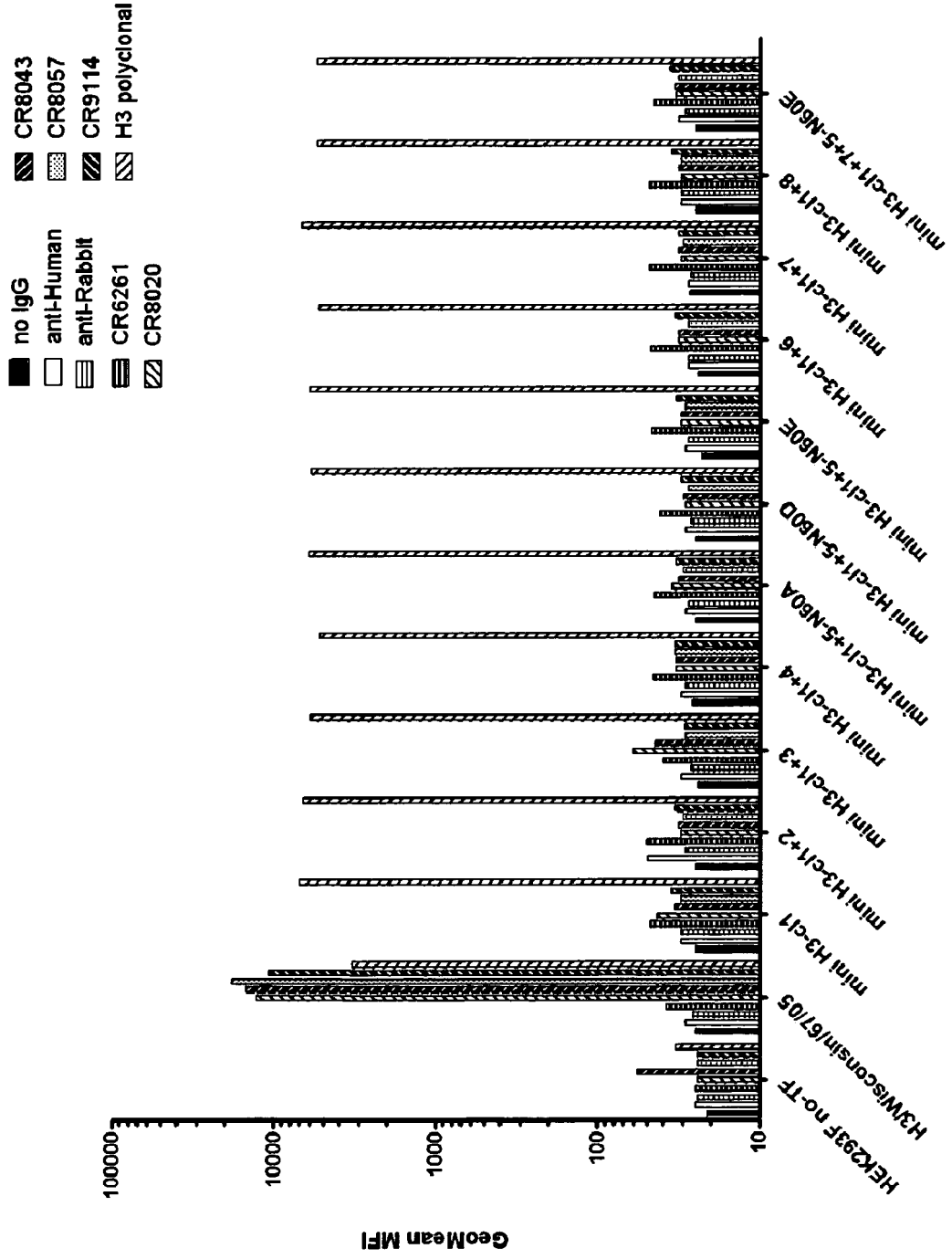

no IgG
anti-Human
anti-Rabbit
CR6261
CR8020
CR8043
CR8057
CR9114
H3 polyclonal
HEK293F no-TF
H3/Wisconsin/67/05
mini H3-cl1
mini H3-cl1+2
mini H3-cl1+3
mini H3-cl1+4
mini H3-cl1+5-N60A
mini H3-cl1+5-N60D
mini H3-cl1+5-N60E
mini H3-cl1+6
mini H3-cl1+7
mini H3-cl1+8
mini H3-cl1+7+5-N60E
100000
10000
1000
100
10
GeoMean MFI

FIG. 9A

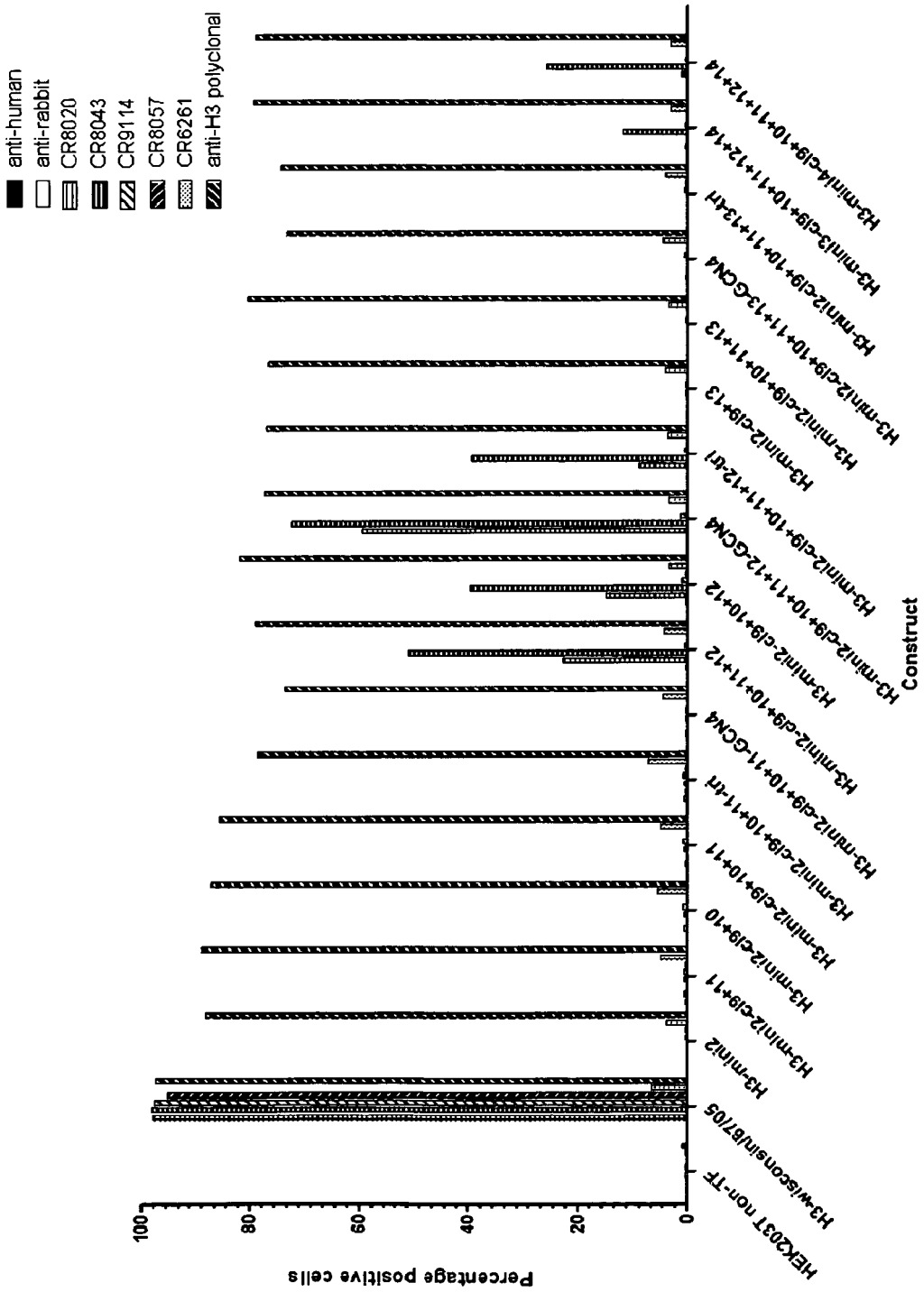

anti-human
anti-rabbit
CR8020
CR8043
CR9114
CR8057
CR6261
anti-H3 polyclonal
Percentage positive cells
100
80
60
40
20
0
Construct
HEK293T non-TF
H3-wi/secondin/87/05
H3-mIn/i2
H3-mIn/i2-c/9+11
H3-mIn/i2-c/9+10
H3-mIn/i2-c/9+10+11
H3-mIn/i2-c/9+10+11-rr
H3-mIn/i2-c/9+10+11-GCN4
H3-mIn/i2-c/9+10+12
H3-mIn/i2-c/9+10+11+12-GCN4
H3-mIn/i2-c/9+10+11+12-rr
H3-mIn/i2-c/9+10+11+13
H3-mIn/i2-c/9+10+11+13-GCN4
H3-mIn/i3-c/9+10+11+13-rr
H3-mIn/i4-c/9+10+11+12+14

FIG. 9B

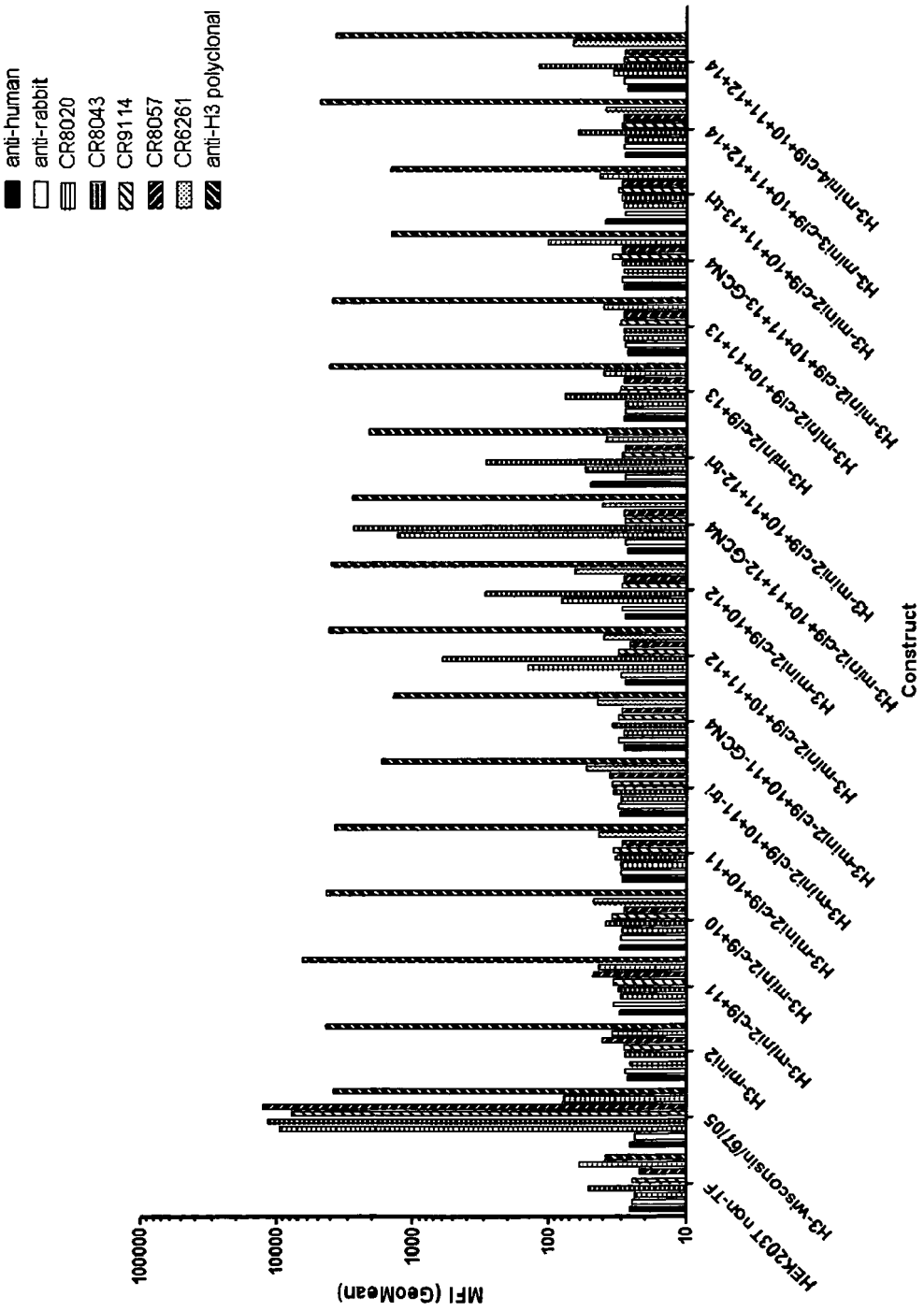

anti-human
anti-rabbit
CR8020
CR8043
CR9114
CR8057
CR6261
anti-H3 polyclonal
MFI (GeoMean)
100000
10000
1000
100
10
Construct
HEK293T non-TF
H3-Wisconsin/67/05
H3-mIn/12
H3-mIn/12-c/9+11
H3-mIn/12-c/9+10
H3-mIn/12-c/9+10+11
H3-mIn/12-c/9+10+11-6T
H3-mIn/12-c/9+10+11-GCN4
H3-mIn/12-c/9+10+11
H3-mIn/12-c/9+10+12
H3-mIn/12-c/9+10+11+12
H3-mIn/12-c/9+10+11+12-6T
H3-mIn/12-c/9+10+11+12-GCN4
H3-mIn/12-c/9+13
H3-mIn/12-c/9+10+11+13
H3-mIn/12-c/9+10+11+13-GCN4
H3-mIn/12-c/9+10+11+13-6T
H3-mIn/4-c/9+10+11+12+14
H3-mIn/3-c/9+10+11+12+14

FIG. 10A

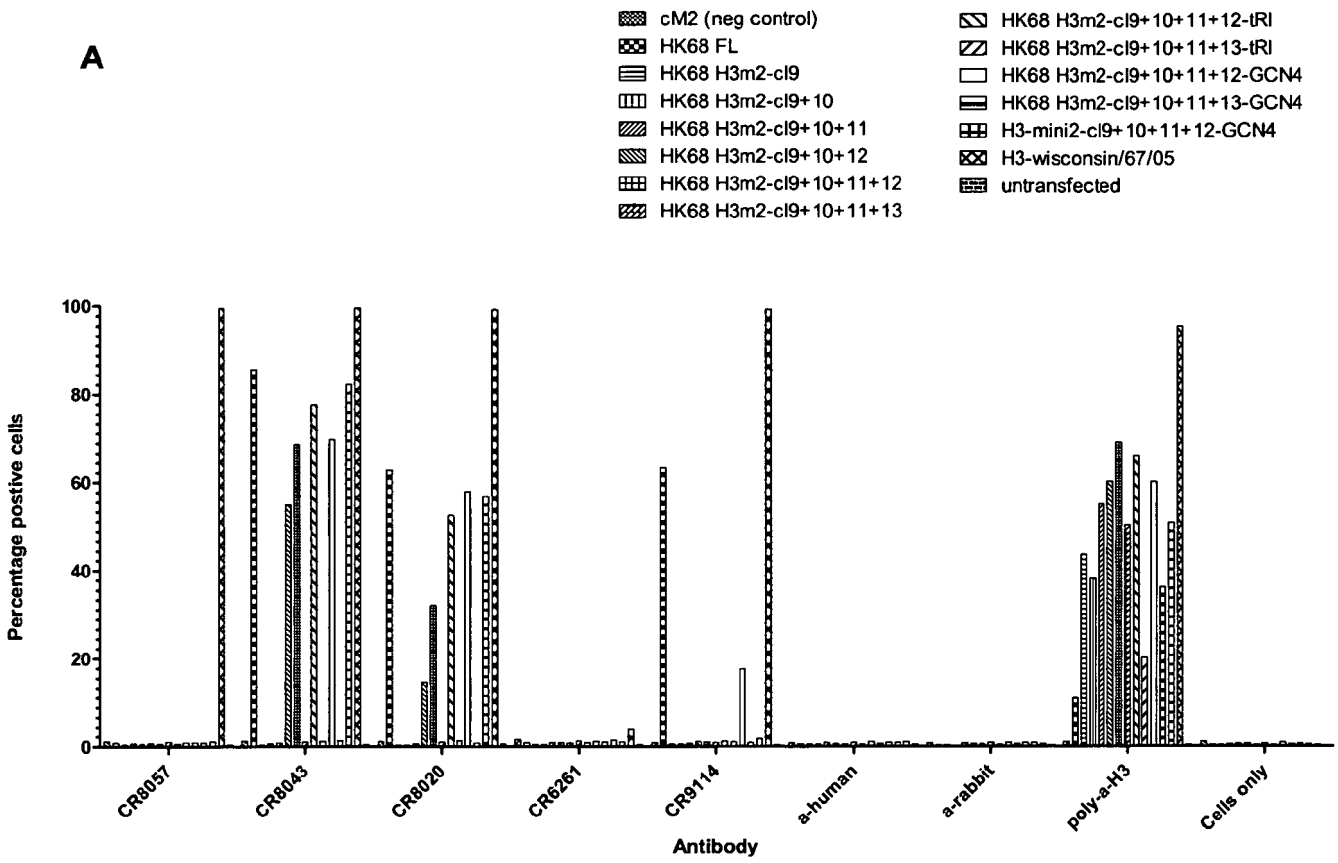

A
cM2 (neg control)
HK68 FL
HK68 H3m2-cl9
HK68 H3m2-cl9+10
HK68 H3m2-cl9+10+11
HK68 H3m2-cl9+10+12
HK68 H3m2-cl9+10+11+12
HK68 H3m2-cl9+10+11+13
HK68 H3m2-cl9+10+11+12-tRI
HK68 H3m2-cl9+10+11+13-tRI
HK68 H3m2-cl9+10+11+12-GCN4
HK68 H3m2-cl9+10+11+13-GCN4
H3-mini2-cl9+10+11+12-GCN4
H3-wisconsin/67/05
untransfected
Percentage postive cells
100
80
60
40
20
0
CR8057
CR8043
CR8020
CR6261
CR9114
a-human
a-rabbit
poly-a-H3
Cells only
Antibody

FIG. 10B

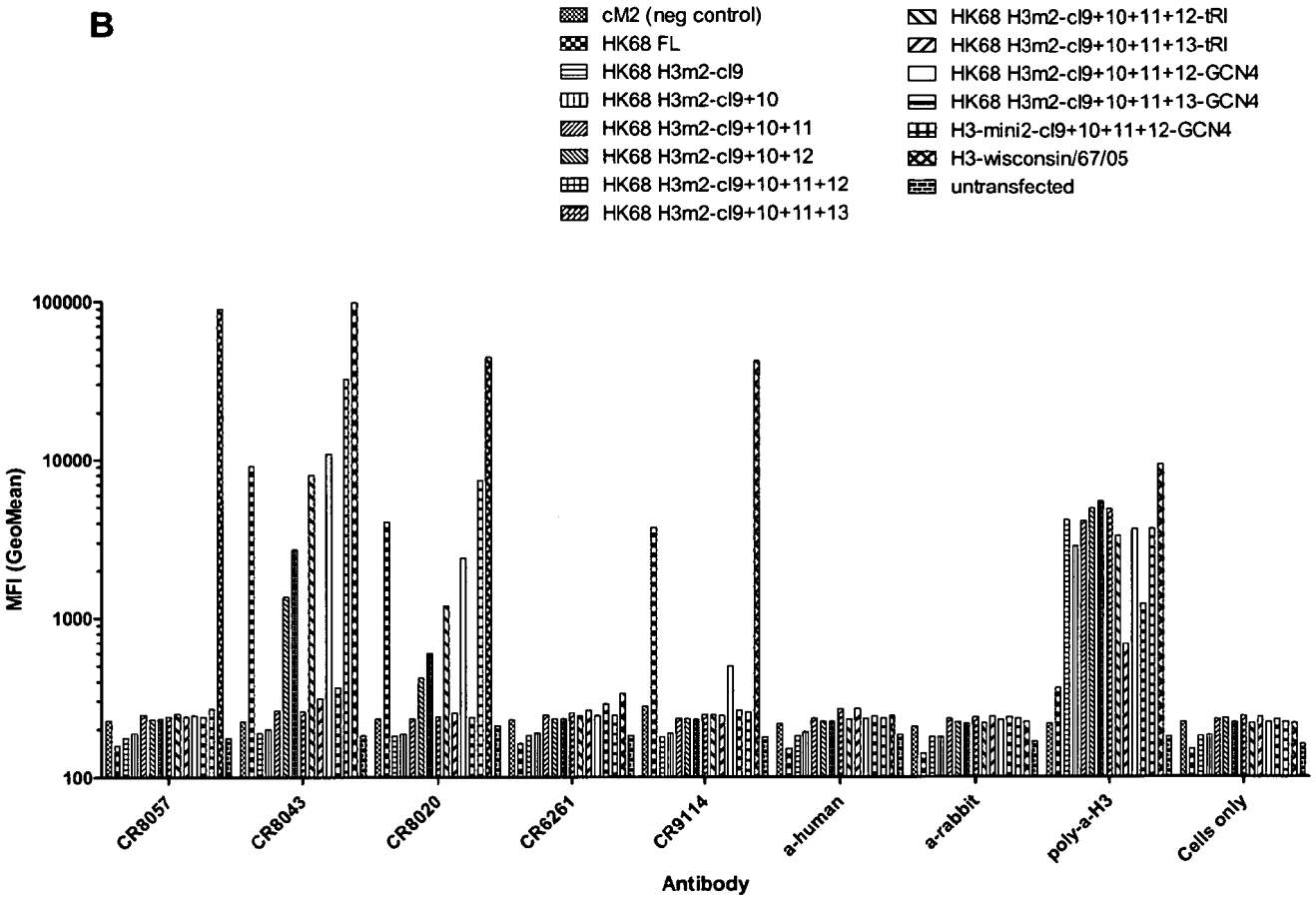

B
cM2 (neg control)
HK68 FL
HK68 H3m2-cl9
HK68 H3m2-cl9+10
HK68 H3m2-cl9+10+11
HK68 H3m2-cl9+10+12
HK68 H3m2-cl9+10+11+12
HK68 H3m2-cl9+10+11+13
HK68 H3m2-cl9+10+11+12-tRI
HK68 H3m2-cl9+10+11+13-tRI
HK68 H3m2-cl9+10+11+12-GCN4
HK68 H3m2-cl9+10+11+13-GCN4
H3-mini2-cl9+10+11+12-GCN4
H3-wisconsin/67/05
untransfected
MFI (GeoMean)
100000
10000
1000
100
CR8057
CR8043
CR8020
CR6261
CR9114
a-human
a-rabbit
poly-a-H3
Cells only
Antibody

FIG. 11A

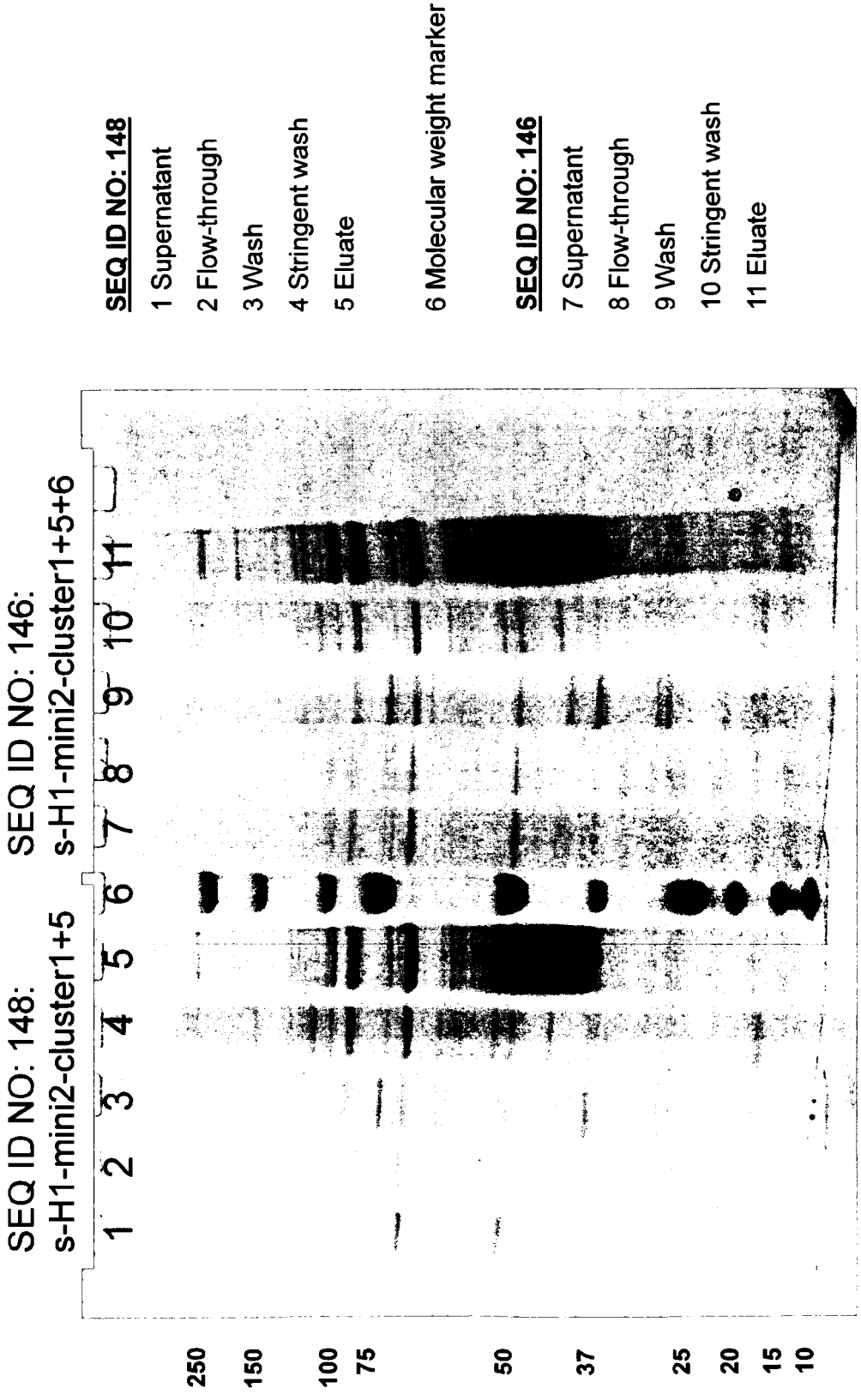

SEQ ID NO: 148:
s-H1-mini2-cluster1+5
SEQ ID NO: 146:
s-H1-mini2-cluster1+5+6
1 2 3 4 5 6 7 8 9 10 11
250
150
100
75
50
37
25
20
15
10
SEQ ID NO: 148
1 Supernatant
2 Flow-through
3 Wash
4 Stringent wash
5 Eluate
6 Molecular weight marker
SEQ ID NO: 146
7 Supernatant
8 Flow-through
9 Wash
10 Stringent wash
11 Eluate

FIG. 11B

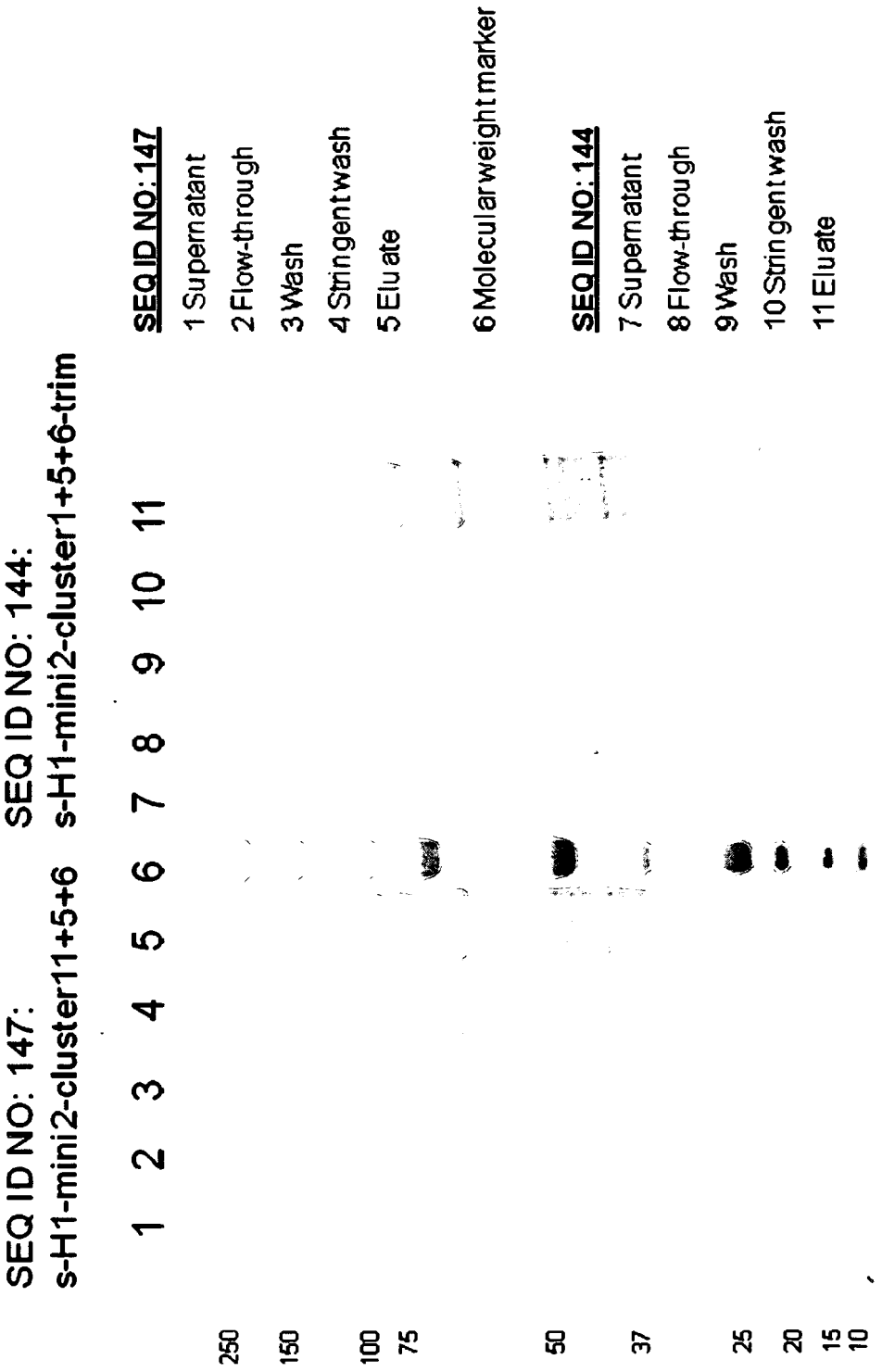
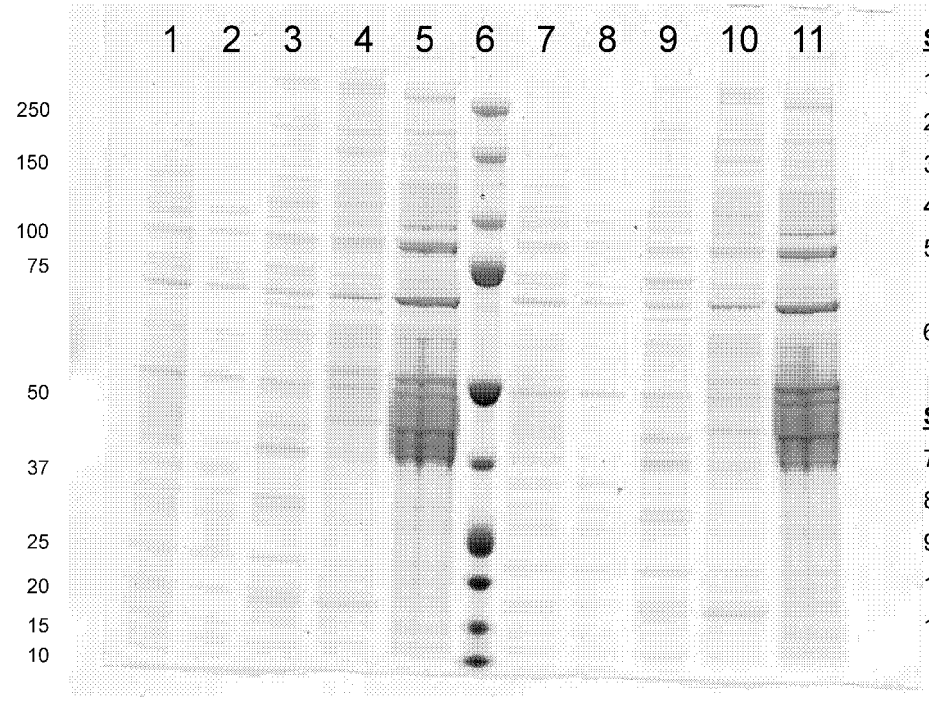

SEQ ID NO: 147:
s-H1-mini2-cluster11+5+6
SEQ ID NO: 144:
s-H1-mini2-cluster1+5+6-trim
1 2 3 4 5 6 7 8 9 10 11
SEQ ID NO:147
1 Supernatant
2 Flow-through
3 Wash
4 Stringent wash
5 Eluate
6 Molecular weight marker
SEQ ID NO:144
7 Supernatant
8 Flow-through
9 Wash
10 Stringent wash
11 Eluate
250
150
100
75
50
37
25
20
15
10

FIG. 11C

SEQ ID NO: 145:
s-H1-mini2-cluster1+5+6-GCN4

SEQ ID NO: 150:
s-H1-mini2-cluster1+5+6-nl



SEQ ID NO: 145
1 Supernatant
2 Flow-through
3 Wash
4 Stringent wash
5 Eluate

6 Molecular weight marker

SEQ ID NO: 150
7 Supernatant
8 Flow-through
9 Wash
10 Stringent wash
11 Eluate

FIG. 11D

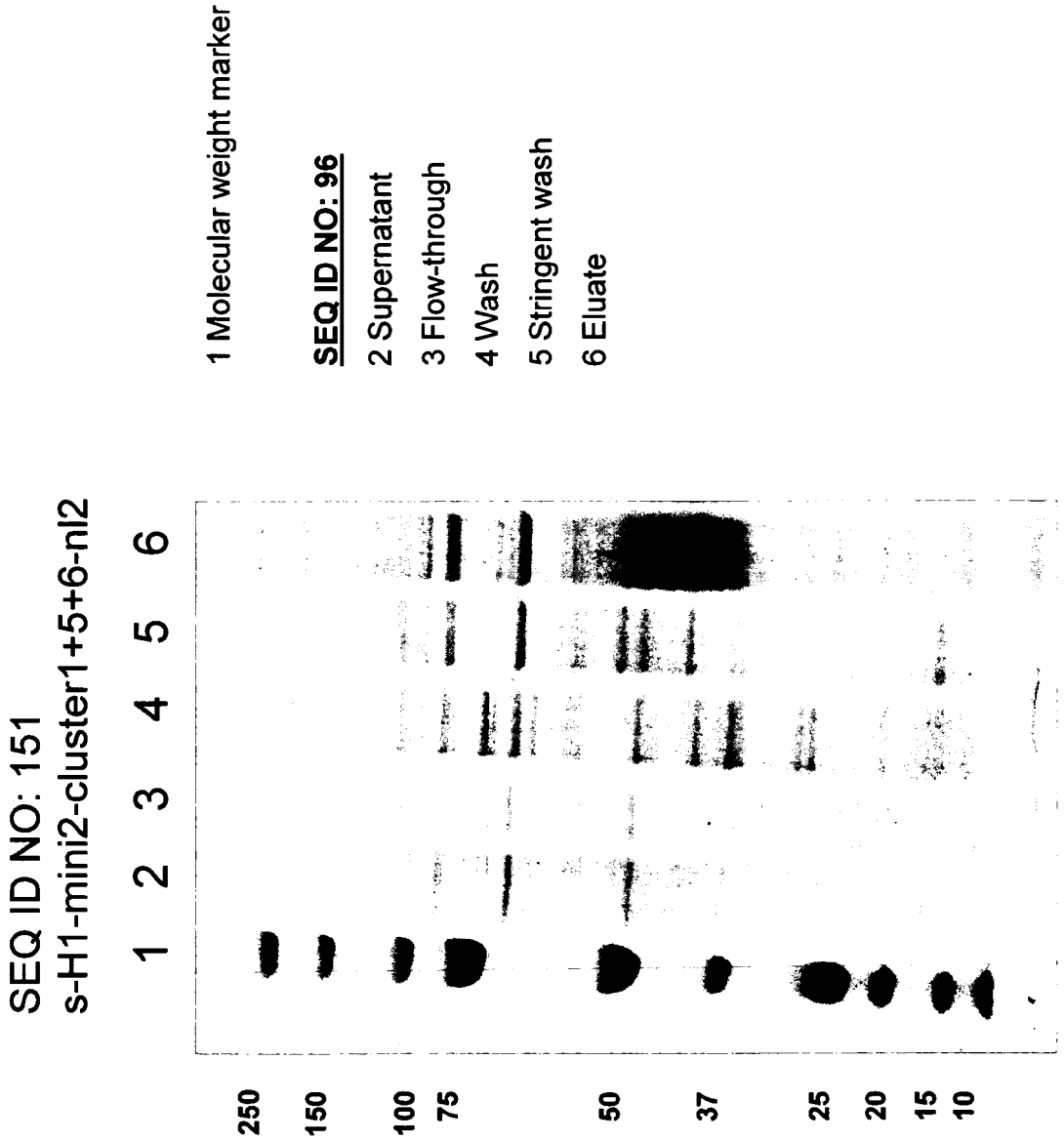
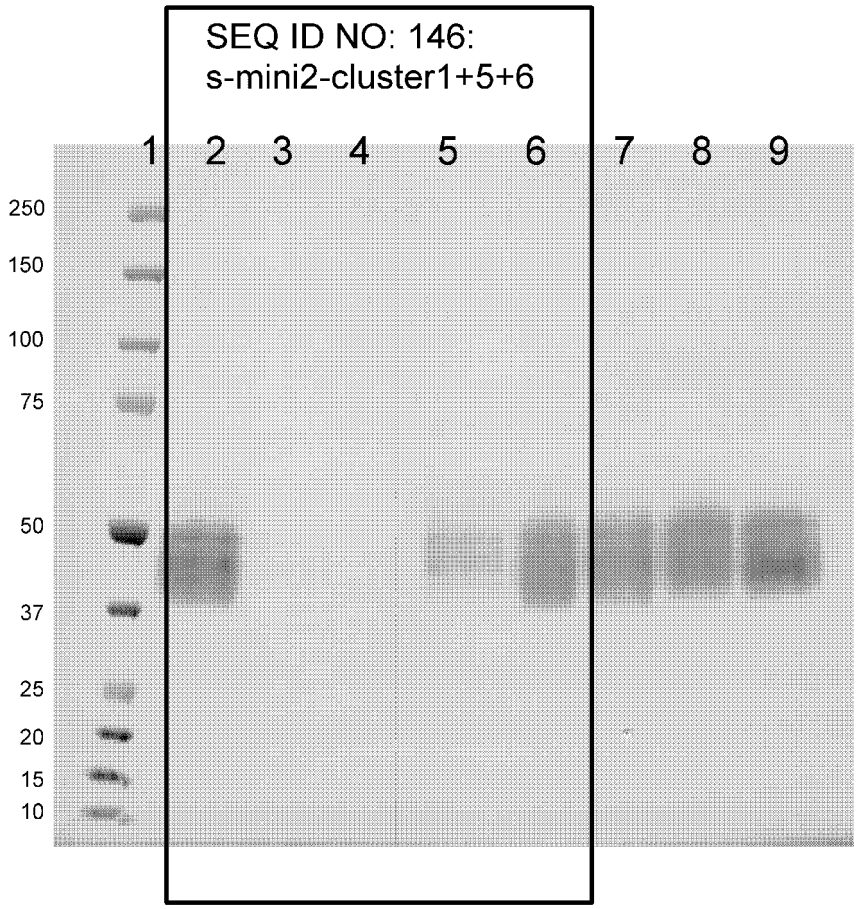

1 Molecular weight marker
SEQ ID NO: 96
2 Supernatant
3 Flow-through
4 Wash
5 Stringent wash
6 Eluate
SEQ ID NO: 151
s-H1-mini2-cluster1+5+6-nl2
1 2 3 4 5 6
250
150
100
75
50
37
25
20
15
10

FIG. 11E



1 Marker

SEQ ID NO: 146

2 Supernatant

3 Flow-through

4 Wash

5 Stringent wash

6 Eluate 1

SEQ ID NO: 148

7 Eluate

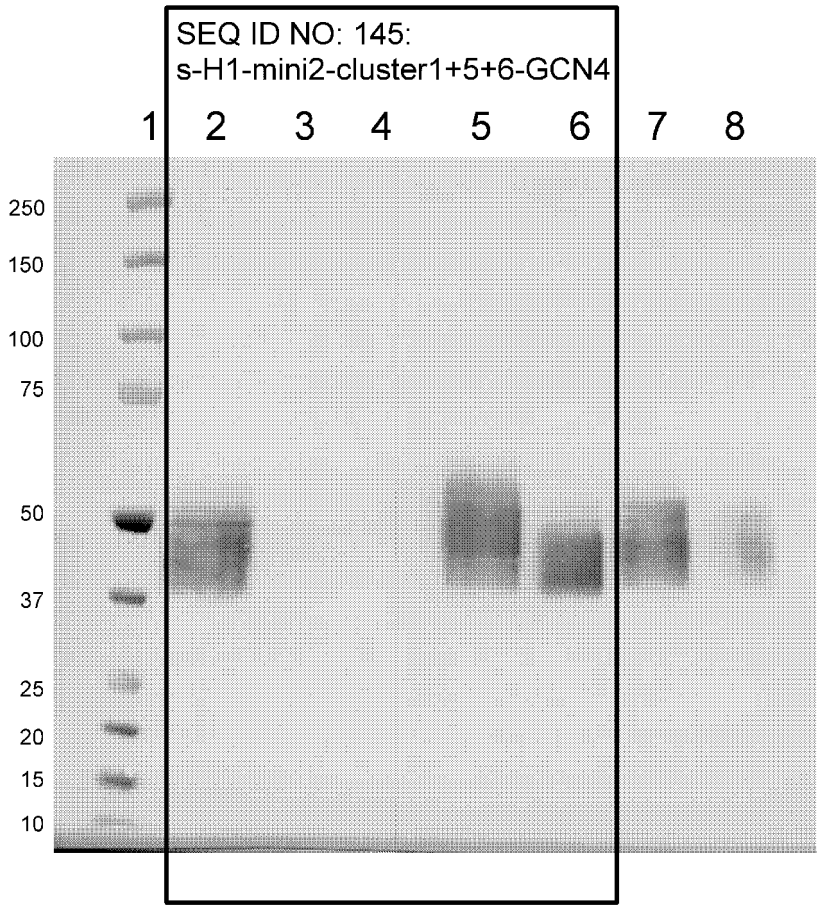
SEQ ID NO: 147

8 Eluate

SEQ ID NO: 144

9 Eluate

FIG. 11F



1 Molecular weight marker

SEQ ID NO: 145

2 Supernatant

3 Flow-through

4 Wash

5 Stringent wash

6 Eluate

SEQ ID NO: 150

7 Eluate

SEQ ID NO: 151

8 Eluate

FIG. 12A

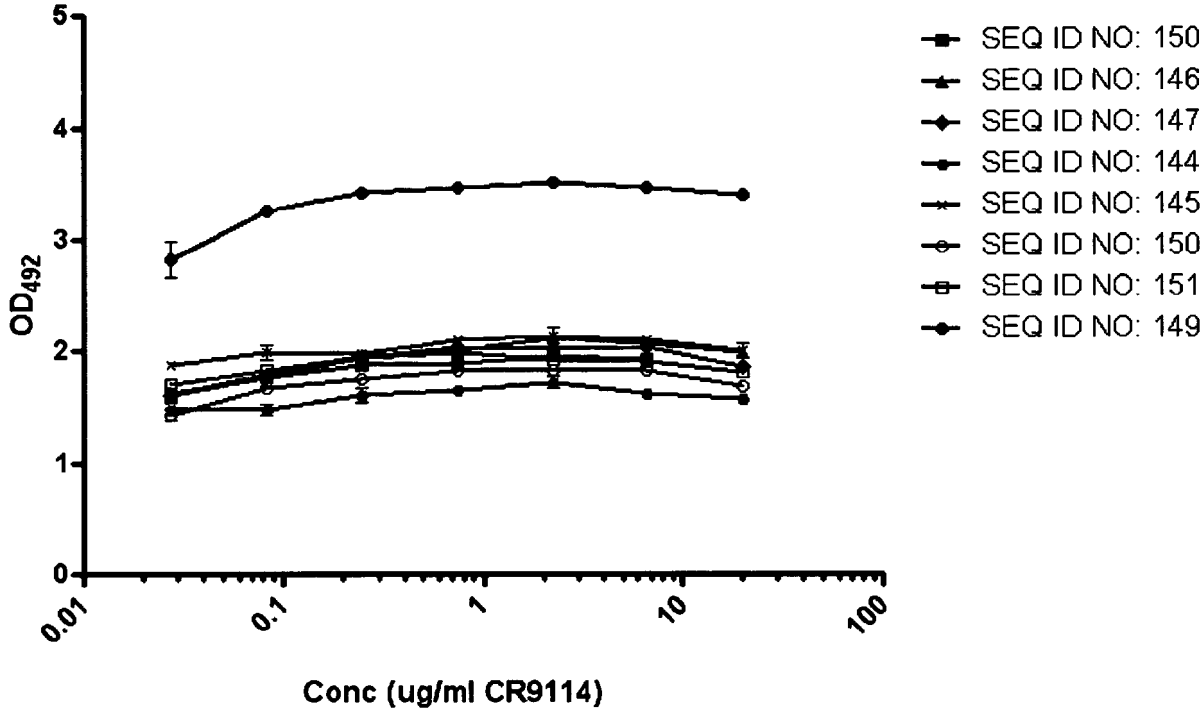


FIG. 12B

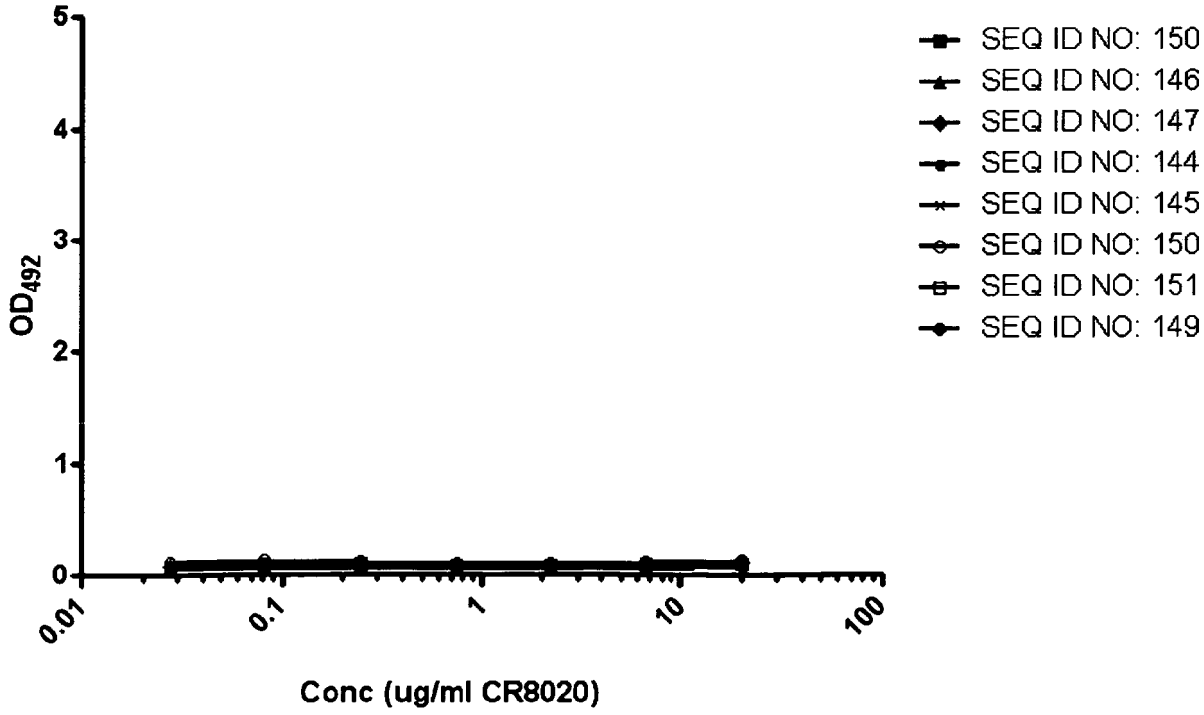


FIG. 12C

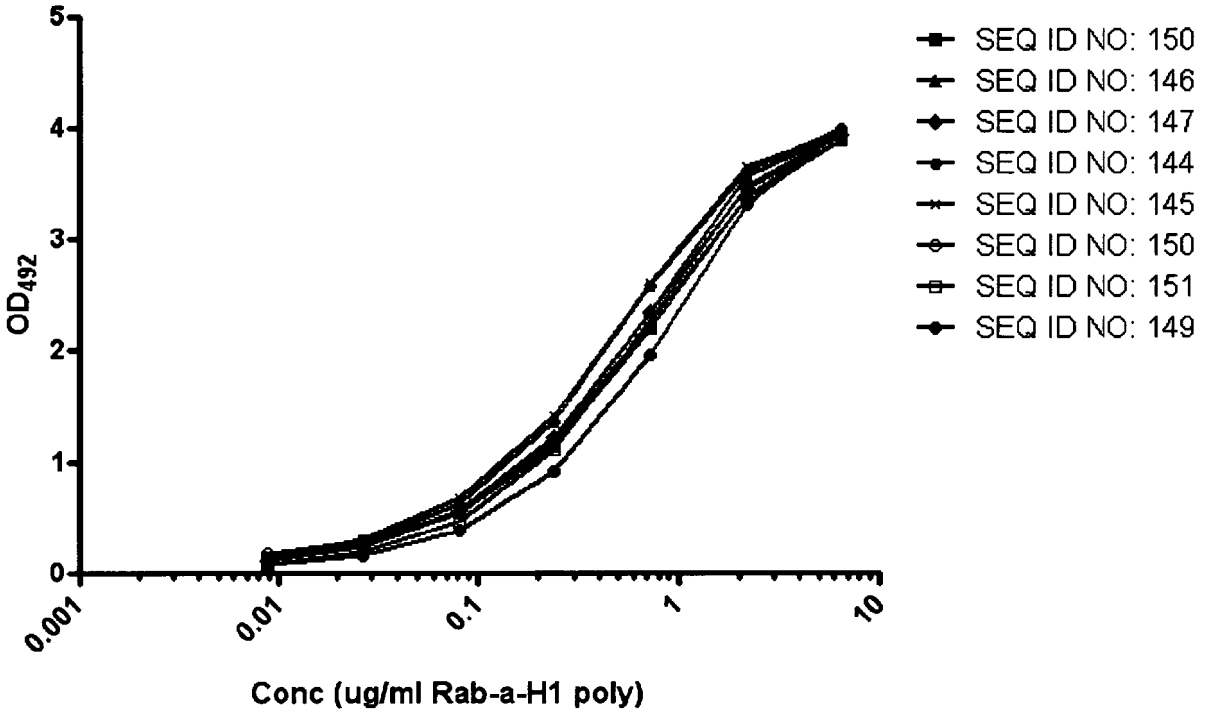

5
4
3
2
1
0
OD492
0.001
0.01
0.1
1
10
Conc (ug/ml Rab-a-H1 poly)
SEQ ID NO: 150
SEQ ID NO: 146
SEQ ID NO: 147
SEQ ID NO: 144
SEQ ID NO: 145
SEQ ID NO: 150
SEQ ID NO: 151
SEQ ID NO: 149

FIG. 13A

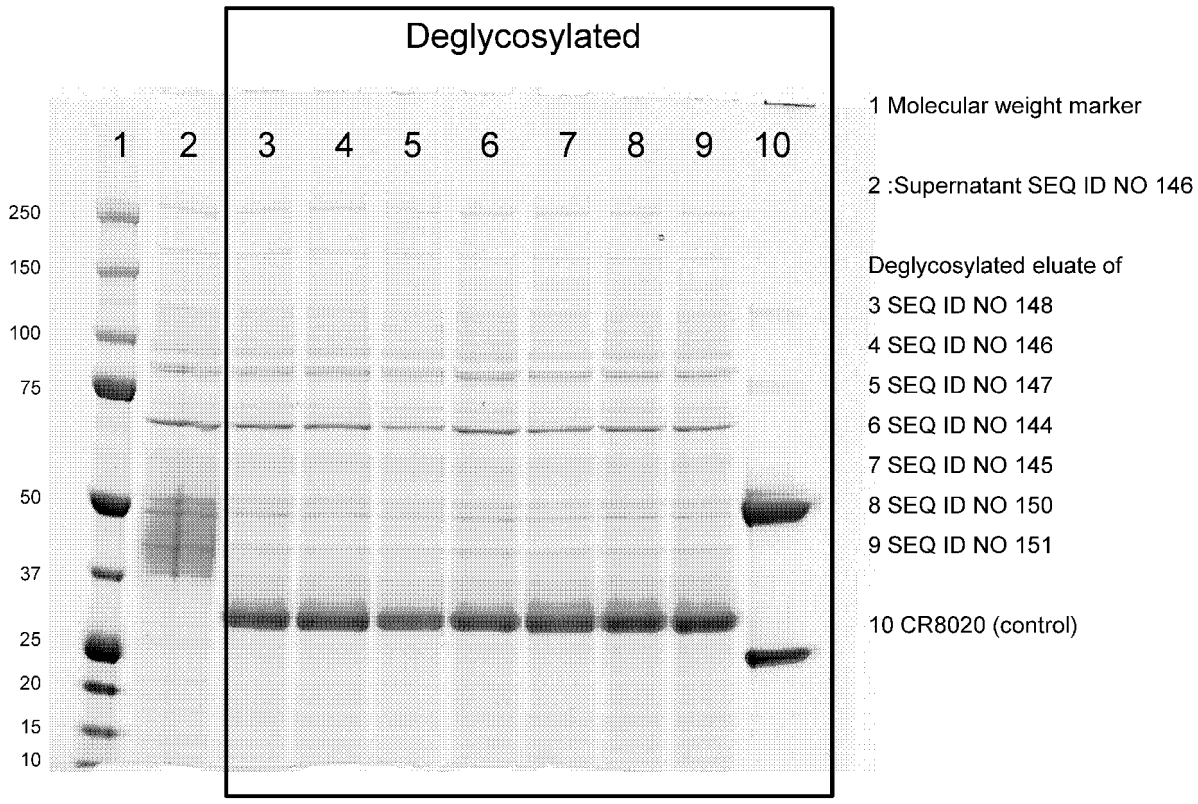

Deglycosylated
1 2 3 4 5 6 7 8 9 10
250
150
100
75
50
37
25
20
15
10
1 Molecular weight marker
2 :Supernatant SEQ ID NO 146
Deglycosylated eluate of
3 SEQ ID NO 148
4 SEQ ID NO 146
5 SEQ ID NO 147
6 SEQ ID NO 144
7 SEQ ID NO 145
8 SEQ ID NO 150
9 SEQ ID NO 151
10 CR8020 (control)

FIG. 13B

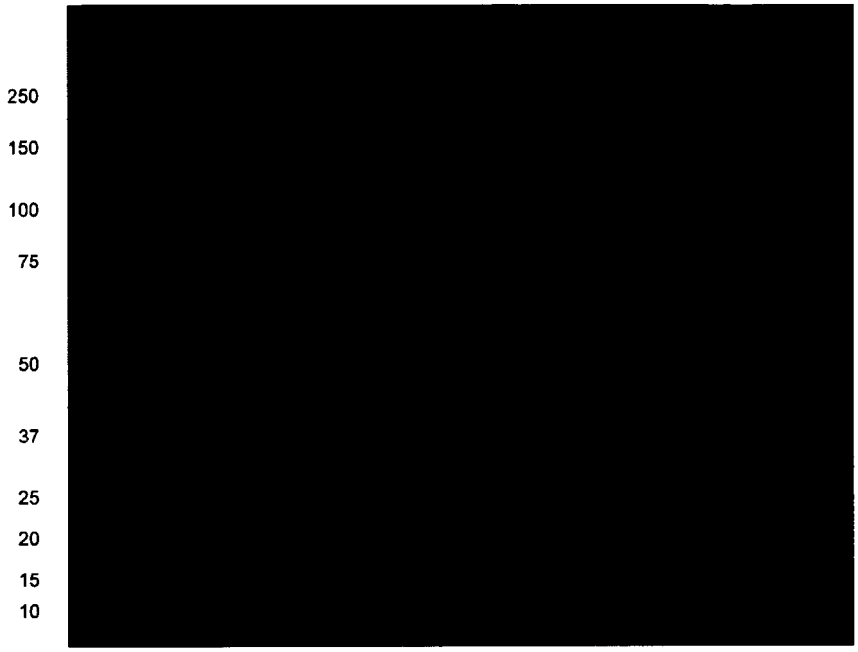
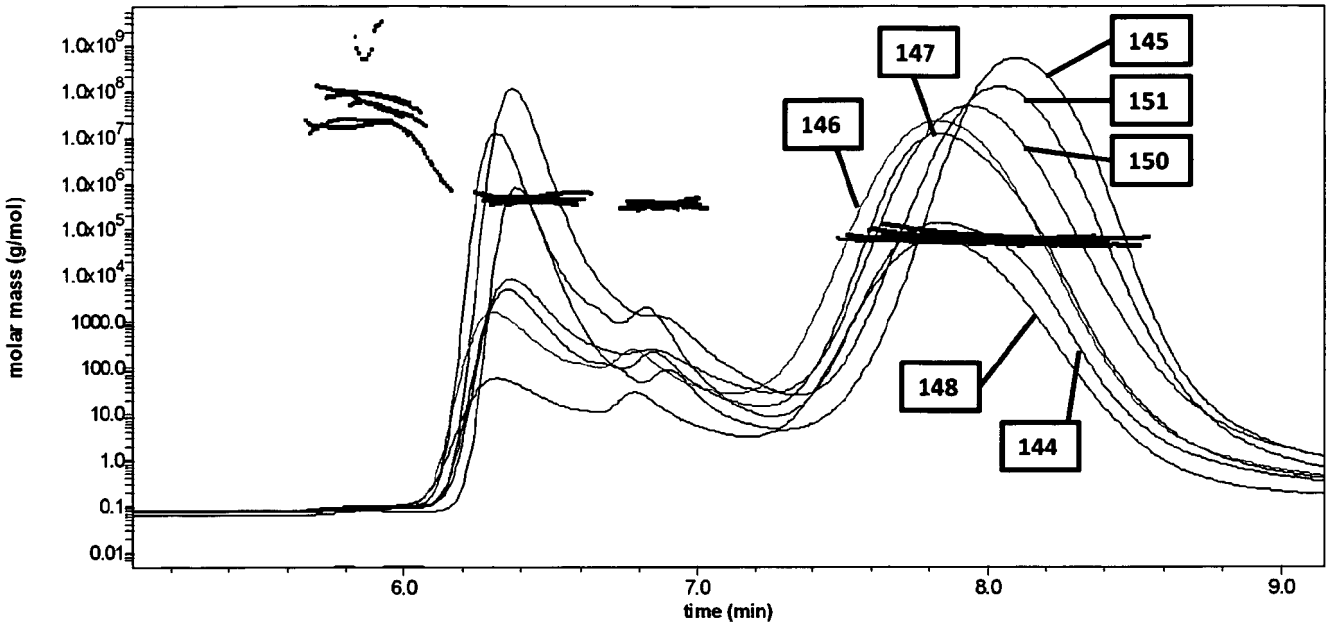

250
150
100
75
50
37
25
20
15
10
1 Molecular weight marker
2 :Supernatant SEQ ID NO 146
Deglycosylated eluate of
3 SEQ ID NO 148
4 SEQ ID NO 146
5 SEQ ID NO 147
6 SEQ ID NO 144
7 SEQ ID NO 145
8 SEQ ID NO 150
9 SEQ ID NO 151
10 CR8020 (control)
Detection: rabbit polyclonal α-H1

FIG. 14


molar mass (g/mol)
1.0x10^9
1.0x10^8
1.0x10^7
1.0x10^6
1.0x10^5
1.0x10^4
1000.0
100.0
10.0
1.0
0.1
0.01
6.0
7.0
8.0
9.0
time (min)
147
145
151
146
150
148
144

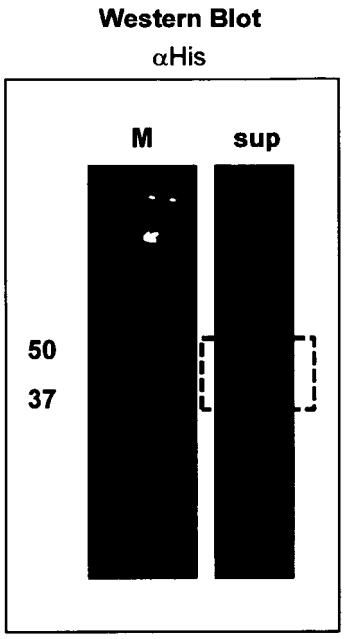


Fig. 15a

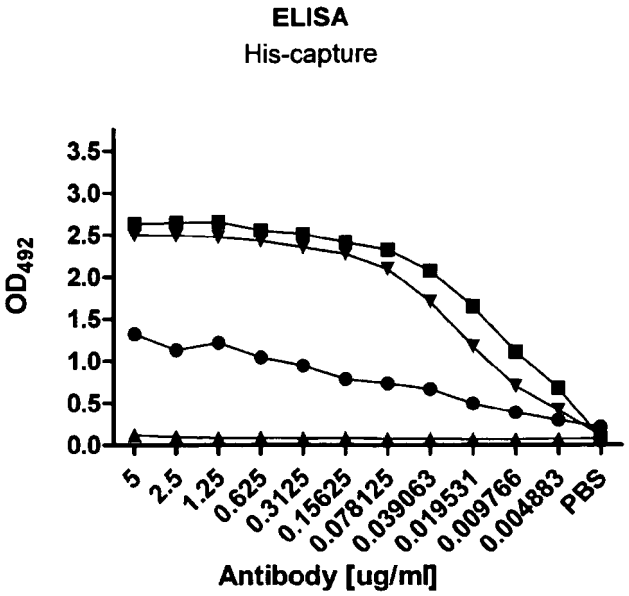


Fig.15b

FIG. 16

Starting material; 250 ml supernatant
Column; 5 ml HisTrap
Elution; Imidazole step gradient

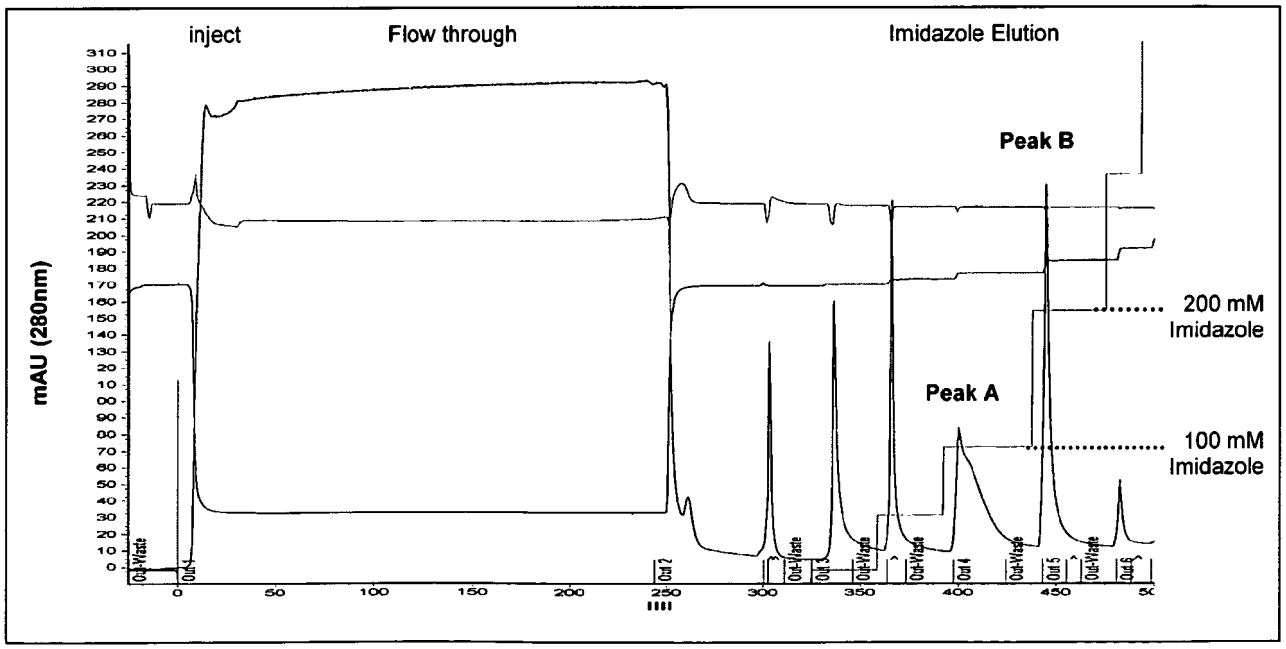


FIG. 17

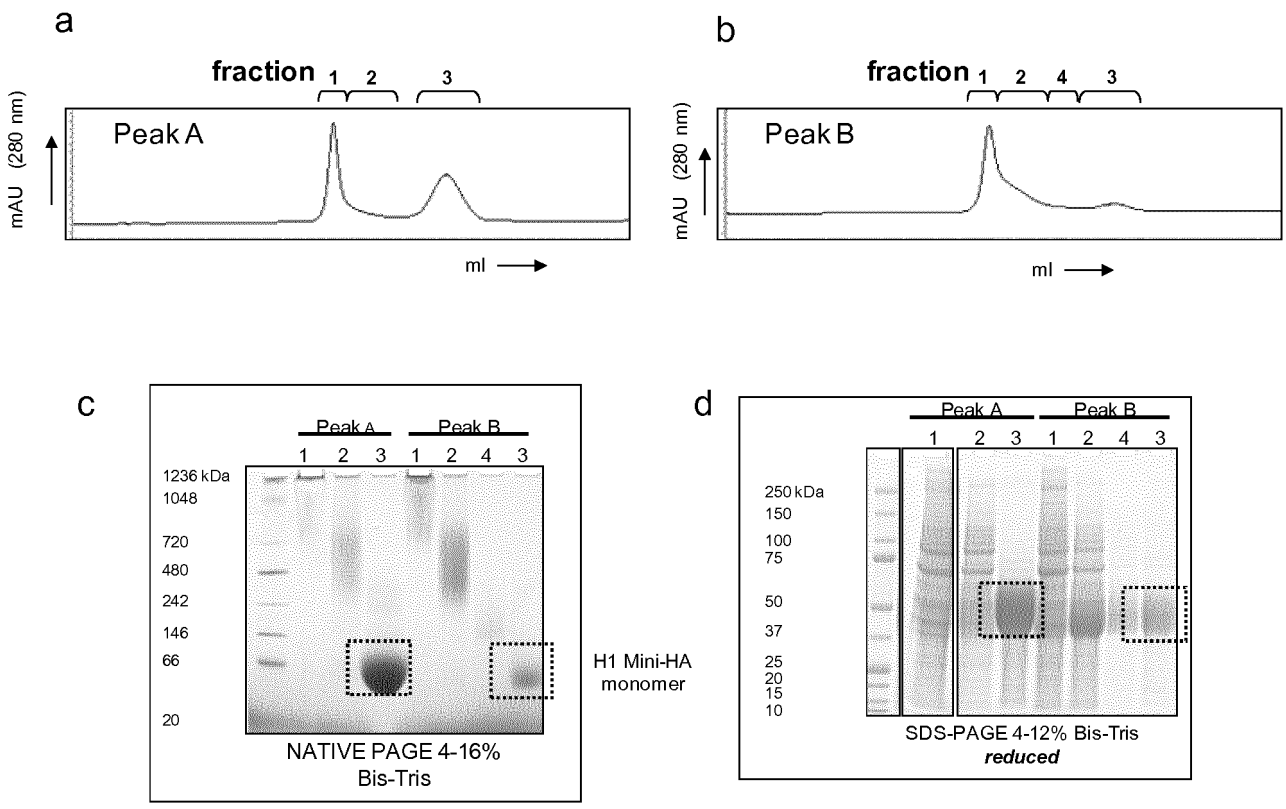

a
fraction 1 2 3
Peak A
mAU (280 nm)
ml
b
fraction 1 2 4 3
Peak B
mAU (280 nm)
ml
c
Peak A
Peak B
1 2 3 1 2 4 3
1236 kDa
1048
720
480
242
146
66
20
NATIVE PAGE 4-16%
Bis-Tris
H1 Mini-HA
monomer
d
Peak A
Peak B
1 2 3 1 2 4 3
250 kDa
150
100
75
50
37
25
20
15
10
SDS-PAGE 4-12% Bis-Tris
reduced

FIG. 18

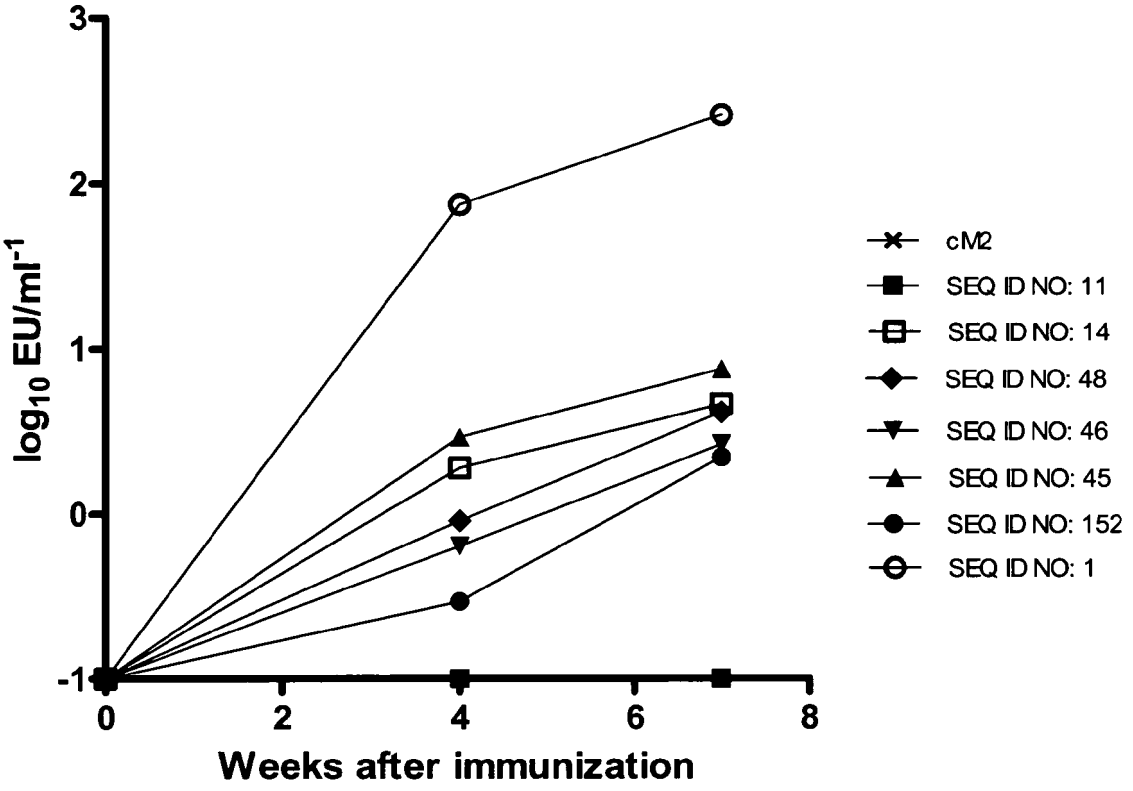

3
2
1
0
-1
log10 EU/ml-1
0
2
4
6
8
Weeks after immunization
cM2
SEQ ID NO: 11
SEQ ID NO: 14
SEQ ID NO: 48
SEQ ID NO: 46
SEQ ID NO: 45
SEQ ID NO: 152
SEQ ID NO: 1

FIG. 19A

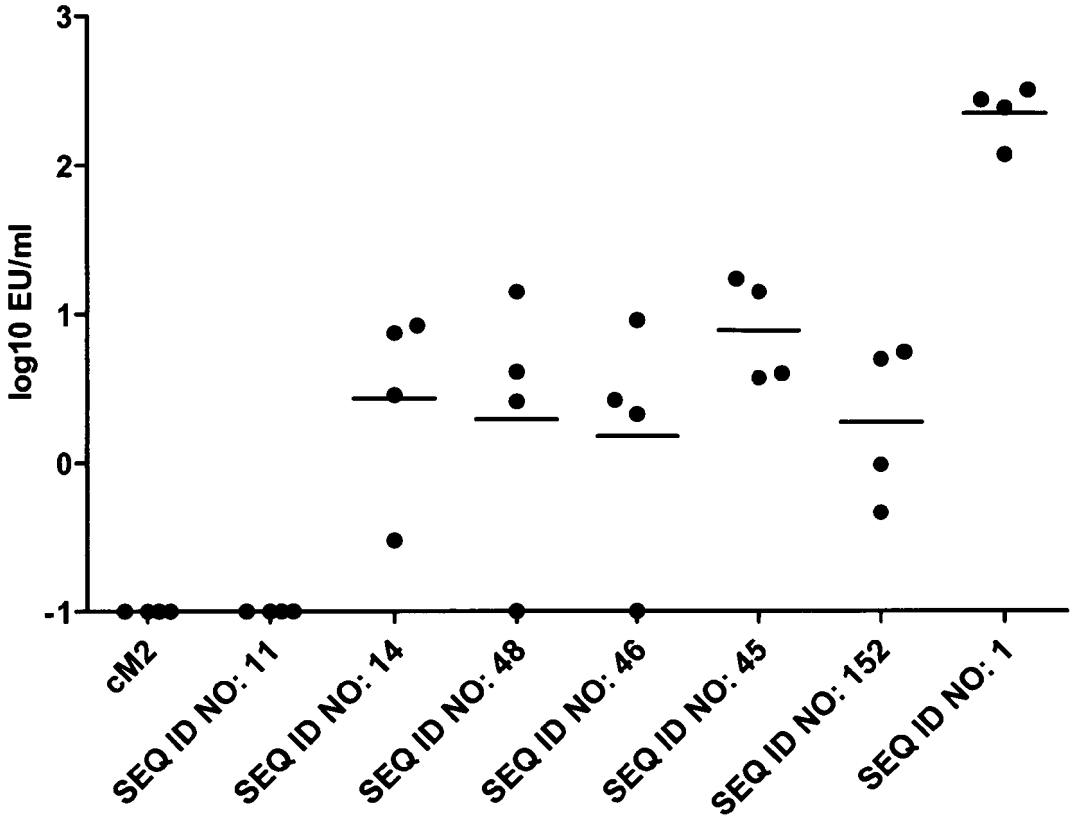

log10 EU/ml
3
2
1
0
-1
cM2
SEQ ID NO: 11
SEQ ID NO: 14
SEQ ID NO: 48
SEQ ID NO: 46
SEQ ID NO: 45
SEQ ID NO: 152
SEQ ID NO: 1

FIG. 19B

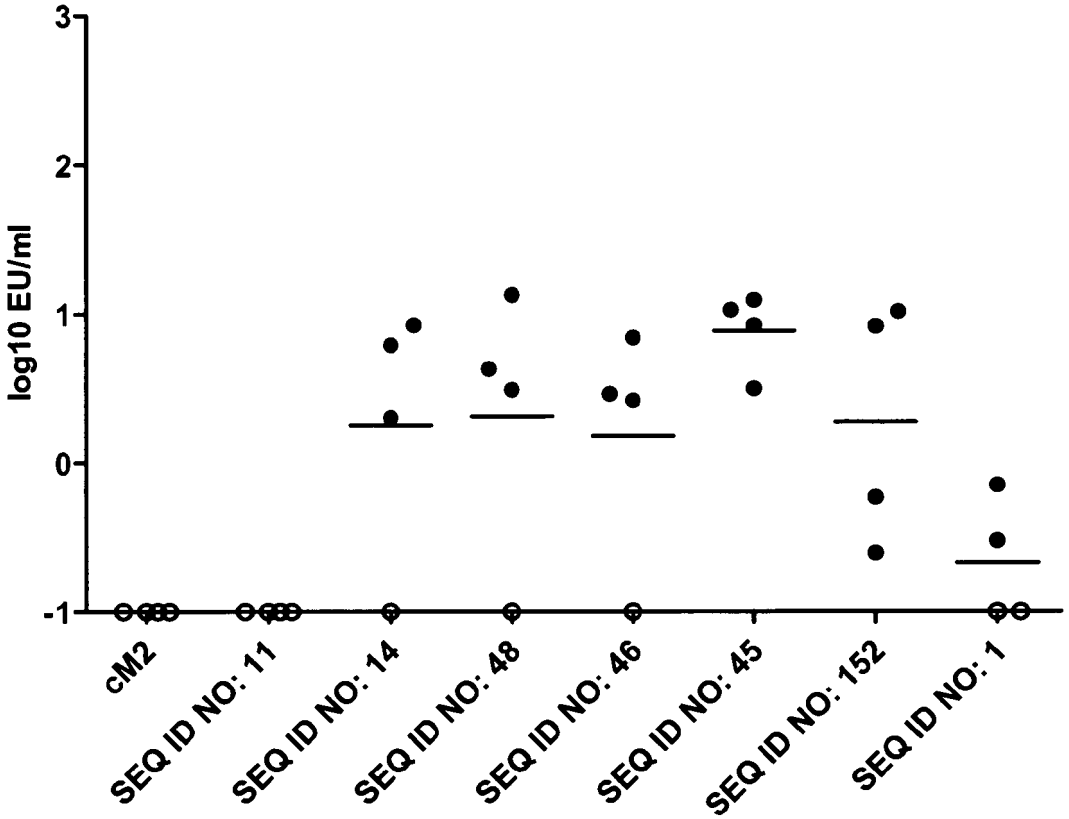

3
2
1
0
-1
log10 EU/ml
cM2
SEQ ID NO: 11
SEQ ID NO: 14
SEQ ID NO: 48
SEQ ID NO: 46
SEQ ID NO: 45
SEQ ID NO: 152
SEQ ID NO: 1

FIG. 20A

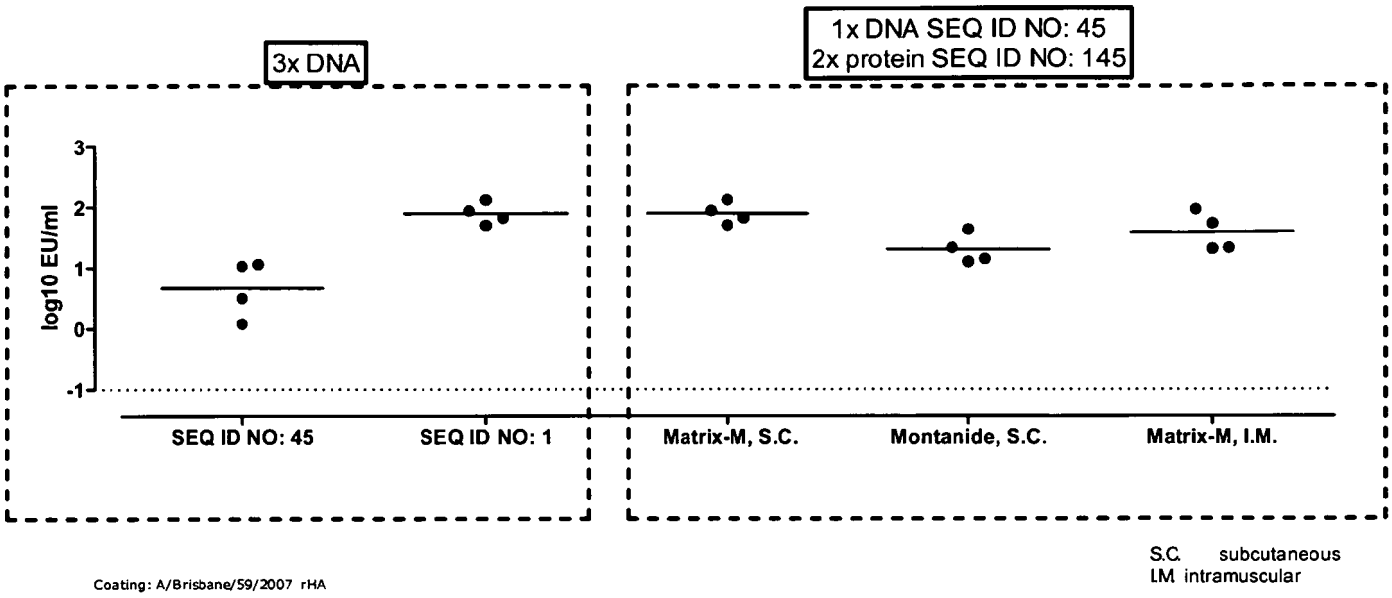


FIG. 20B

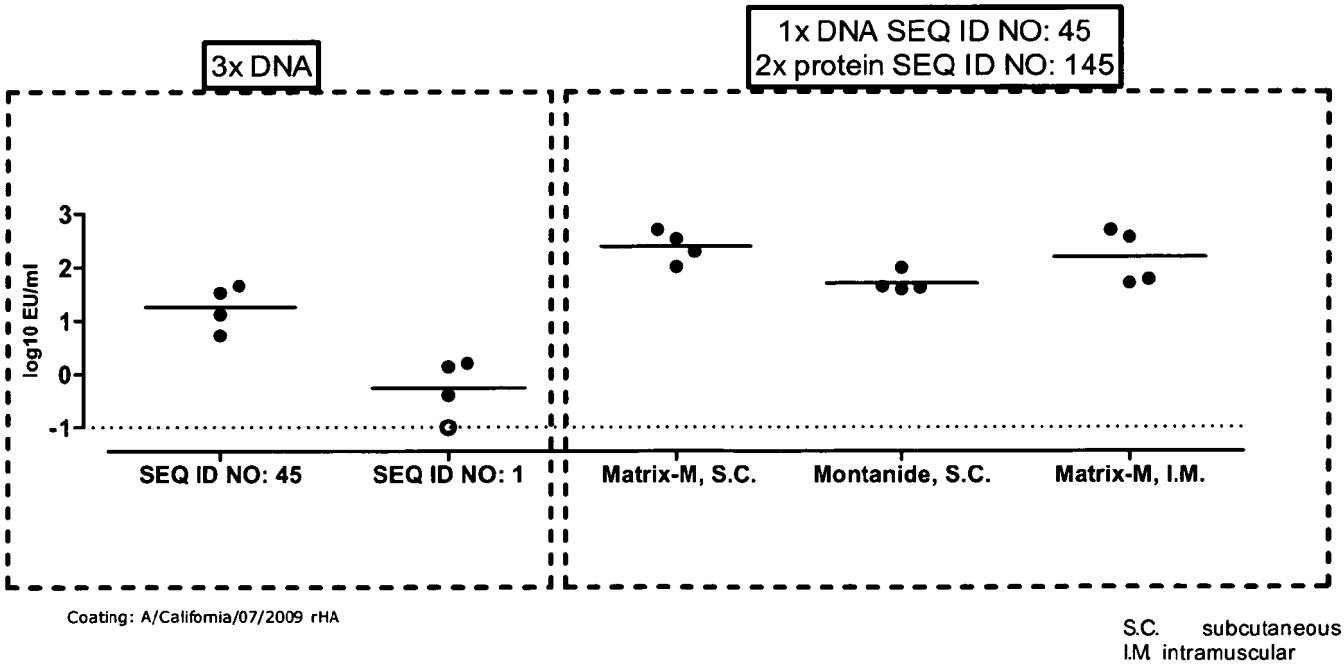


FIG. 20C

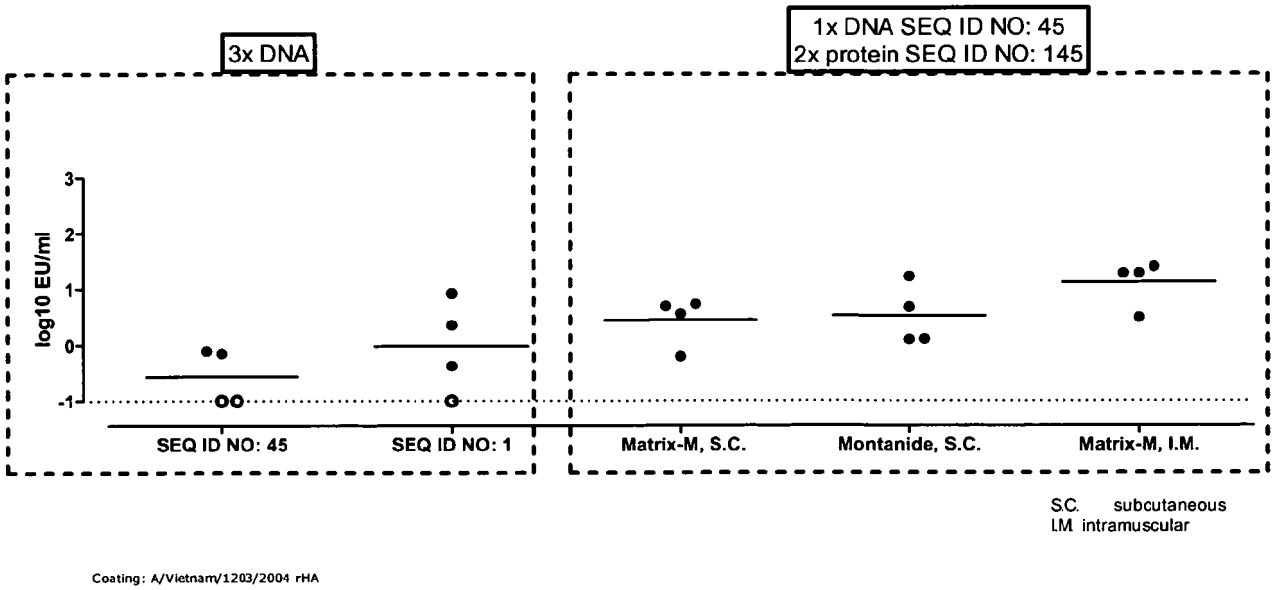


FIG. 20D

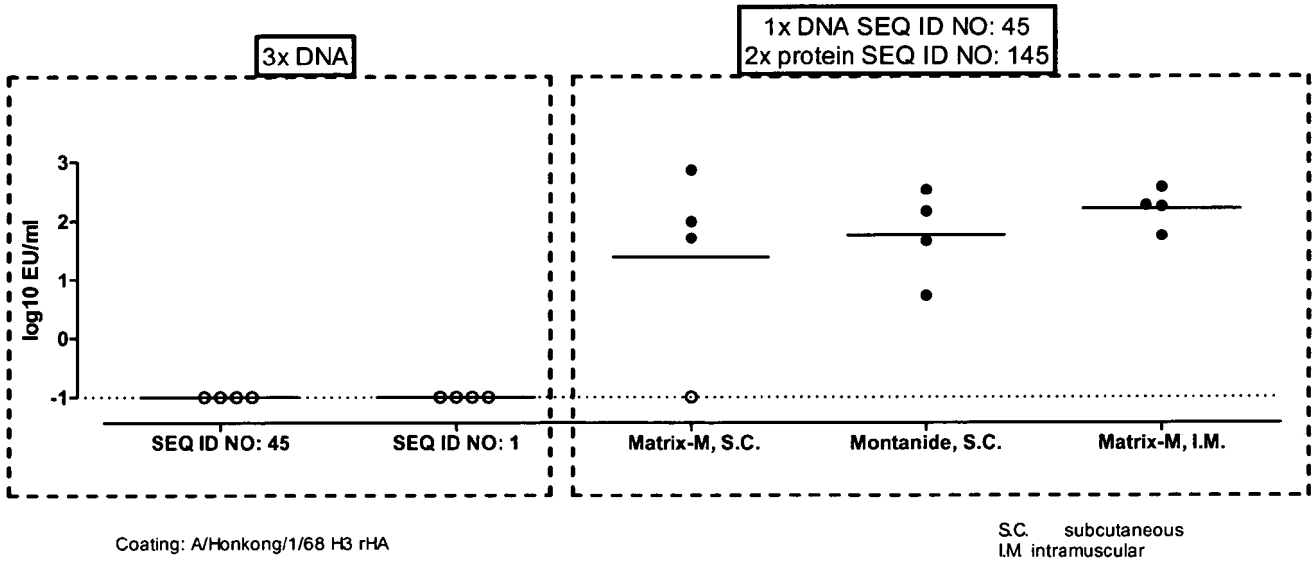


FIG. 21

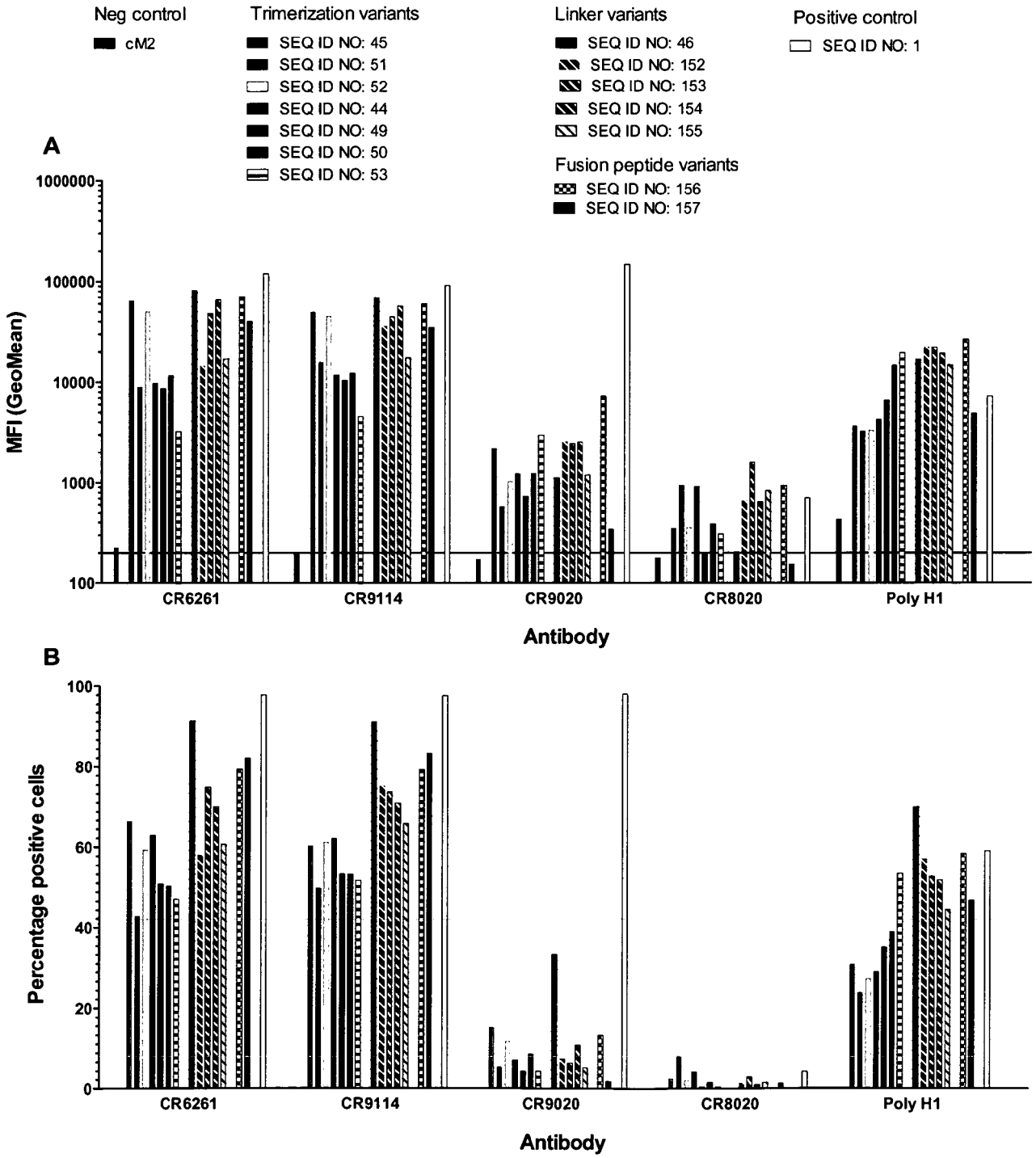

Neg control
cM2
Trimerization variants
SEQ ID NO: 45
SEQ ID NO: 51
SEQ ID NO: 52
SEQ ID NO: 44
SEQ ID NO: 49
SEQ ID NO: 50
SEQ ID NO: 53
Linker variants
SEQ ID NO: 46
SEQ ID NO: 152
SEQ ID NO: 153
SEQ ID NO: 154
SEQ ID NO: 155
Fusion peptide variants
SEQ ID NO: 156
SEQ ID NO: 157
Positive control
SEQ ID NO: 1
A
MFI (GeoMean)
1000000
100000
10000
1000
100
CR6261
CR9114
CR9020
CR8020
Poly H1
Antibody
B
Percentage positive cells
100
80
60
40
20
0
CR6261
CR9114
CR9020
CR8020
Poly H1
Antibody

FIG. 22A

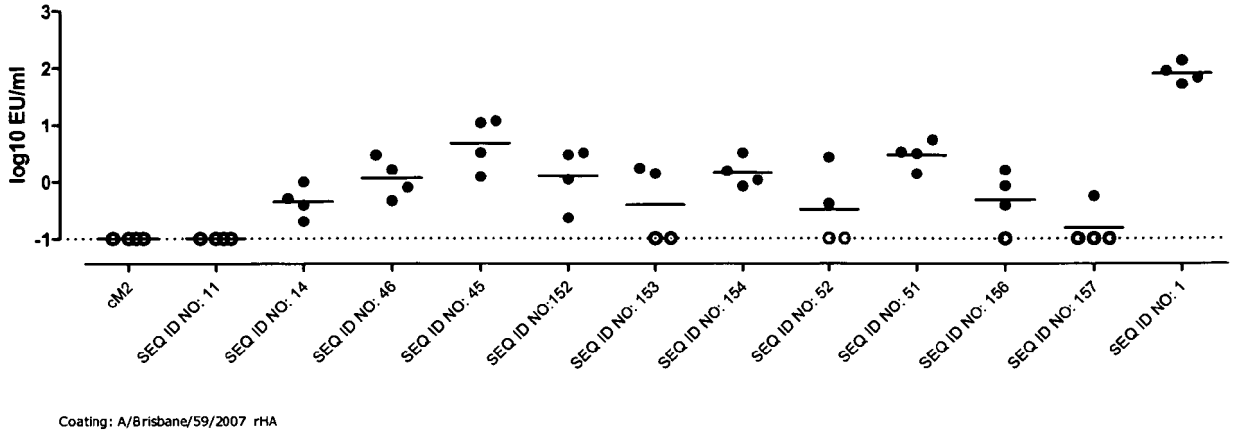


FIG. 22B

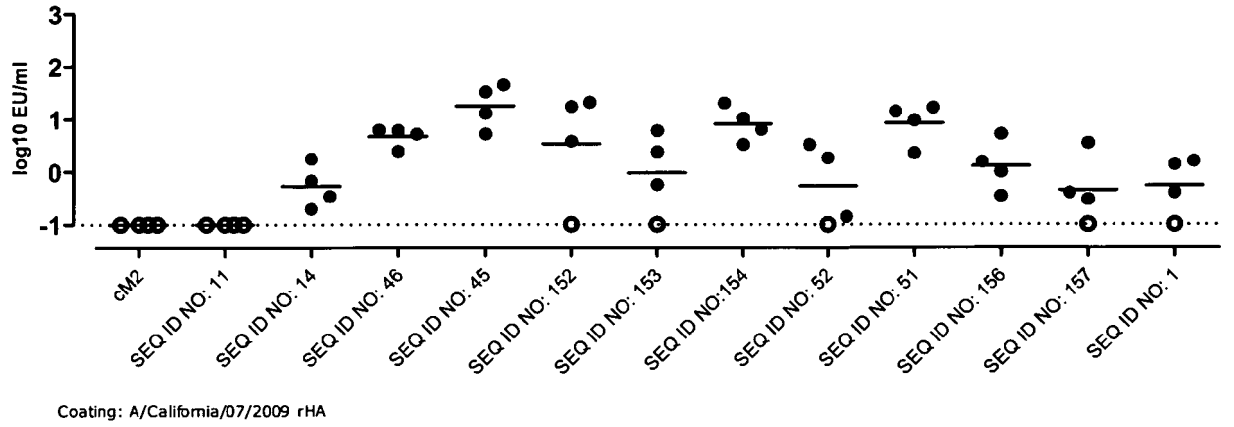


FIG. 22C

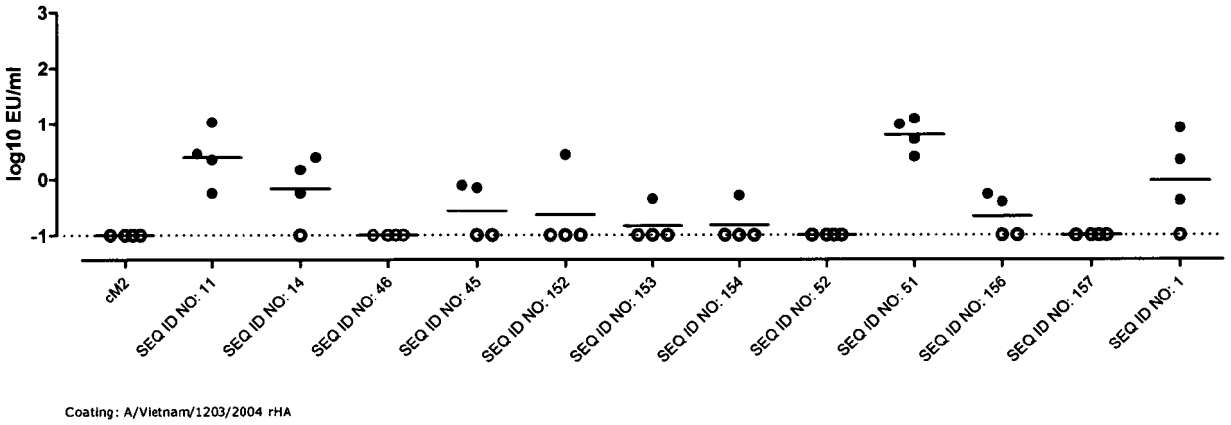

log10 EU/ml
3
2
1
0
-1
cM2
SEQ ID NO: 11
SEQ ID NO: 14
SEQ ID NO: 46
SEQ ID NO: 45
SEQ ID NO: 152
SEQ ID NO: 153
SEQ ID NO: 154
SEQ ID NO: 52
SEQ ID NO: 51
SEQ ID NO: 156
SEQ ID NO: 157
SEQ ID NO: 1
Coating: A/Vietnam/1203/2004 rHA

FIG. 23

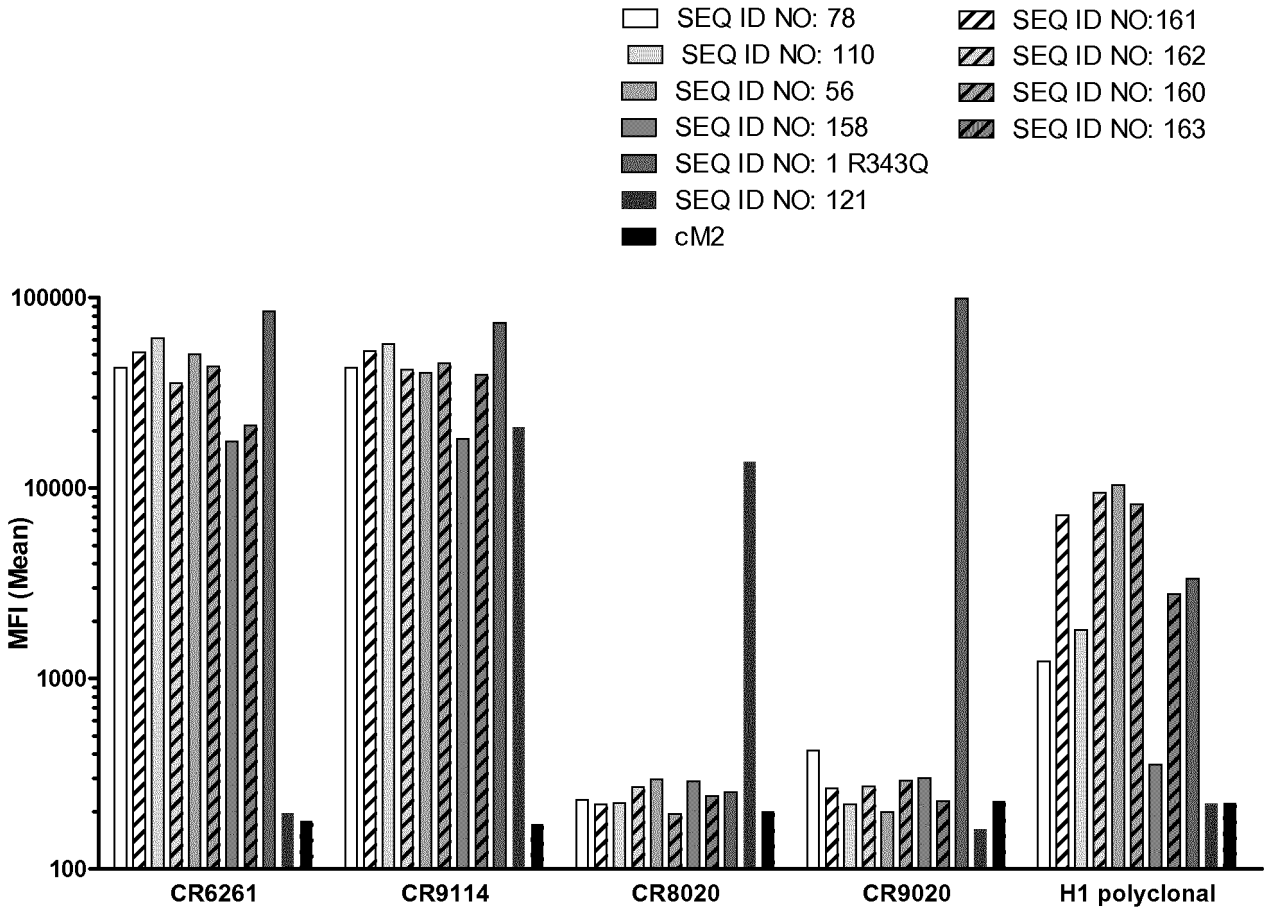

SEQ ID NO: 78
SEQ ID NO: 110
SEQ ID NO: 56
SEQ ID NO: 158
SEQ ID NO: 1 R343Q
SEQ ID NO: 121
cM2
SEQ ID NO:161
SEQ ID NO: 162
SEQ ID NO: 160
SEQ ID NO: 163
MFI (Mean)
100000
10000
1000
100
CR6261
CR9114
CR8020
CR9020
H1 polyclonal

FIG. 24A

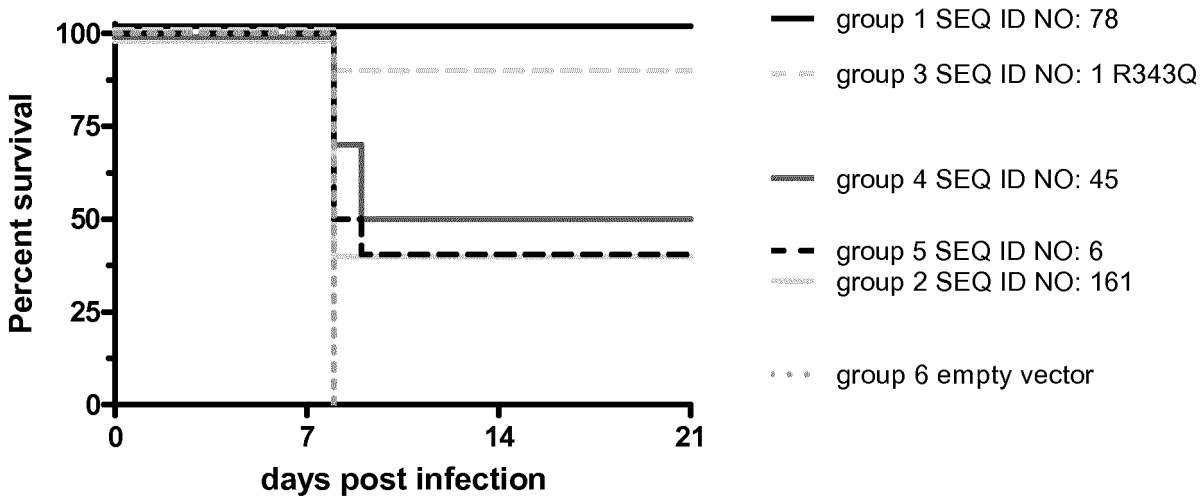


FIG. 24B

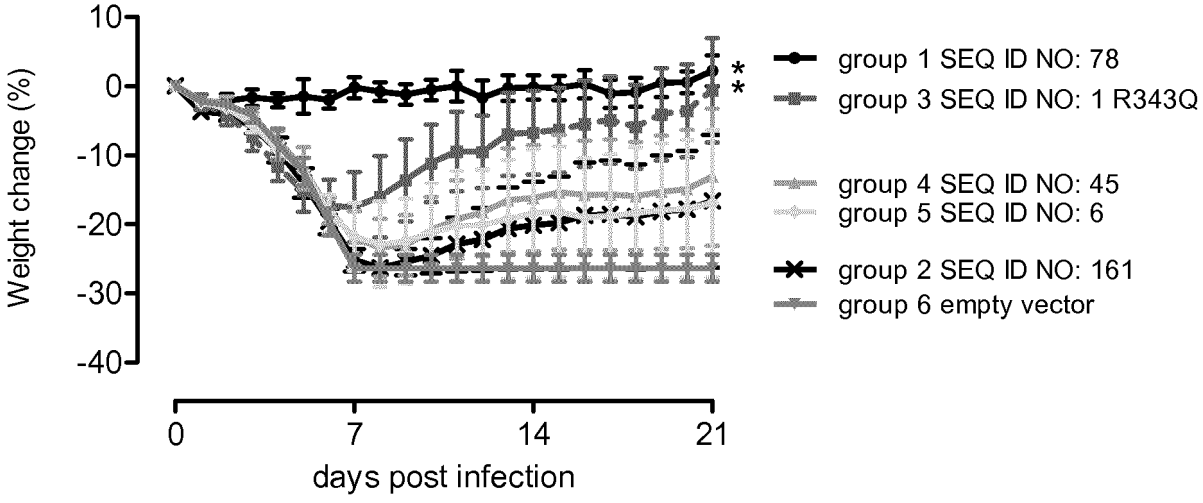
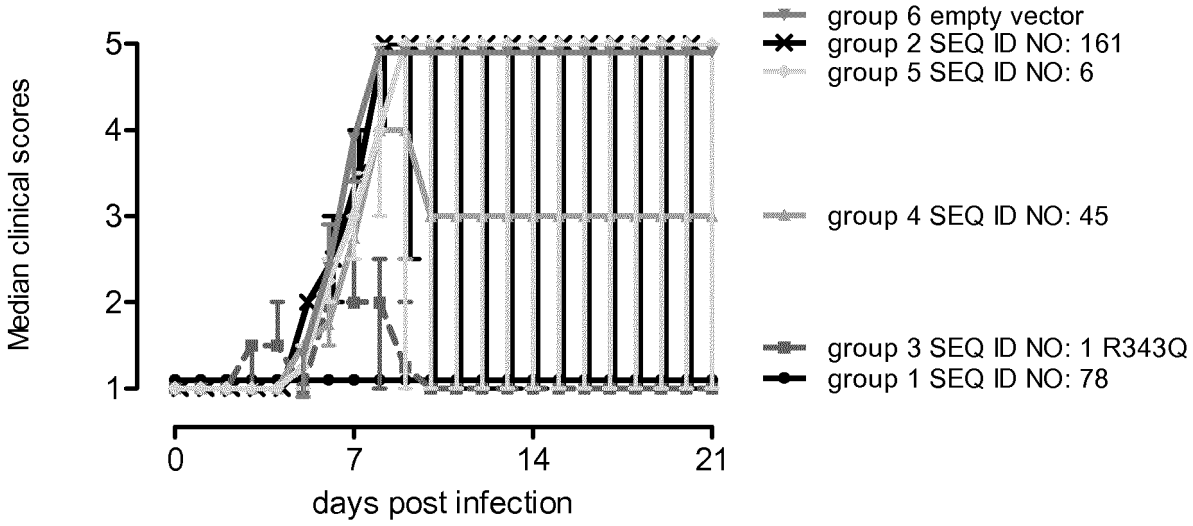


FIG. 24 C


Median clinical scores
5
4
3
2
1
0
7
14
21
days post infection
group 6 empty vector
group 2 SEQ ID NO: 161
group 5 SEQ ID NO: 6
group 4 SEQ ID NO: 45
group 3 SEQ ID NO: 1 R343Q
group 1 SEQ ID NO: 78

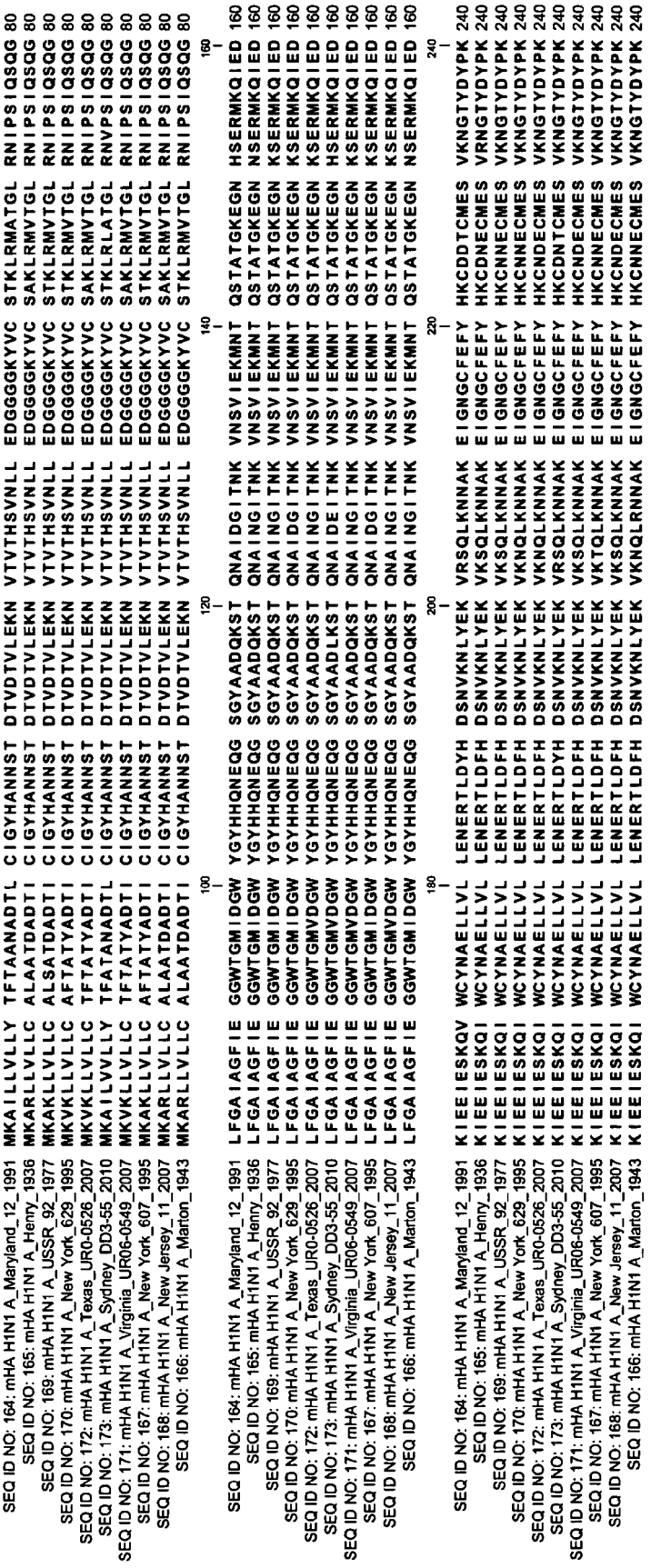

SEQ ID NO: 164: mHA H1N1 A_Maryland_12_1991 MKAILLVLLY TFTAANADTL CIGYHANNST DTVDTVLEKN VTVTHSVNLL EDGGGGKYVC STKLRMATGL RNIPSIQSQG 80
SEQ ID NO: 165: mHA H1N1 A_Henry_1936 MKARLLVLLC ALAATDADTI CIGYHANNST DTVDTVLEKN VTVTHSVNLL EDGGGGKYVC SAKLRMVTGL RNIPSIQSQG 80
SEQ ID NO: 169: mHA H1N1 A_USSR_92_1977 MKAKLLVLLC ALSATDADTI CIGYHANNST DTVDTVLEKN VTVTHSVNLL EDGGGGKYVC STKLRMVTGL RNIPSIQSQG 80
SEQ ID NO: 170: mHA H1N1 A_New York_629_1995 MKVKLLVLLC AFTATYADTI CIGYHANNST DTVDTVLEKN VTVTHSVNLL EDGGGGKYVC STKLRMVTGL RNIPSIQSQG 80
SEQ ID NO: 172: mHA H1N1 A_Texas_UR0-0526_2007 MKVKLLVLLC TFTATYADTI CIGYHANNST DTVDTVLEKN VTVTHSVNLL EDGGGGKYVC SAKLRMVTGL RNIPSIQSQG 80
SEQ ID NO: 173: mHA H1N1 A_Sydney_DD3-55_2010 MKAILVVLLY TFATANADTL CIGYHANNST DTVDTVLEKN VTVTHSVNLL EDGGGGKYVC STKLRLATGL RNVPSIQSQG 80
SEQ ID NO: 171: mHA H1N1 A_Virginia_UR06-0549_2007 MKVKLLVLLC TFTATYADTI CIGYHANNST DTVDTVLEKN VTVTHSVNLL EDGGGGKYVC SAKLRMVTGL RNIPSIQSQG 80
SEQ ID NO: 167: mHA H1N1 A_New York_607_1995 MKAKLLVLLC AFTATYADTI CIGYHANNST DTVDTVLEKN VTVTHSVNLL EDGGGGKYVC STKLRMVTGL RNIPSIQSQG 80
SEQ ID NO: 168: mHA H1N1 A_New Jersey_11_2007 MKARLLVLLC ALAATDADTI CIGYHANNST DTVDTVLEKN VTVTHSVNLL EDGGGGKYVC SAKLRMVTGL RNIPSIQSQG 80
SEQ ID NO: 166: mHA H1N1 A_Marton_1943 MKARLLVLLC ALAATDADTI CIGYHANNST DTVDTVLEKN VTVTHSVNLL EDGGGGKYVC STKLRMVTGL RNIPSIQSQG 80
SEQ ID NO: 164: mHA H1N1 A_Maryland_12_1991 LFGAIAGFIE GGWTGMIDGW YGYHHQNEQG SGYAADQKST QNAIDGITNK VNSVIEKMNT QSTATGKEGN HSERMKQIED 160
SEQ ID NO: 165: mHA H1N1 A_Henry_1936 LFGAIAGFIE GGWTGMIDGW YGYHHQNEQG SGYAADQKST QNAINGITNK VNSVIEKMNT QSTATGKEGN NSERMKQIED 160
SEQ ID NO: 169: mHA H1N1 A_USSR_92_1977 LFGAIAGFIE GGWTGMIDGW YGYHHQNEQG SGYAADQKST QNAINGITNK VNSVIEKMNT QSTATGKEGN KSERMKQIED 160
SEQ ID NO: 170: mHA H1N1 A_New York_629_1995 LFGAIAGFIE GGWTGMVDGW YGYHHQNEQG SGYAADQKST QNAIDGITNK VNSVIEKMNT QSTATGKEGN KSERMKQIED 160
SEQ ID NO: 172: mHA H1N1 A_Texas_UR0-0526_2007 LFGAIAGFIE GGWTGMVDGW YGYHHQNEQG SGYAADQKST QNAINGITNK VNSVIEKMNT QSTATGKEGN KSERMKQIED 160
SEQ ID NO: 173: mHA H1N1 A_Sydney_DD3-55_2010 LFGAIAGFIE GGWTGMVDGW YGYHHQNEQG SGYAADLKST QNAIDEITNK VNSVIEKMNT QSTATGKEGN HSERMKQIED 160
SEQ ID NO: 171: mHA H1N1 A_Virginia_UR06-0549_2007 LFGAIAGFIE GGWTGMVDGW YGYHHQNEQG SGYAADQKST QNAINGITNK VNSVIEKMNT QSTATGKEGN KSERMKQIED 160
SEQ ID NO: 167: mHA H1N1 A_New York_607_1995 LFGAIAGFIE GGWTGMIDGW YGYHHQNEQG SGYAADQKST QNAIDGITNK VNSVIEKMNT QSTATGKEGN KSERMKQIED 160
SEQ ID NO: 168: mHA H1N1 A_New Jersey_11_2007 LFGAIAGFIE GGWTGMVDGW YGYHHQNEQG SGYAADQKST QNAINGITNK VNSVIEKMNT QSTATGKEGN KSERMKQIED 160
SEQ ID NO: 166: mHA H1N1 A_Marton_1943 LFGAIAGFIE GGWTGMIDGW YGYHHQNEQG SGYAADQKST QNAINGITNK VNSVIEKMNT QSTATGKEGN NSERMKQIED 160
SEQ ID NO: 164: mHA H1N1 A_Maryland_12_1991 KIEEIESKQV WCYNAELLVL LENERTLDYH DSNVKNLYEK VRSQLKNNAK EIGNGCFEFY HKCDDTCMES VKNGTYDYPK 240
SEQ ID NO: 165: mHA H1N1 A_Henry_1936 KIEEIESKQI WCYNAELLVL LENERTLDFH DSNVKNLYEK VKSQLKNNAK EIGNGCFEFY HKCDNECMES VRNGTYDYPK 240
SEQ ID NO: 169: mHA H1N1 A_USSR_92_1977 KIEEIESKQI WCYNAELLVL LENERTLDFH DSNVKNLYEK VKSQLKNNAK EIGNGCFEFY HKCNNECMES VKNGTYDYPK 240
SEQ ID NO: 170: mHA H1N1 A_New York_629_1995 KIEEIESKQI WCYNAELLVL LENERTLDFH DSNVKNLYEK VKNQLKNNAK EIGNGCFEFY HKCNNECMES VKNGTYDYPK 240
SEQ ID NO: 172: mHA H1N1 A_Texas_UR0-0526_2007 KIEEIESKQI WCYNAELLVL LENERTLDFH DSNVKNLYEK VKNQLKNNAK EIGNGCFEFY HKCNDECMES VKNGTYDYPK 240
SEQ ID NO: 173: mHA H1N1 A_Sydney_DD3-55_2010 KIEEIESKQI WCYNAELLVL LENERTLDYH DSNVKNLYEK VRSQLKNNAK EIGNGCFEFY HKCDNTCMES VKNGTYDYPK 240
SEQ ID NO: 171: mHA H1N1 A_Virginia_UR06-0549_2007 KIEEIESKQI WCYNAELLVL LENERTLDFH DSNVKNLYEK VKSQLKNNAK EIGNGCFEFY HKCNDECMES VKNGTYDYPK 240
SEQ ID NO: 167: mHA H1N1 A_New York_607_1995 KIEEIESKQI WCYNAELLVL LENERTLDFH DSNVKNLYEK VKTQLKNNAK EIGNGCFEFY HKCNNECMES VKNGTYDYPK 240
SEQ ID NO: 168: mHA H1N1 A_New Jersey_11_2007 KIEEIESKQI WCYNAELLVL LENERTLDFH DSNVKNLYEK VKSQLKNNAK EIGNGCFEFY HKCNDECMES VKNGTYDYPK 240
SEQ ID NO: 166: mHA H1N1 A_Marton_1943 KIEEIESKQI WCYNAELLVL LENERTLDFH DSNVKNLYEK VKNQLRNNAK EIGNGCFEFY HKCNNECMES VKNGTYDYPK 240
SEQ ID NO: 164: mHA H1N1 A_Maryland_12_1991 YSEESKLNRE EIDGVKLEST RIYQILAIYS TVASSLVLLV SLGAISFWMC SNGSLQCRIC I* 302
SEQ ID NO: 165: mHA H1N1 A_Henry_1936 YSEESKLNRE KIDGVKLESM GVYQILAIYS TVASSLVLLV SLGAISFWMC SNGSLQCRIC I* 302
SEQ ID NO: 169: mHA H1N1 A_USSR_92_1977 YSEESKLNRE KIDGVKLESM GVYQILAIYS TVASSLVLLV SLGAISFWMC SNGSLQCRIC I* 302
SEQ ID NO: 170: mHA H1N1 A_New York_629_1995 YSEESKLNRE KIDGVKLESM GVYQILAIYS TVASSLVLLV SLGAISFWMC SNGSLQCRIC I* 302
SEQ ID NO: 172: mHA H1N1 A_Texas_UR0-0526_2007 YSEESKLNRE KIDGVKLESM GVYQILAIYS TVASSLVLLI SLGAISFWMC SNGSLQCRIC I* 302
SEQ ID NO: 173: mHA H1N1 A_Sydney_DD3-55_2010 YSEEAKLNRE EIDGVKLEST RIYQILAIYS TVASSLVLVV SLGAISFWMC SNGSLQCRIC I* 302
SEQ ID NO: 171: mHA H1N1 A_Virginia_UR06-0549_2007 YSEESKLNRE KIDGVKLESM GVYQILAIYS TVASSLVLLV SLGAISFWMC SNGSLQCRIC I* 302
SEQ ID NO: 167: mHA H1N1 A_New York_607_1995 YSEESKLNRE KIDGVKLESM GVYQILAIYS TVASSLVLLV SLGAISFWMC SNGSLQCRIC I* 302
SEQ ID NO: 168: mHA H1N1 A_New Jersey_11_2007 YSEESKLNRE KIDGVKLESM GVYQILAIYS TVASSLVLLV SLGAISFWMC SNGSLQCRIC I* 302
SEQ ID NO: 166: mHA H1N1 A_Marton_1943 YSEESKLNRE KIDGVKLESM GVYQILAIYS TVASSLVLLV SLGAISFWMC SNGSLQCRIC I* 302

Fig. 25

FIG. 26

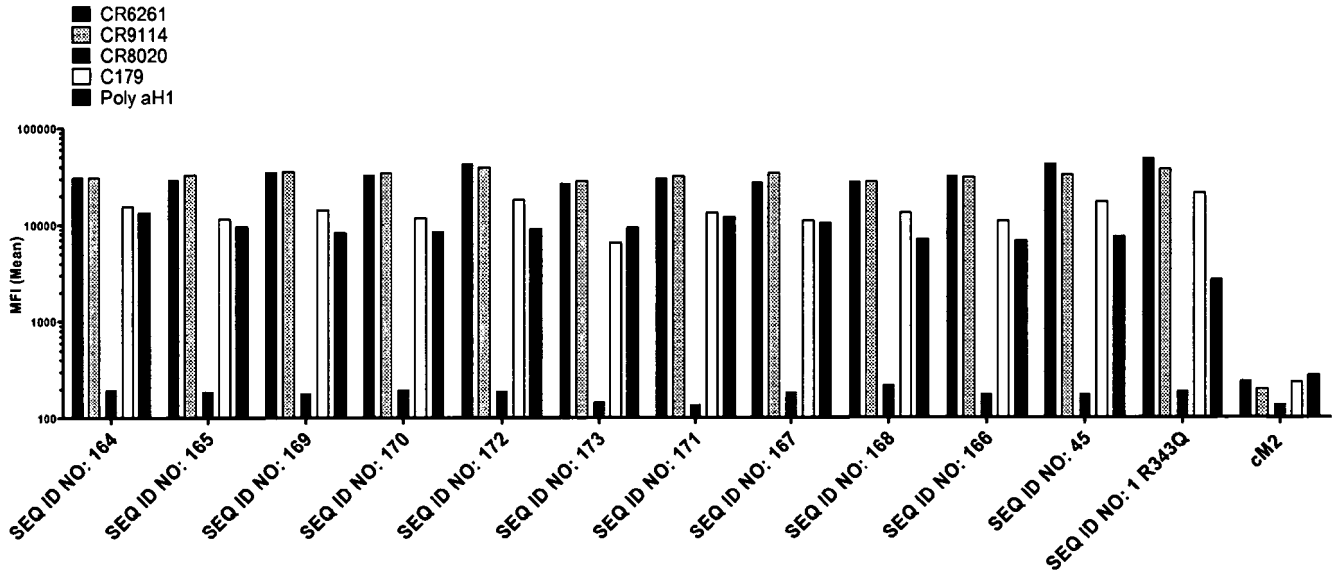

CR6261
CR9114
CR8020
C179
Poly aH1
MFI (Mean)
100000
10000
1000
100
SEQ ID NO: 164
SEQ ID NO: 165
SEQ ID NO: 169
SEQ ID NO: 170
SEQ ID NO: 172
SEQ ID NO: 173
SEQ ID NO: 171
SEQ ID NO: 167
SEQ ID NO: 168
SEQ ID NO: 166
SEQ ID NO: 45
SEQ ID NO: 1 R343Q
cM2

FIG. 27

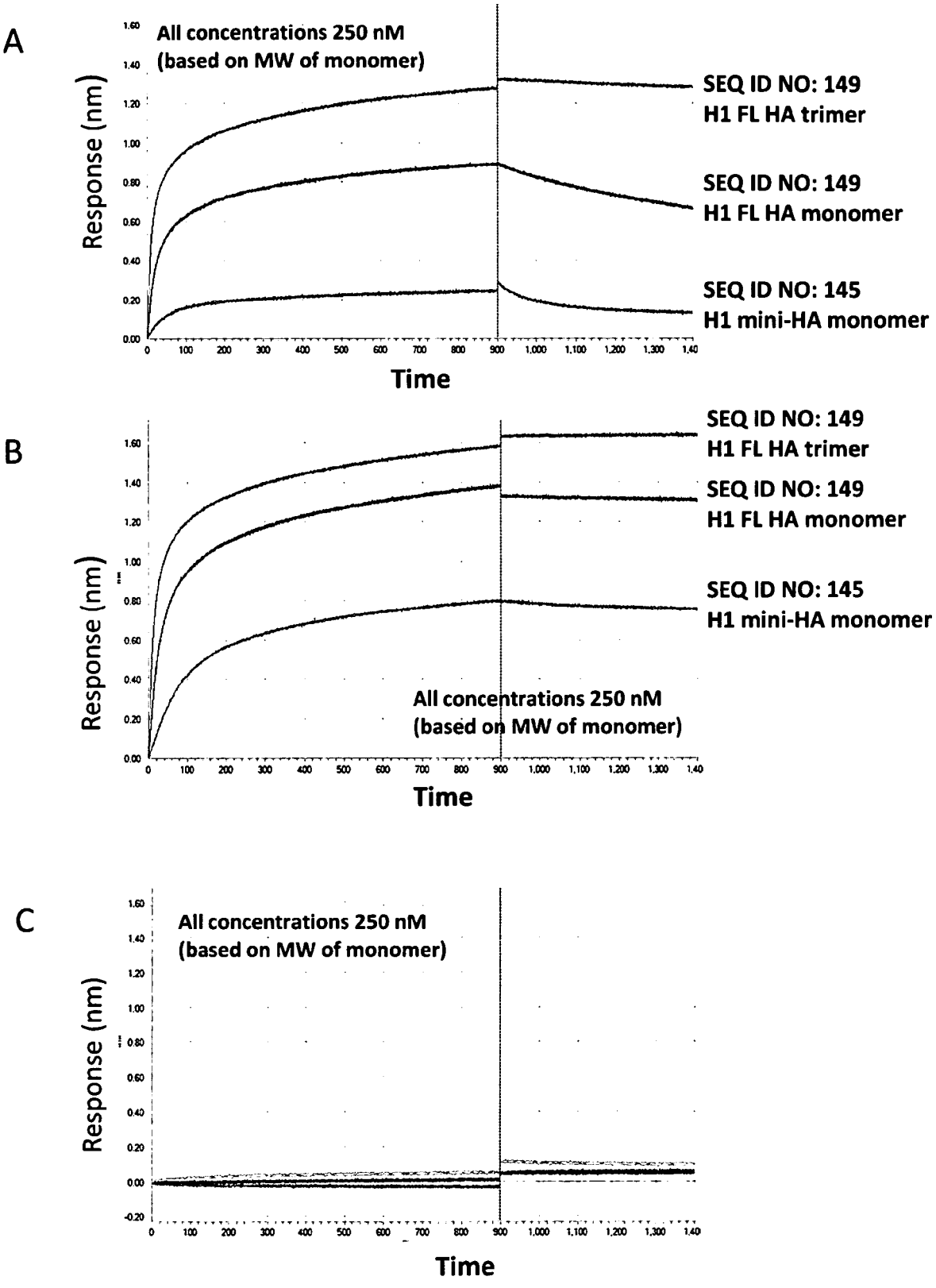
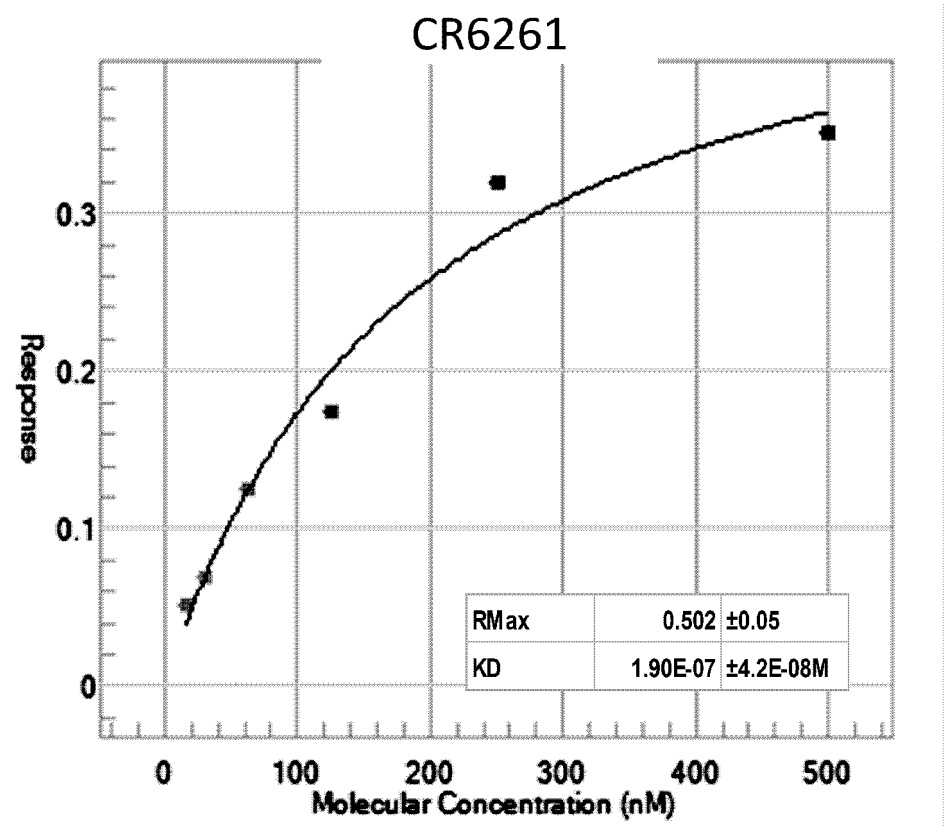

A
All concentrations 250 nM
(based on MW of monomer)
Response (nm)
Time
SEQ ID NO: 149
H1 FL HA trimer
SEQ ID NO: 149
H1 FL HA monomer
SEQ ID NO: 145
H1 mini-HA monomer
B
Response (nm)
Time
SEQ ID NO: 149
H1 FL HA trimer
SEQ ID NO: 149
H1 FL HA monomer
SEQ ID NO: 145
H1 mini-HA monomer
All concentrations 250 nM
(based on MW of monomer)
C
All concentrations 250 nM
(based on MW of monomer)
Response (nm)
Time

FIG. 28

A


CR6261
Response
0.3
0.2
0.1
0
0
100
200
300
400
500
Molecular Concentration (nM)
RMax 0.502 ±0.05
KD 1.90E-07 ±4.2E-08M

B

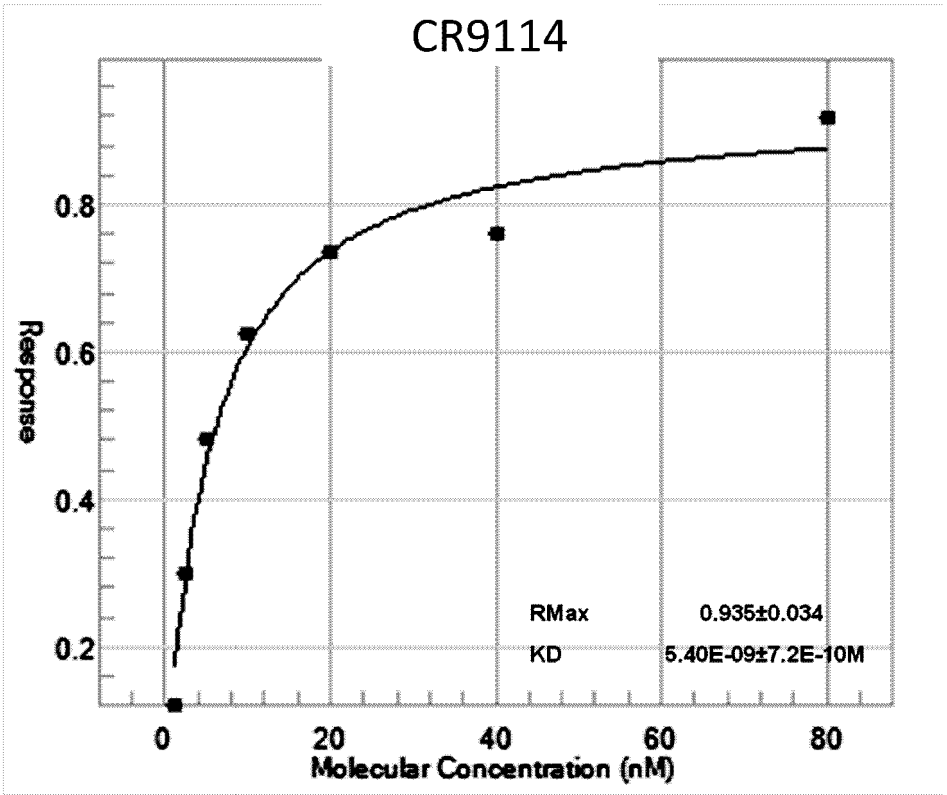
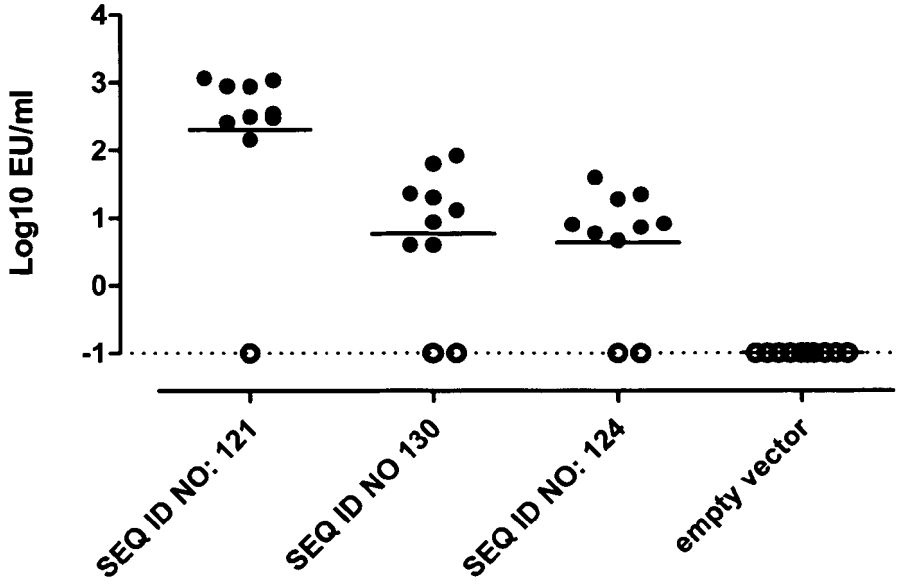

CR9114
Response
0.8
0.6
0.4
0.2
0
20
40
60
80
Molecular Concentration (nM)
RMax 0.935±0.034
KD 5.40E-09±7.2E-10M

FIG. 29



coating: rHA A/HK/1/68

FIG. 30A

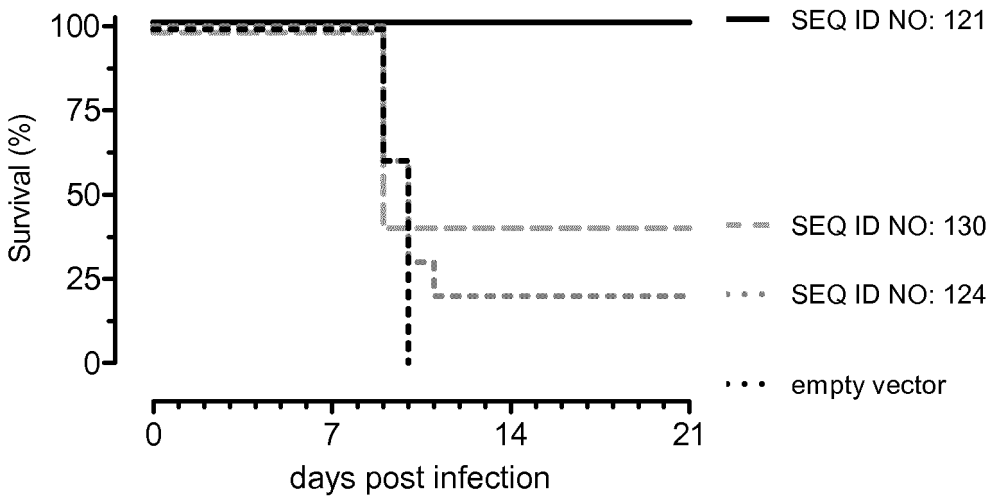


FIG. 30B

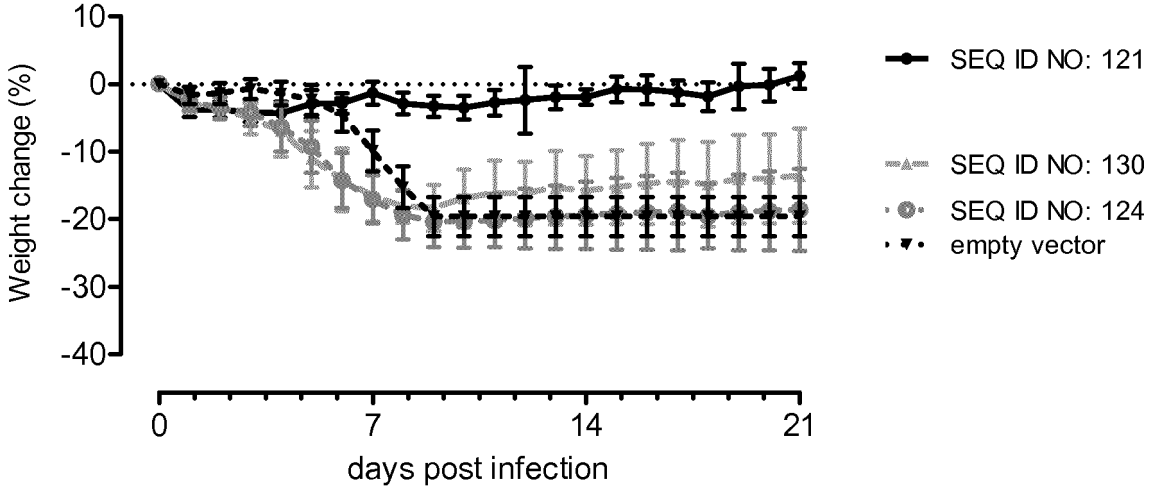


FIG. 30C

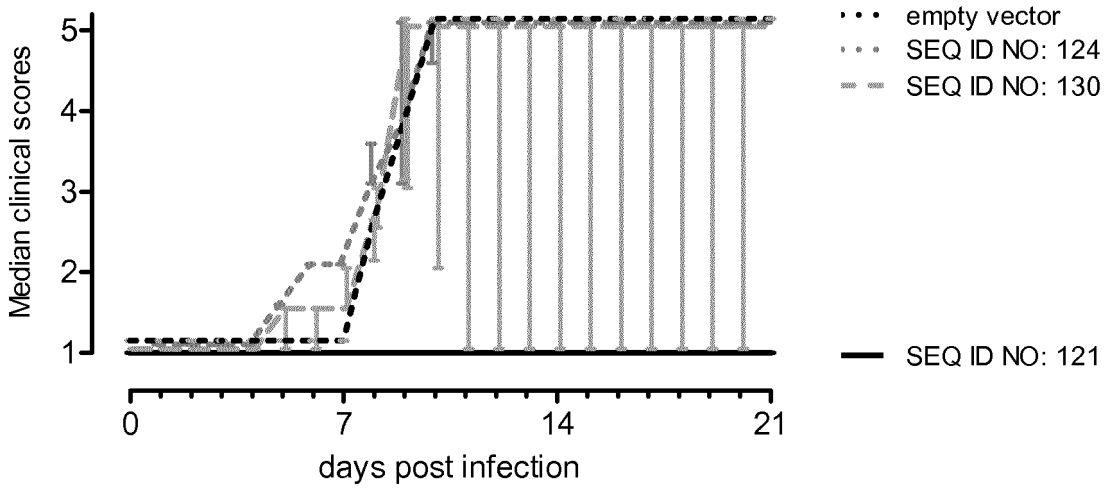

Median clinical scores
5
4
3
2
1
0
7
14
21
days post infection
empty vector
SEQ ID NO: 124
SEQ ID NO: 130
SEQ ID NO: 121

FIG. 31

SEQ ID NO	Name:
121	pcDNA2004Neo_H3-Hongkong_68 R345Q
130	pcDNA2004Neo_H3mini2a -linker+cl9+10+11+12-GCN4t
174	H3 HK mini2a-linker+cl9 +10+11+12+GCN4T -CG7-1
175	HK68 H3mini2a-linker+cl9_+10+12+18+GCN4T
176	HK68 H3mini2a-linker+cl9_+10+12+16+CG7-GCN4T
177	HK68 H3mini2a-linker+cl9_+10+12+19+GCN4T
178	HK68 H3mini2a-linker+cl9_+10+12+17+CG7-GCN4T
179	H3 HK68 mini2a-linker2+cl9_+10+12+GCN4T
CM2	cM2

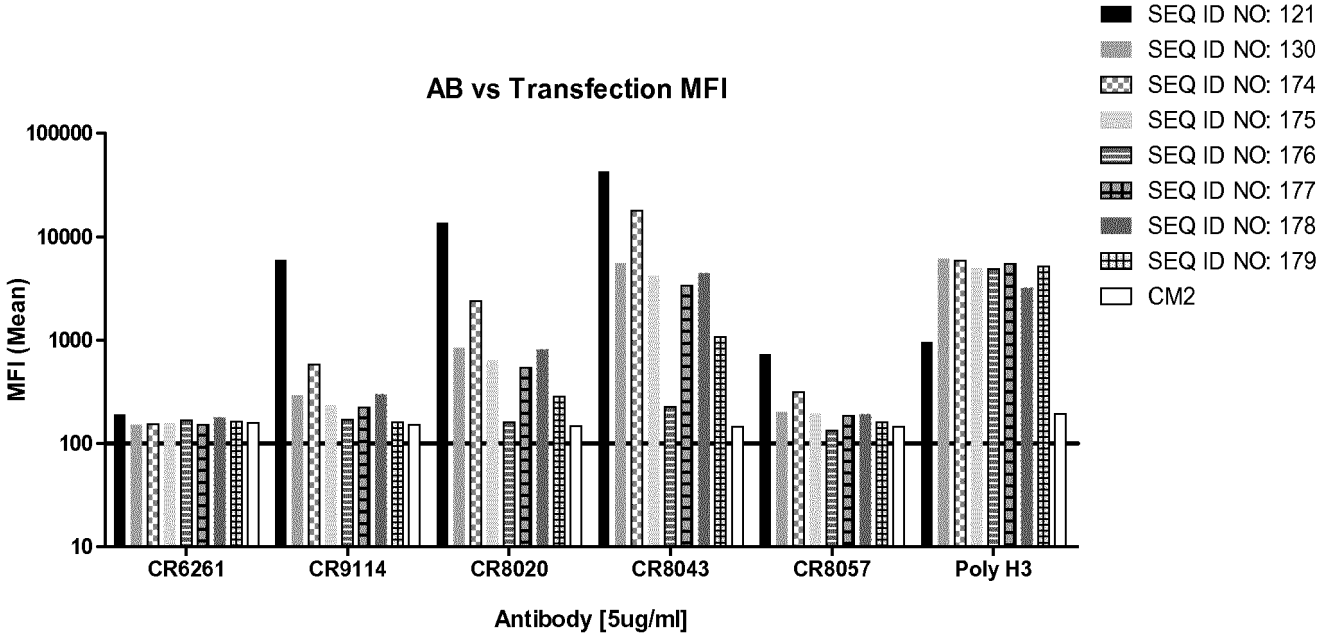


FIG. 32A

#2766 SEQ ID NO: 105: H3-mini2
#2769 SEQ ID NO: 108: H3-mini2-cl9+10+11
#2773 SEQ ID NO: 112: H3-mini2-cl9+10+12
#2772 SEQ ID NO: 111: H3-mini2-cl9+10+11+12
#2775 SEQ ID NO: 114: H3-mini2-cl9+10+11+12-tri
#2774 SEQ ID NO: 113: H3-mini2-cl9+10+11+12-GCN4
#2780 SEQ ID NO: 119: H3-mini3-cl9+10+11+12+14
#2781 SEQ ID NO: 120: H3-mini4-cl9+10+11+12+14
#1969 SEQ ID NO: 89 H3 Full length A/Wisconsin/67/2005
#1372 cM2

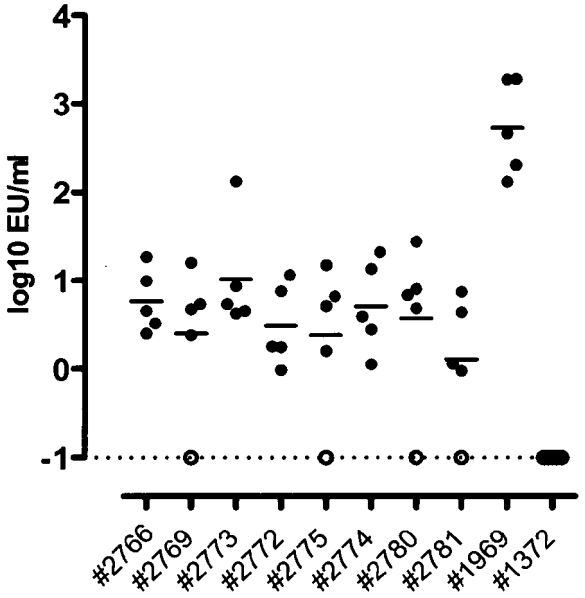


FIG. 32B

#2766 SEQ ID NO: 105: H3-mini2
#2769 SEQ ID NO: 108: H3-mini2-cl9+10+11
#2773 SEQ ID NO: 112: H3-mini2-cl9+10+12
#2772 SEQ ID NO: 111: H3-mini2-cl9+10+11+12
#2775 SEQ ID NO: 114: H3-mini2-cl9+10+11+12-tri
#2774 SEQ ID NO: 113: H3-mini2-cl9+10+11+12-GCN4
#2780 SEQ ID NO: 119: H3-mini3-cl9+10+11+12+14
#2781 SEQ ID NO: 120: H3-mini4-cl9+10+11+12+14
#1969 SEQ ID NO: 89 H3 Full length A/Wisconsin/67/2005
#1372 cM2

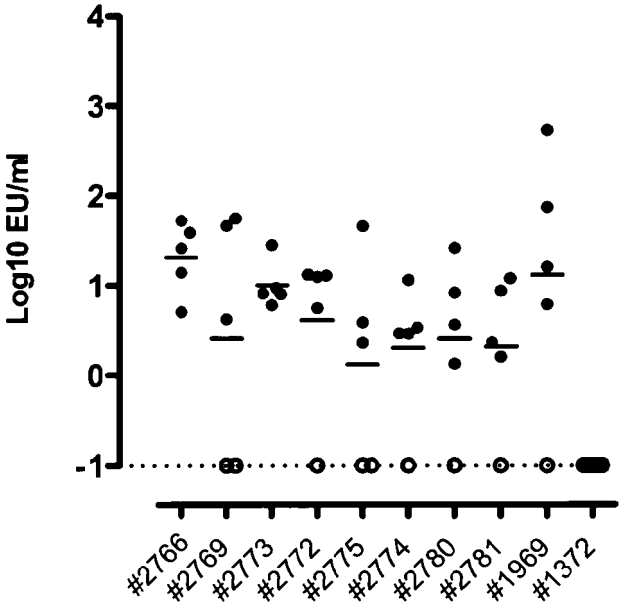


FIG. 32C

#2766 SEQ ID NO: 105: H3-mini2
#2769 SEQ ID NO: 108: H3-mini2-cl9+10+11
#2773 SEQ ID NO: 112: H3-mini2-cl9+10+12
#2772 SEQ ID NO: 111: H3-mini2-cl9+10+11+12
#2775 SEQ ID NO: 114: H3-mini2-cl9+10+11+12-tri
#2774 SEQ ID NO: 113: H3-mini2-cl9+10+11+12-GCN4
#2780 SEQ ID NO: 119: H3-mini3-cl9+10+11+12+14
#2781 SEQ ID NO: 120: H3-mini4-cl9+10+11+12+14
#1969 SEQ ID NO: 89 H3 Full length A/Wisconsin/67/2005
#1372 cM2

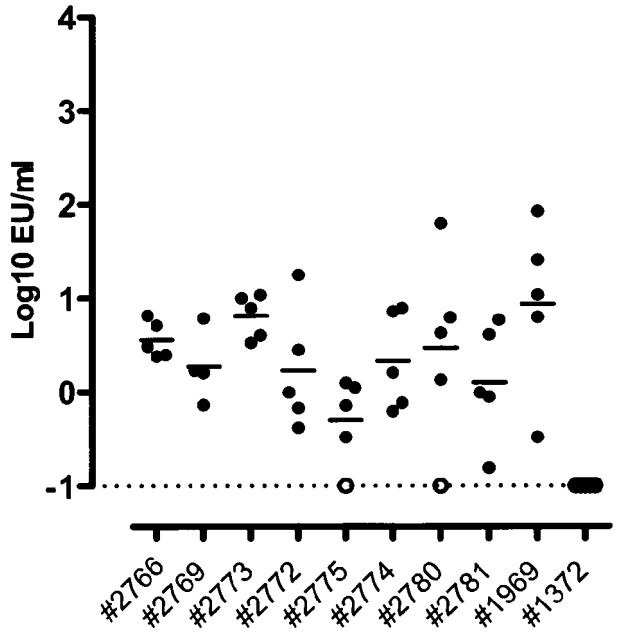
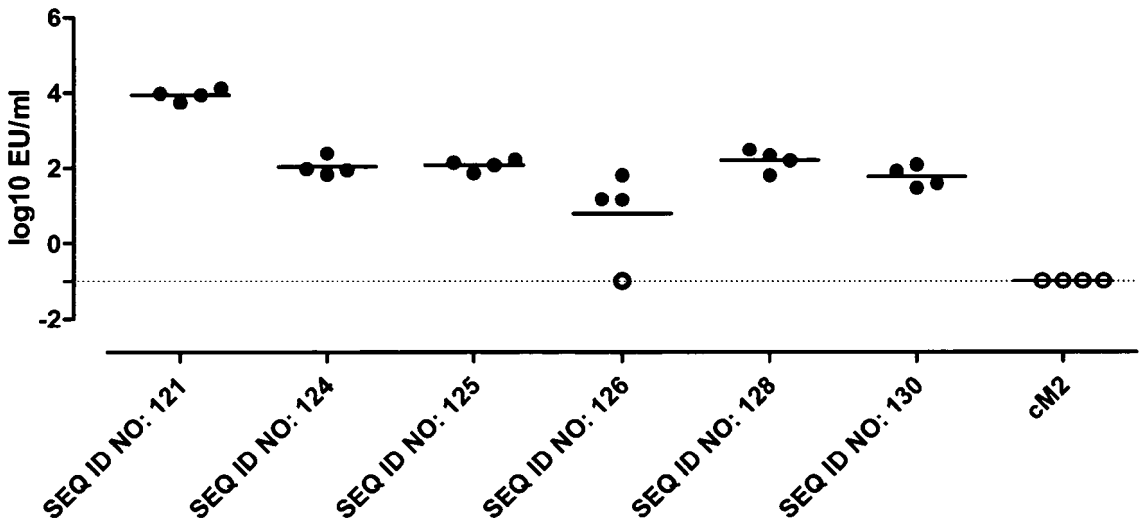
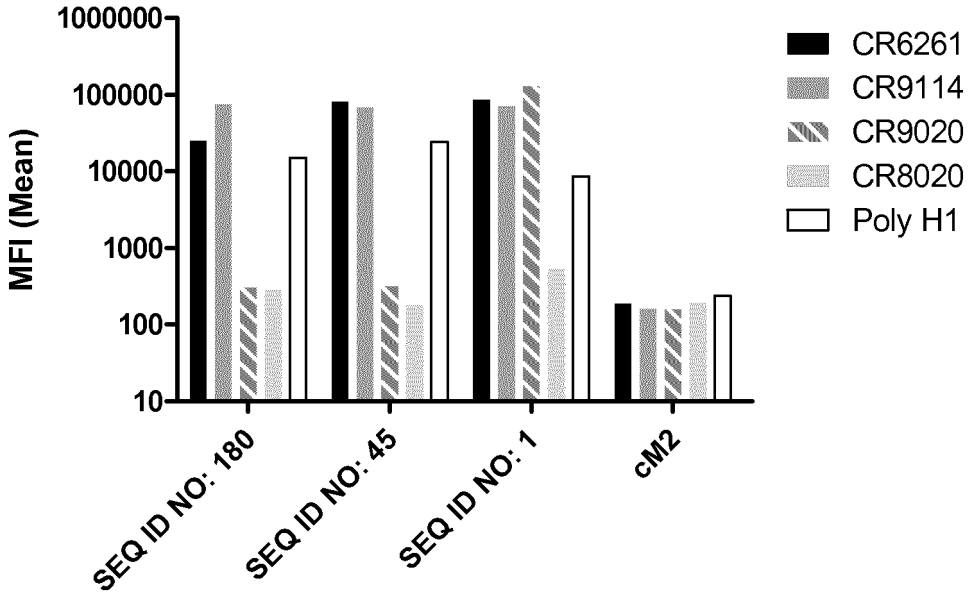


FIG. 33



coating: rHA A/HongKong/1/68 (human cell derived)

FIG. 34


1000000
100000
10000
1000
100
10
MFI (Mean)
CR6261
CR9114
CR9020
CR8020
Poly H1
SEQ ID NO: 180
SEQ ID NO: 45
SEQ ID NO: 1
cM2