FIGURE 1A

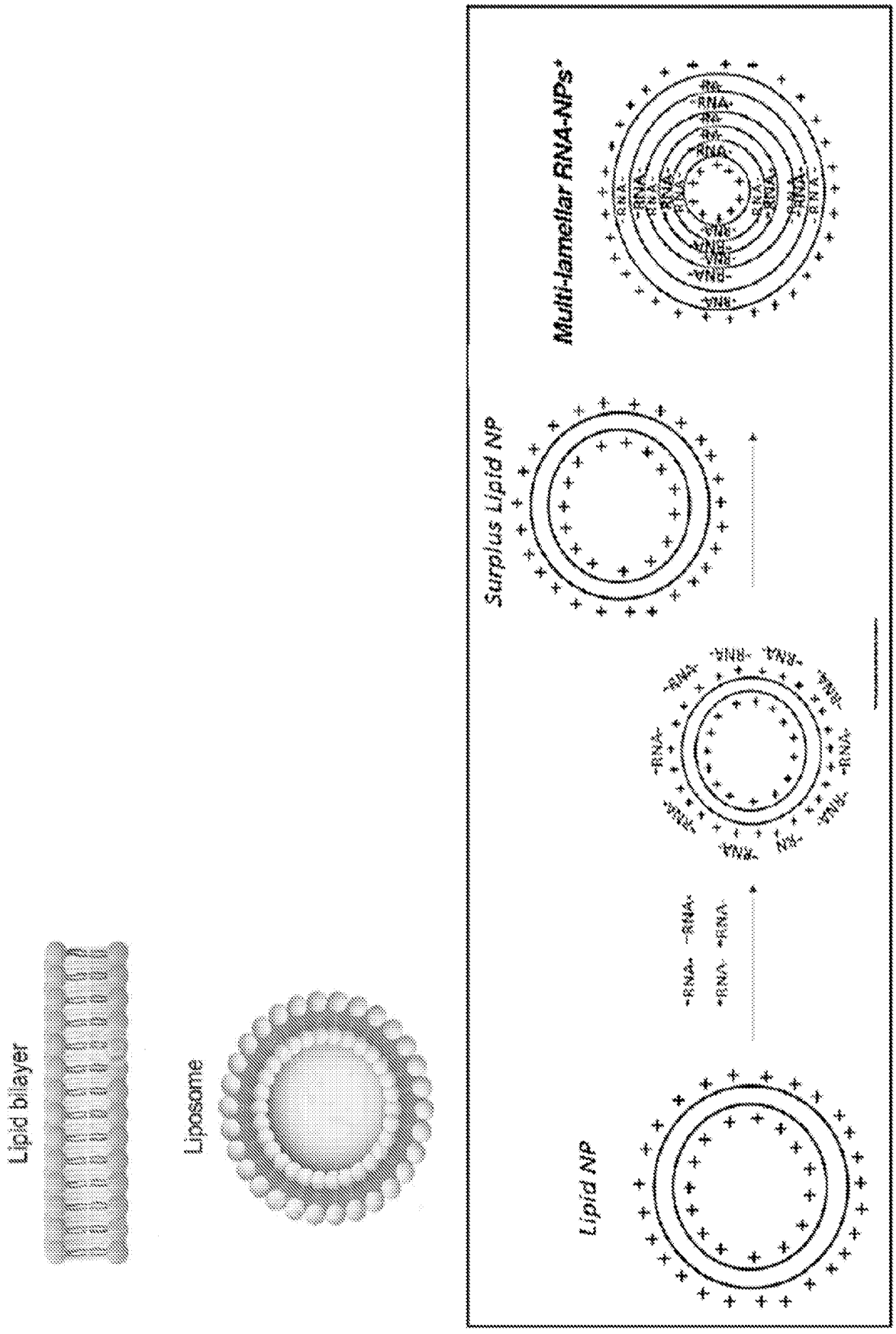

Lipid bilayer
Liposome
Lipid NP
Surplus Lipid NP
Multi-lamellar RNA-NPs*

FIGURE 1B

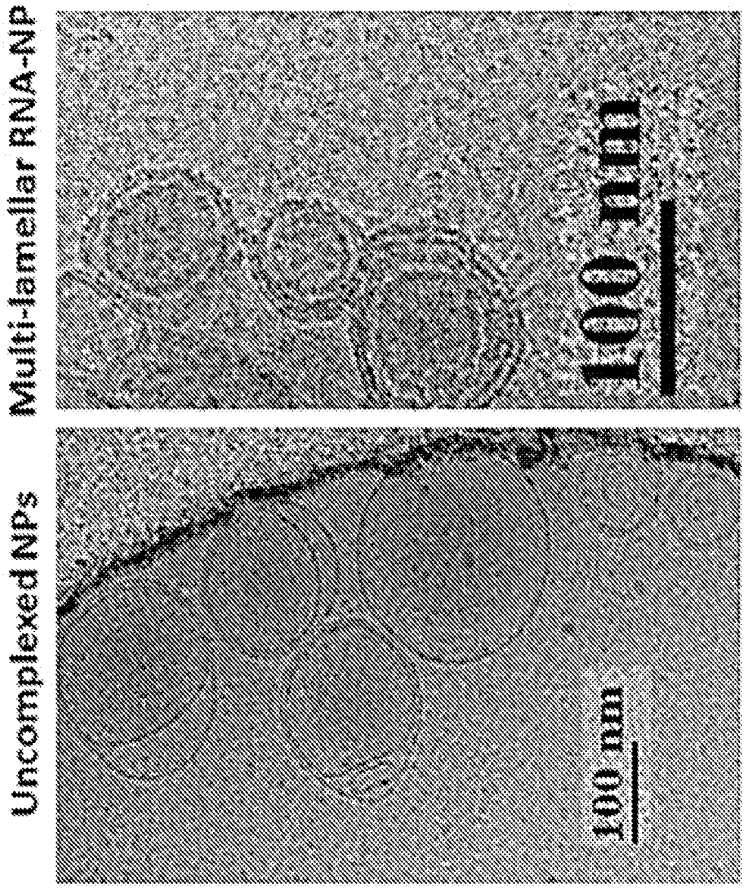


FIGURE 2A

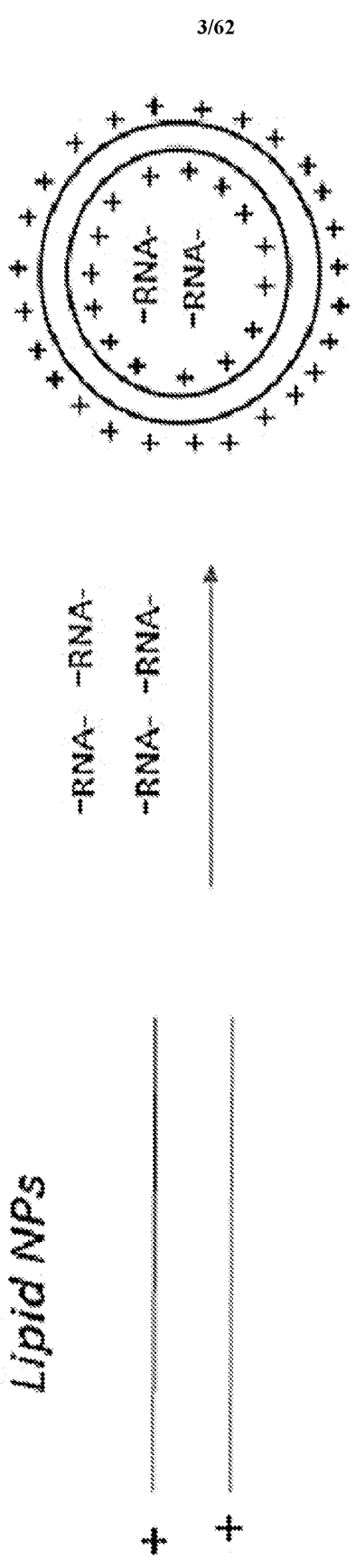


FIGURE 2B

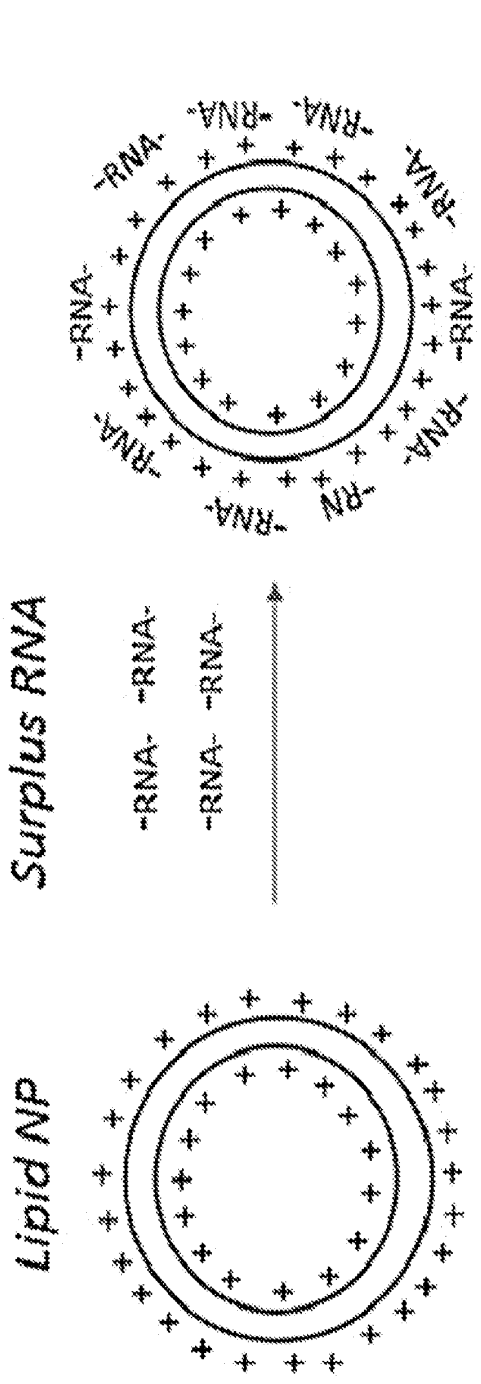


FIGURE 2C - Uncomplexed NPs

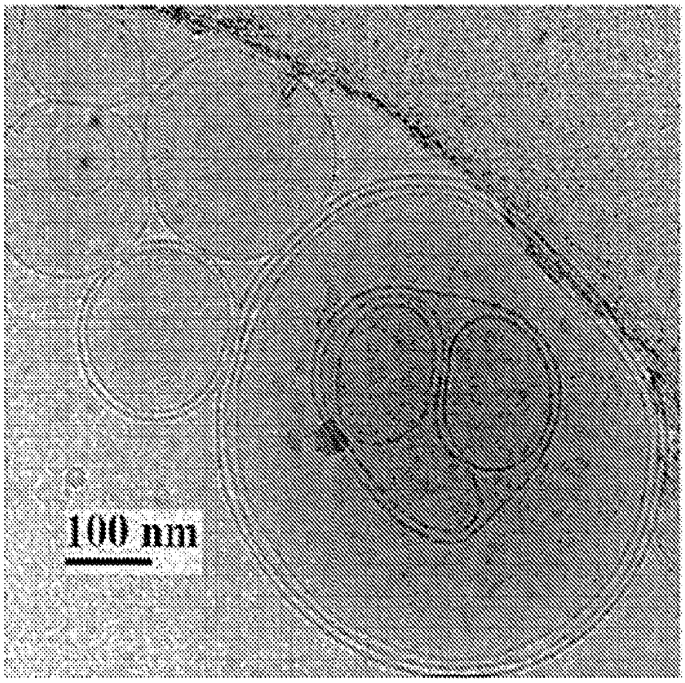


FIGURE 2D - RNA Lipoplexes

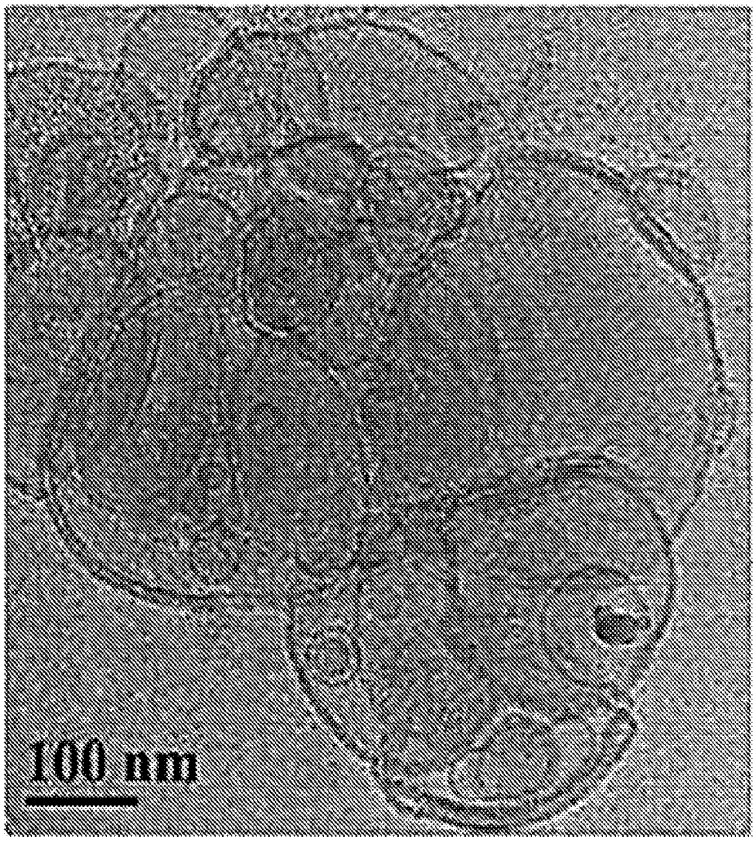
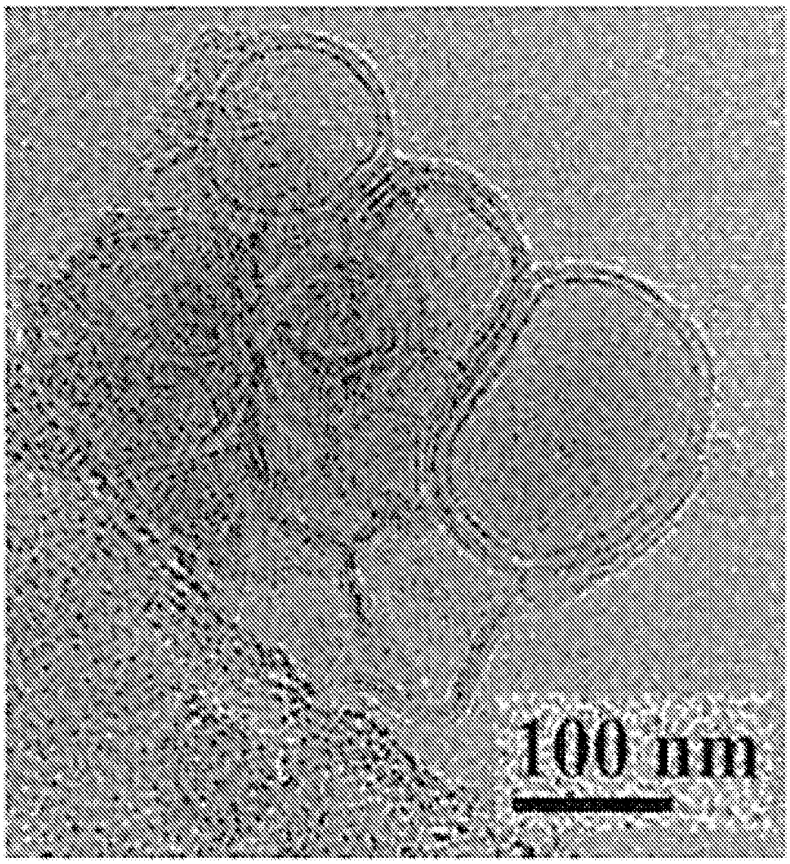


FIGURE 2E - Multi-lamellar RNA-NPs



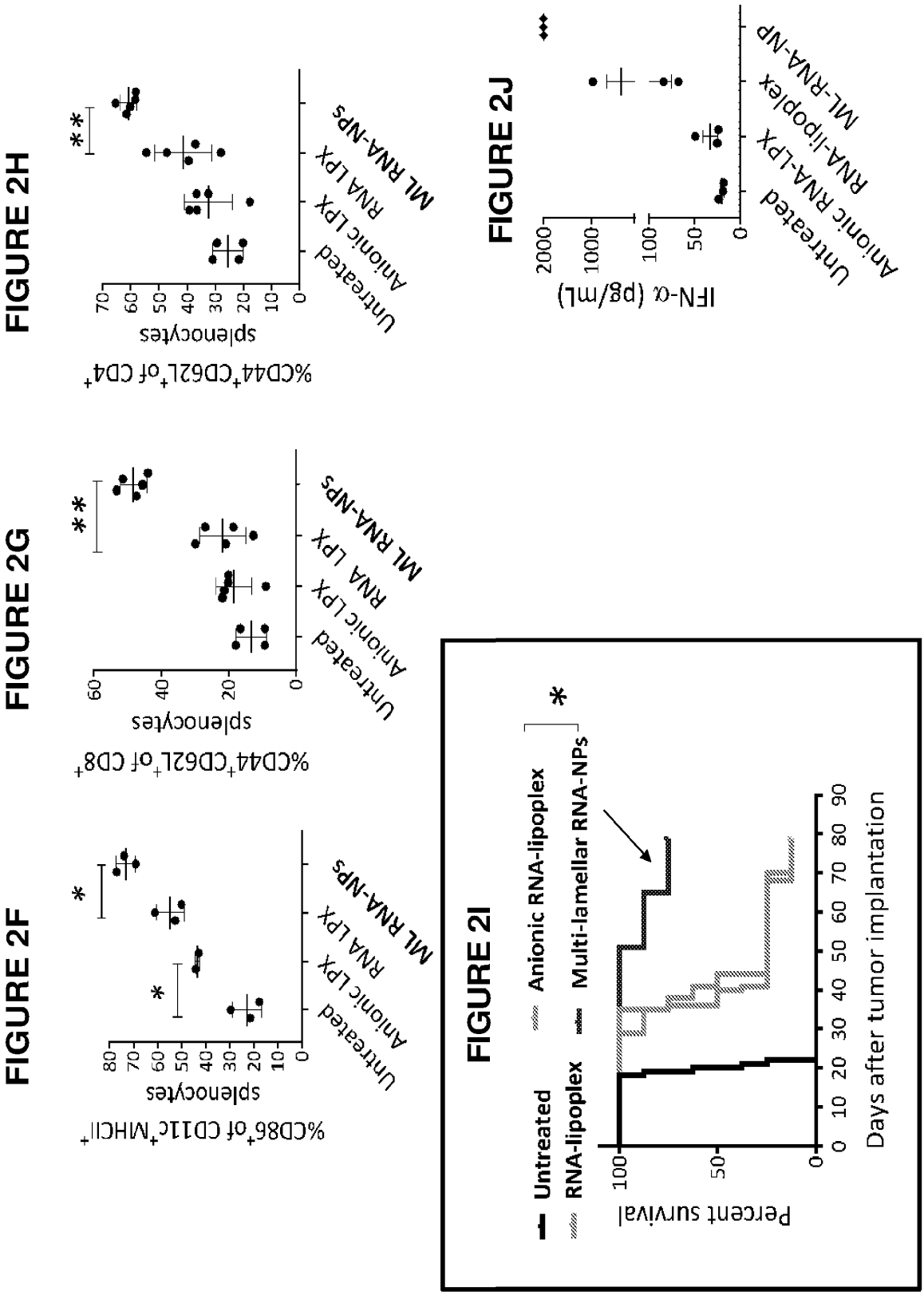

FIGURE 2H
%CD44+CD62L+of CD4+
splenocytes
Untreated
Anionic LPX
RNA LPX
ML RNA-NPs
FIGURE 2G
%CD44+CD62L+of CD8+
splenocytes
Untreated
Anionic LPX
RNA LPX
ML RNA-NPs
FIGURE 2F
%CD86+of CD11c+MHCII+
splenocytes
Untreated
Anionic LPX
RNA LPX
ML RNA-NPs
FIGURE 2J
IFN-α (pg/mL)
Untreated
Anionic RNA-LPX
RNA-lipoplex
ML-RNA-NP
FIGURE 2I
Untreated
RNA-lipoplex
Anionic RNA-lipoplex
Multi-lamellar RNA-NPs
Percent survival
Days after tumor implantation

FIGURE 3A

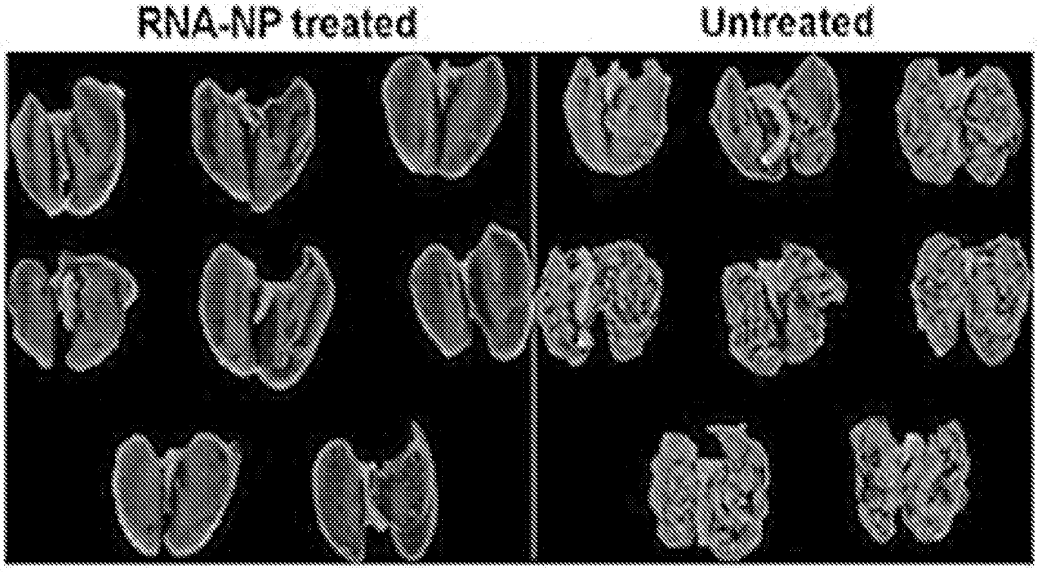


FIGURE 3B

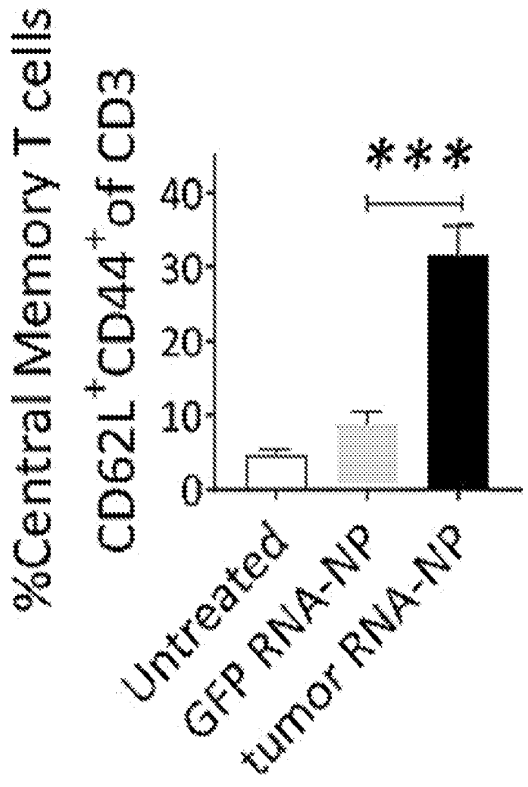


FIGURE 3C

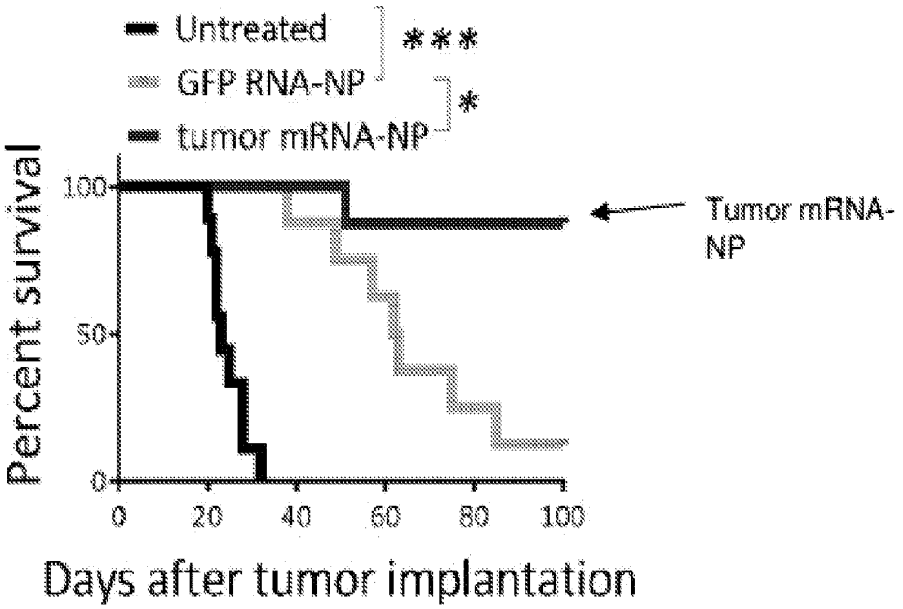


FIGURE 3D

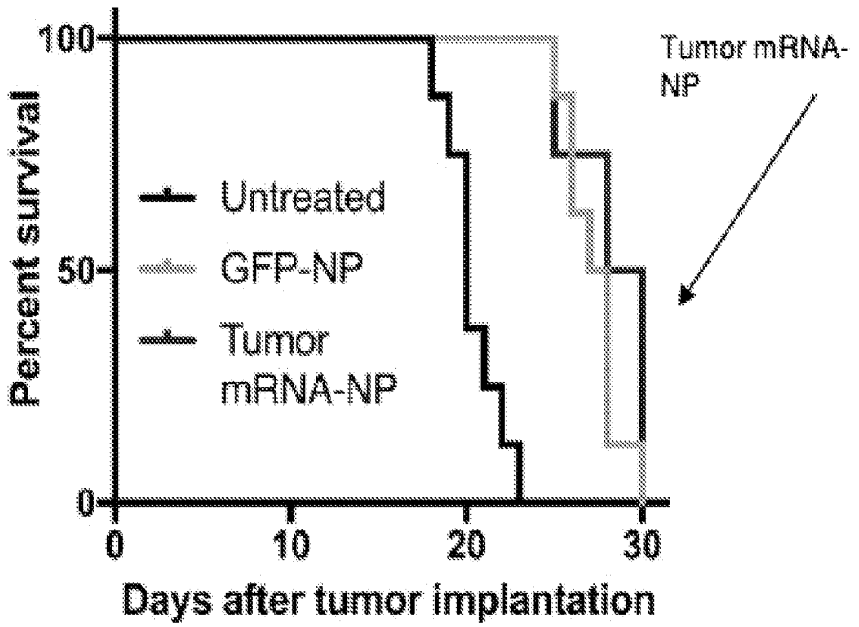


FIGURE 4A

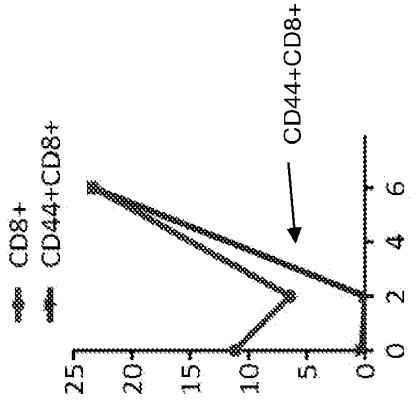


FIGURE 4B

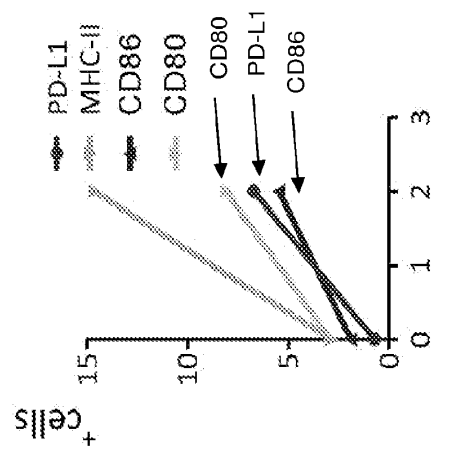


FIGURE 4C

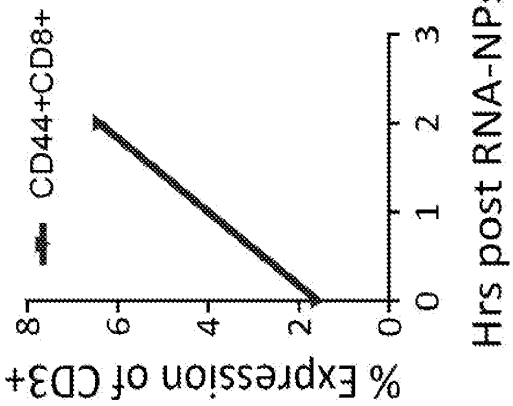


FIGURE 4D

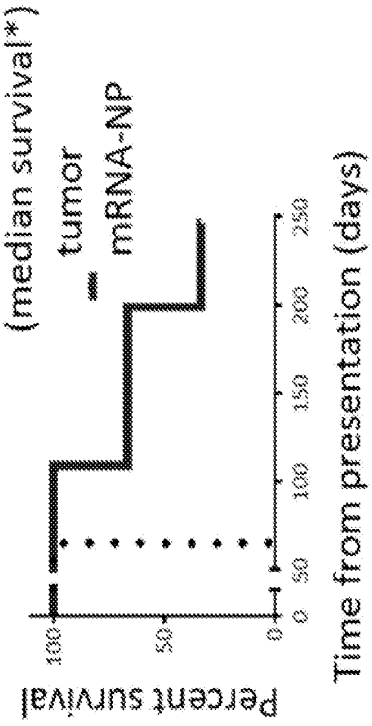


FIGURE 5

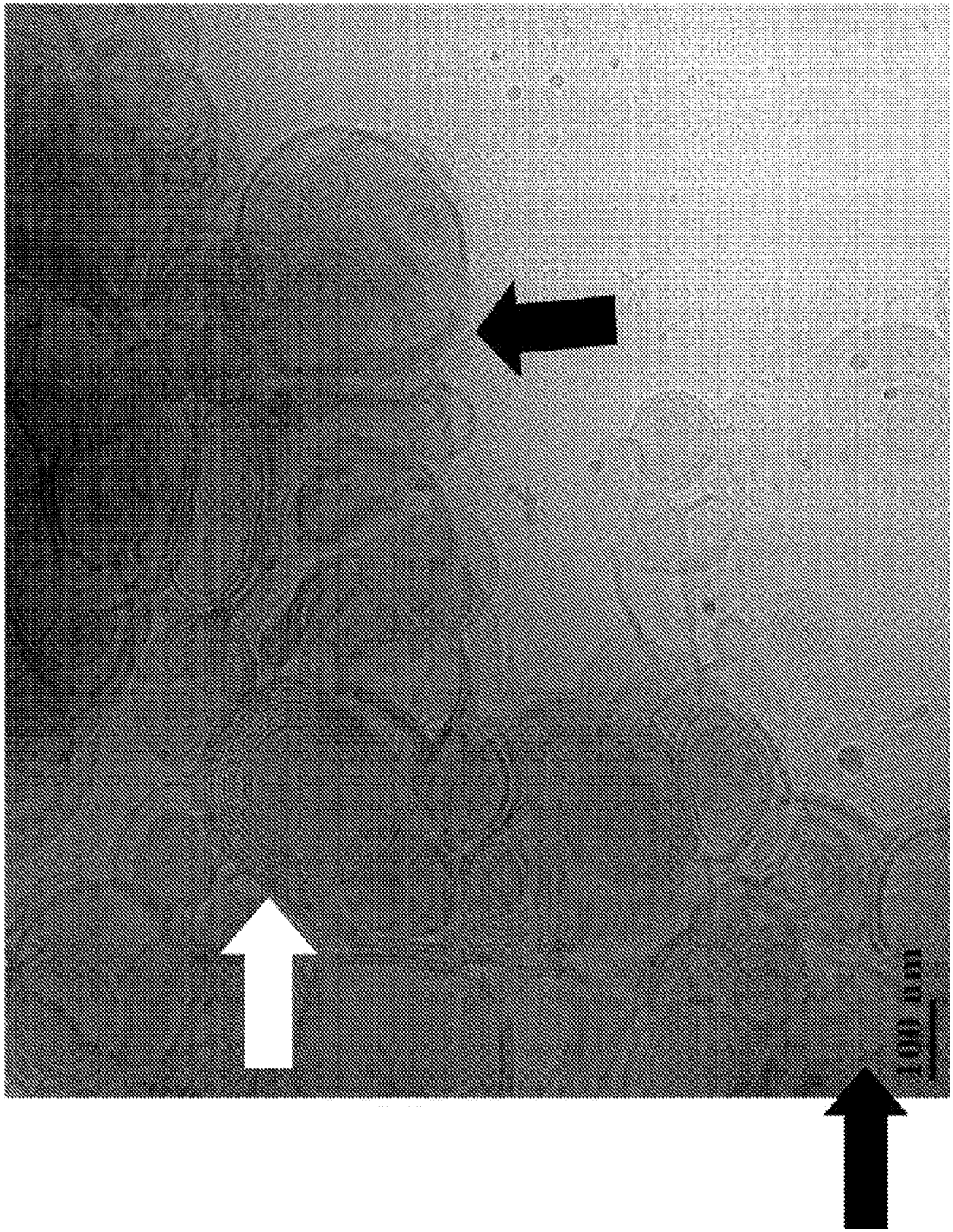
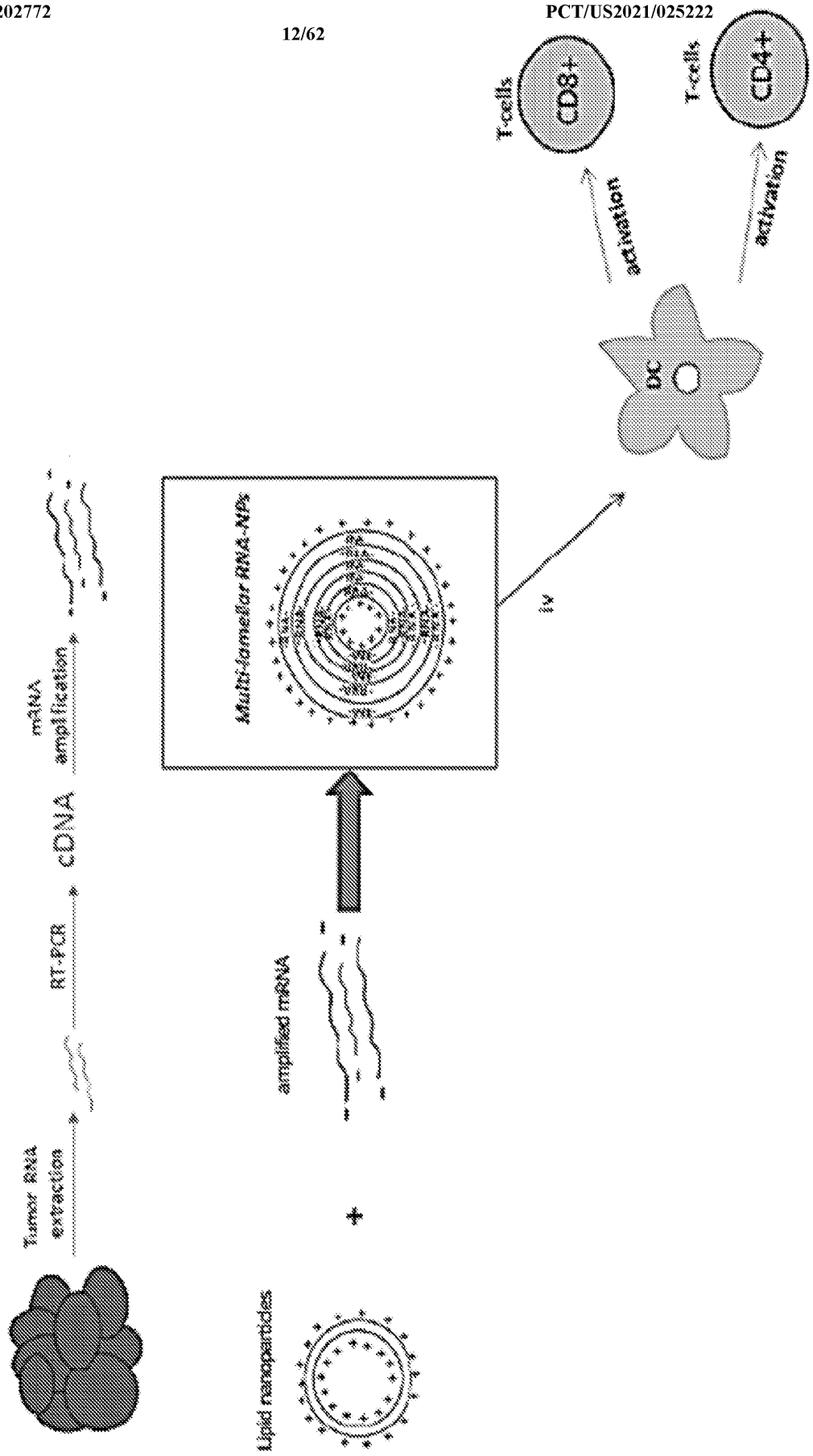


FIGURE 6


Tumor RNA extraction
RT-PCR
cDNA
mRNA amplification
Lipid nanoparticles
amplified mRNA
Multi-lamellar RNA-NPs
IV
DC
T-cells
CD8+
activation
T-cells
CD4+
activation

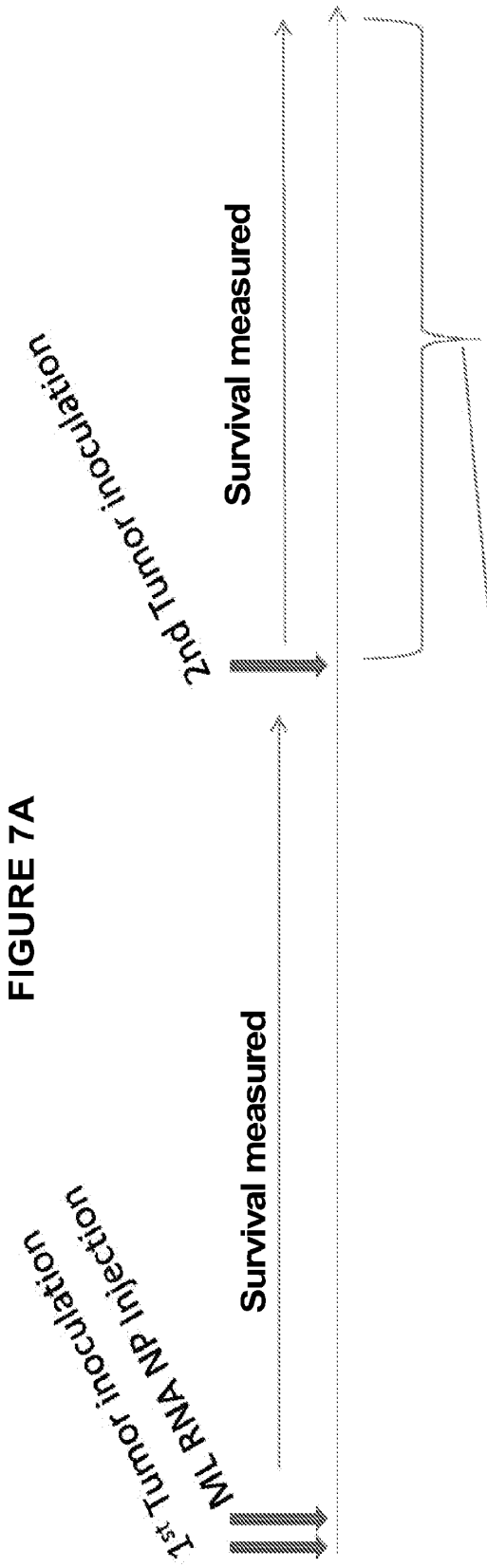


FIGURE 7A

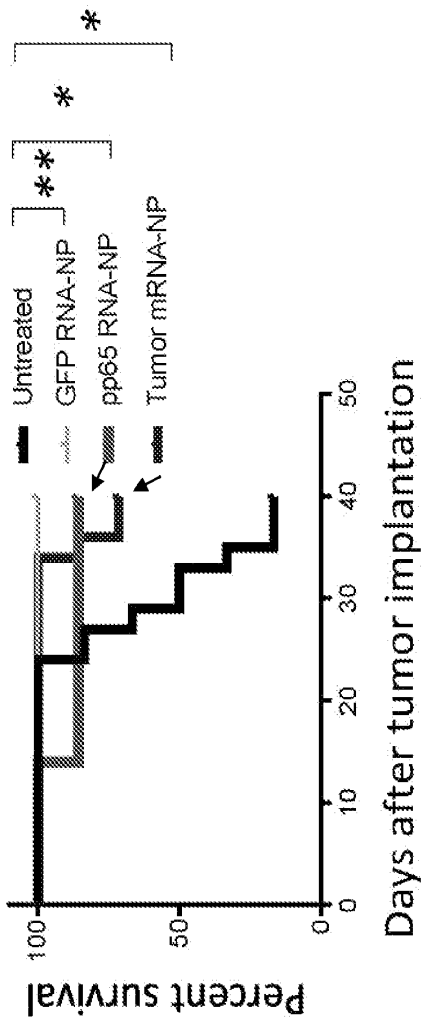


FIGURE 7B

FIGURE 8

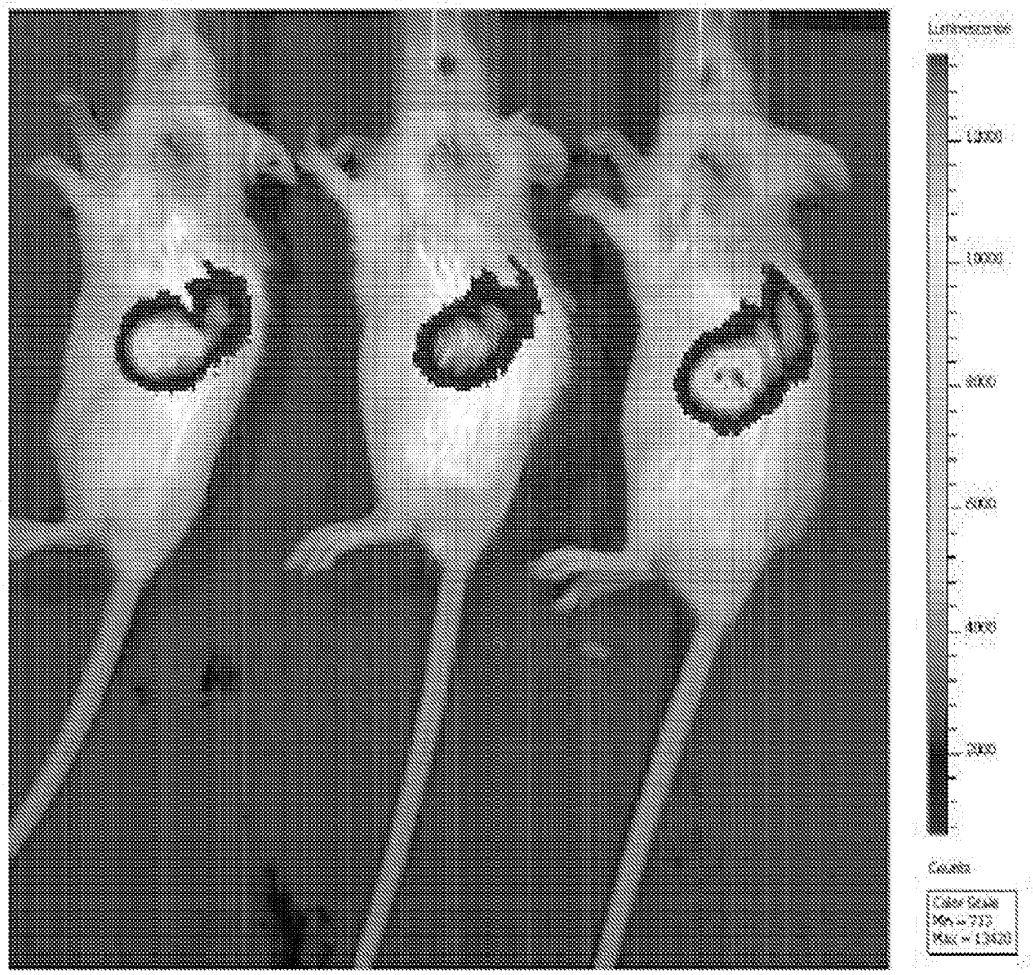


FIGURE 9A

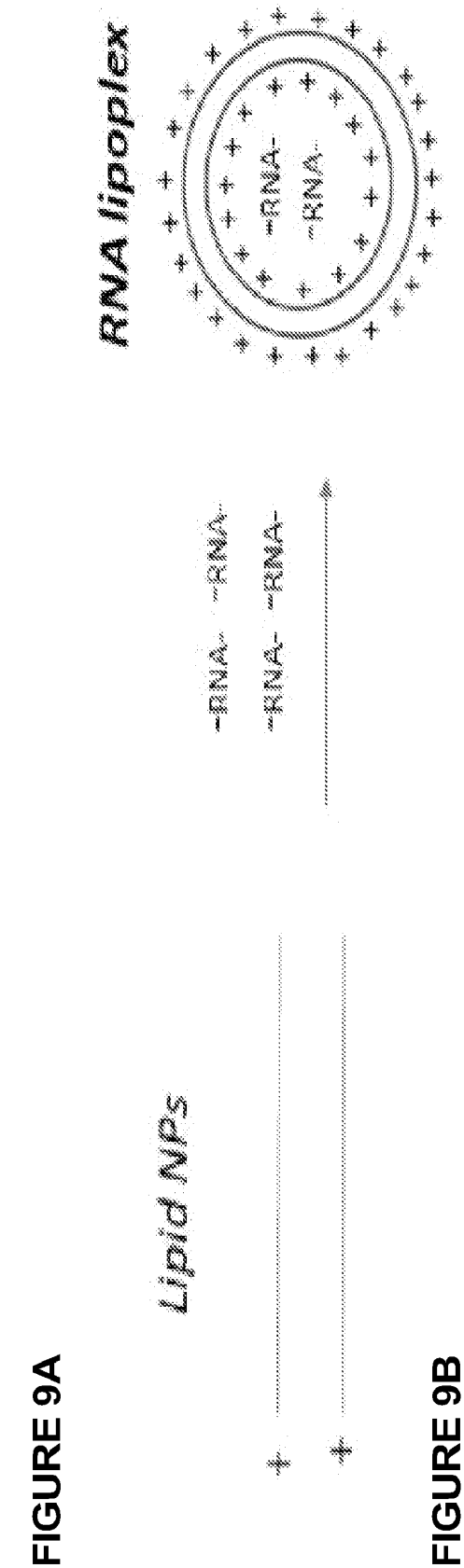
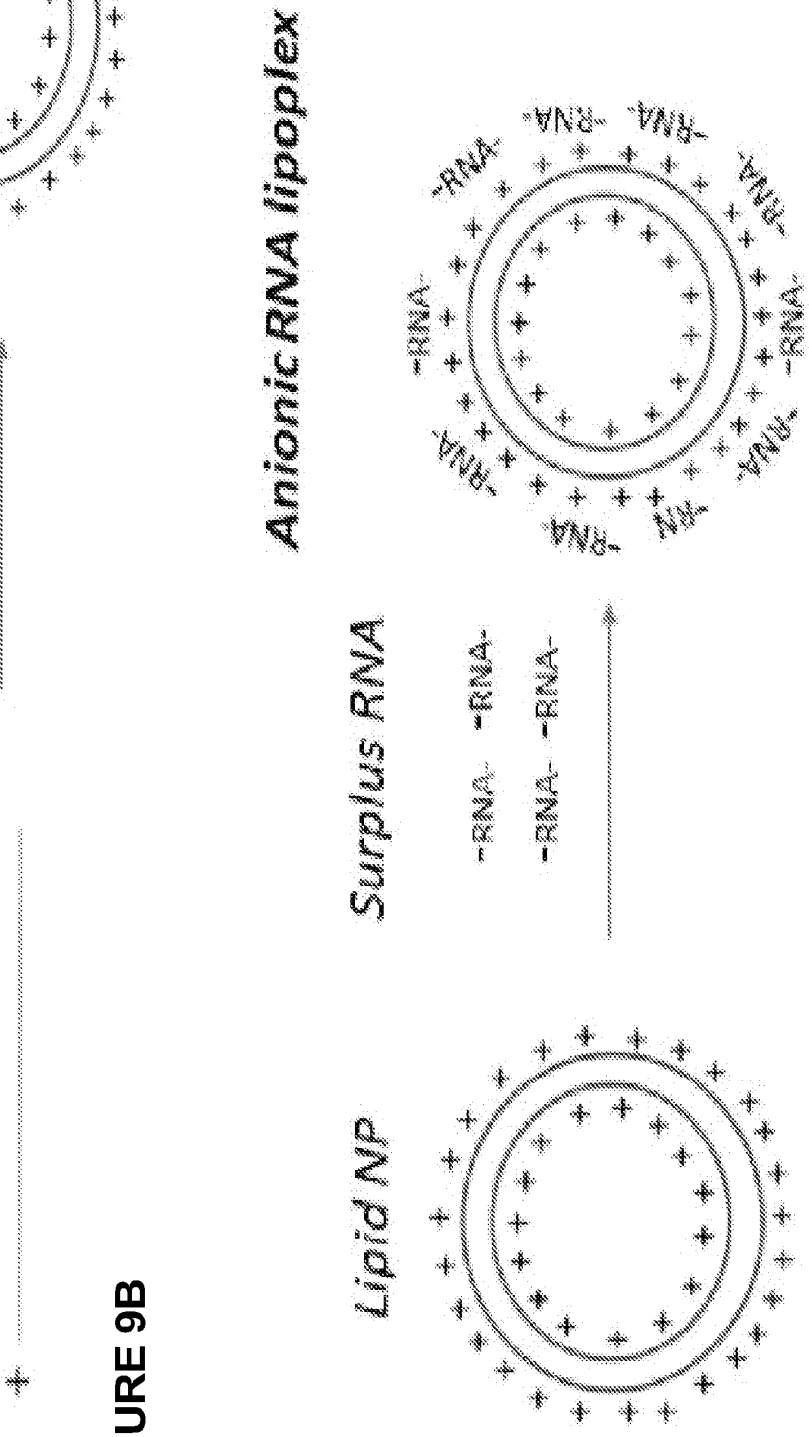


FIGURE 9B



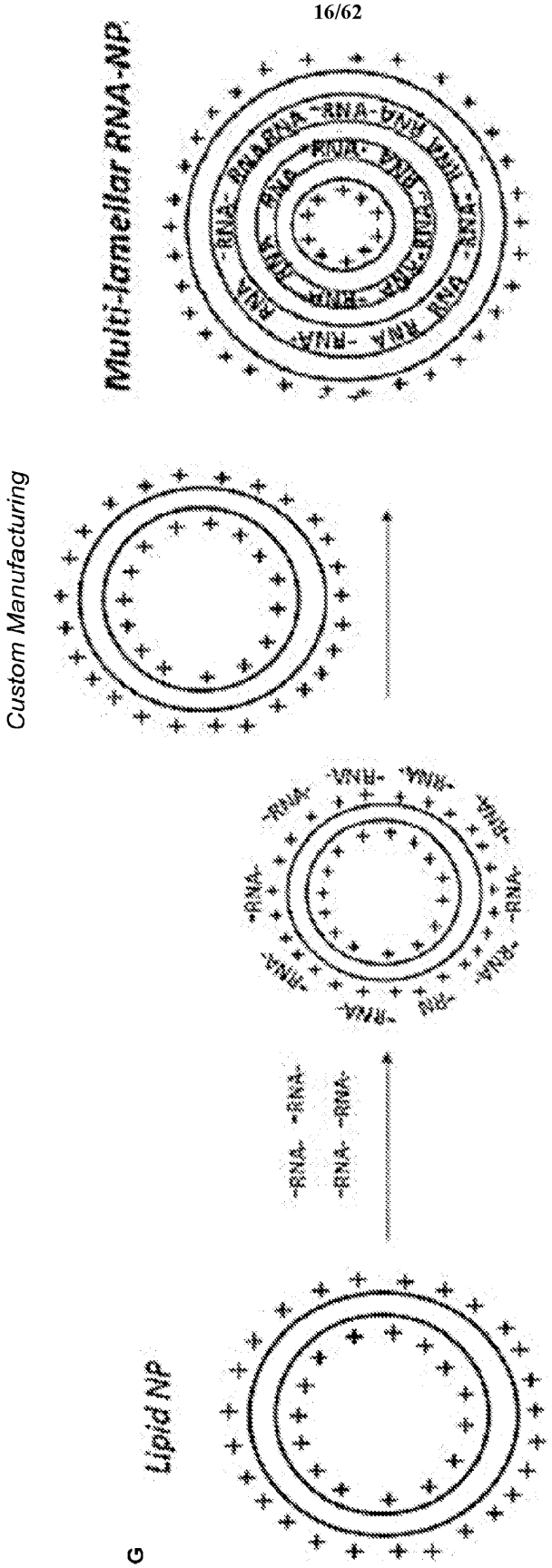


FIGURE 9C

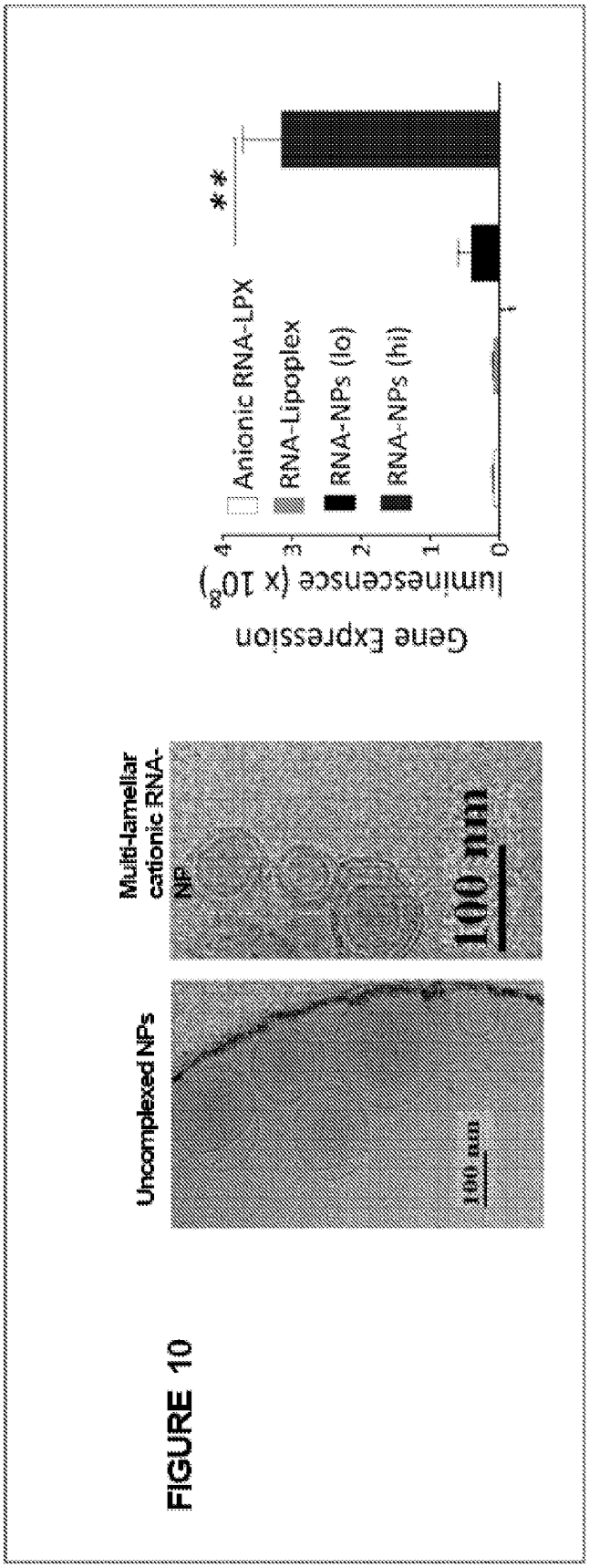

Gene Expression
luminescence (x 10⁶)
0
1
2
3
4
Anionic RNA-LPX
RNA-Lipoplex
RNA-NPs (lo)
RNA-NPs (hi)
**
Multi-lamellar cationic RNA-NP
100 nm
Uncomplexed NPs
100 nm

FIGURE 10

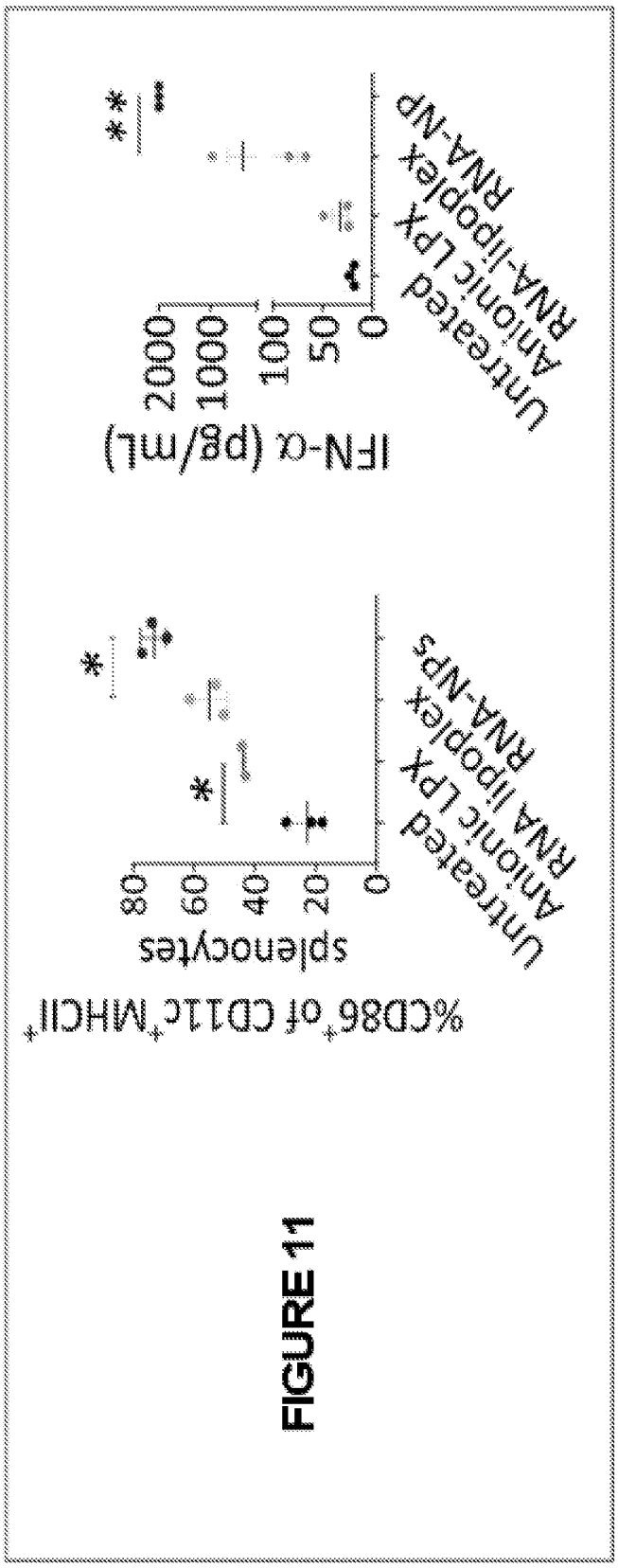
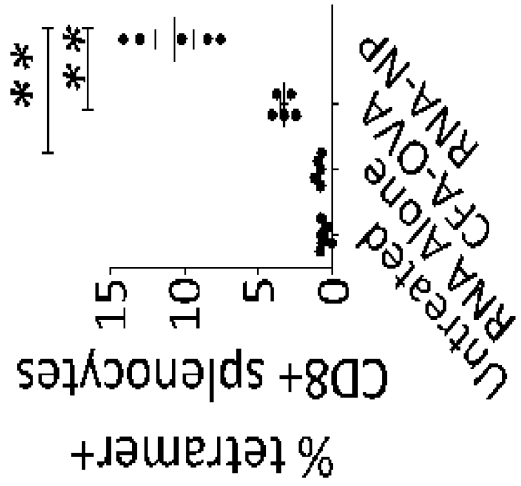

%CD86+ of CD11c+MHCII+ splenocytes
0
20
40
60
80
Untreated
Anionic LPX RNA lipoplex RNA-NPs
IFN-α (pg/mL)
0
50
100
1000
2000
Untreated
Anionic LPX RNA-lipoplex RNA-NP

FIGURE 11


% tetramer+
CD8+ splenocytes
15
10
5
0
Untreated
RNA Alone
CFA-OVA
RNA-NP
****
**
**


%tetramer+ CD8+
of blood WBCs
80
60
40
20
0
NP Alone
Anionic LPX
RNA lipoplex
RNA-NPs
****

FIGURE 12

FIGURE 13

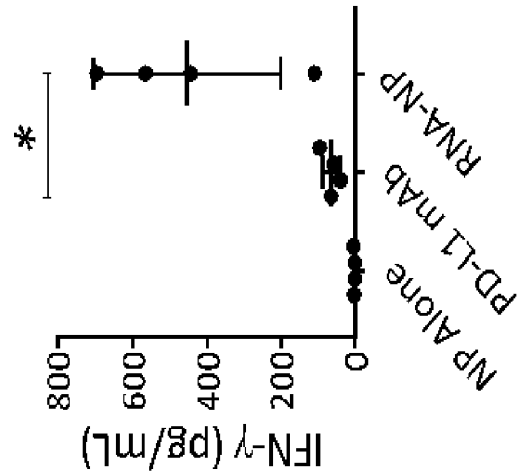
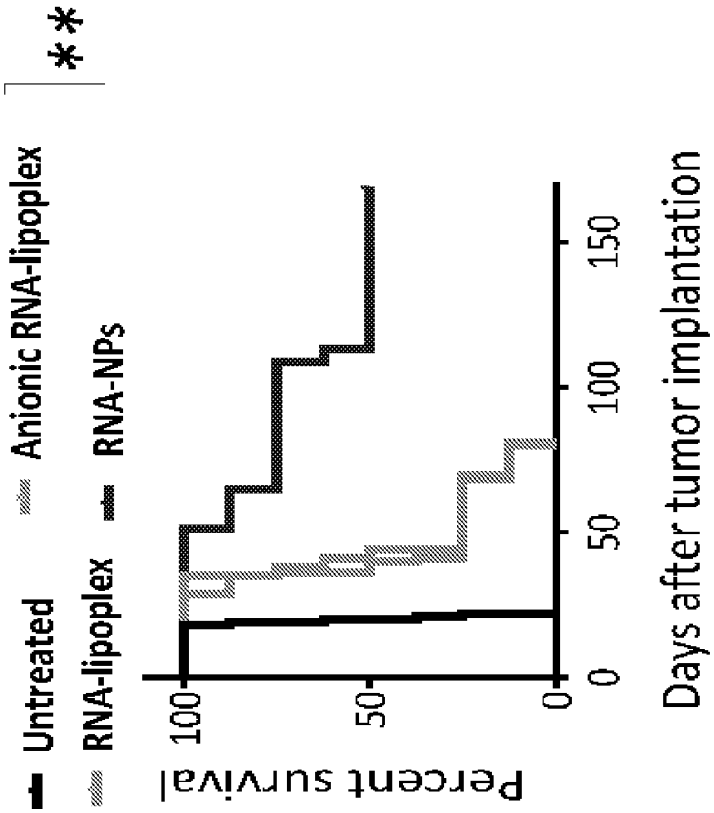
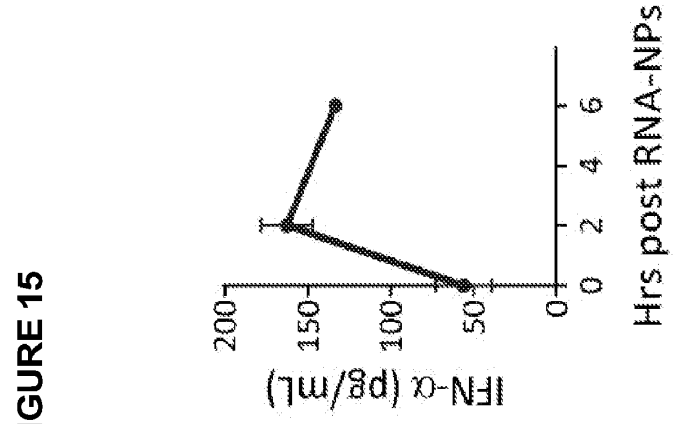
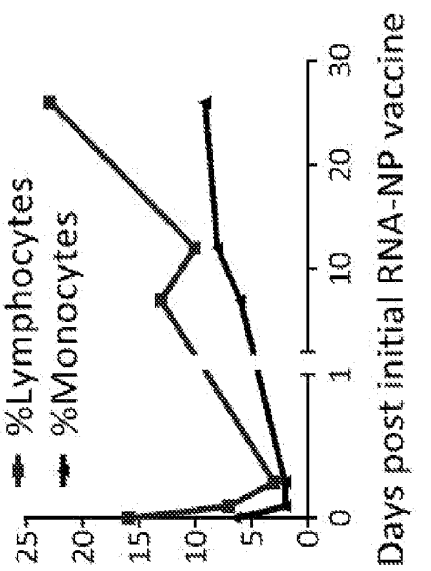


FIGURE 14




IFN-α (pg/mL)
200
150
100
50
0
0 2 4 6
Hrs post RNA-NPs


%Lymphocytes
%Monocytes
25
20
15
10
5
0
0 1 10 20 30
Days post initial RNA-NP vaccine

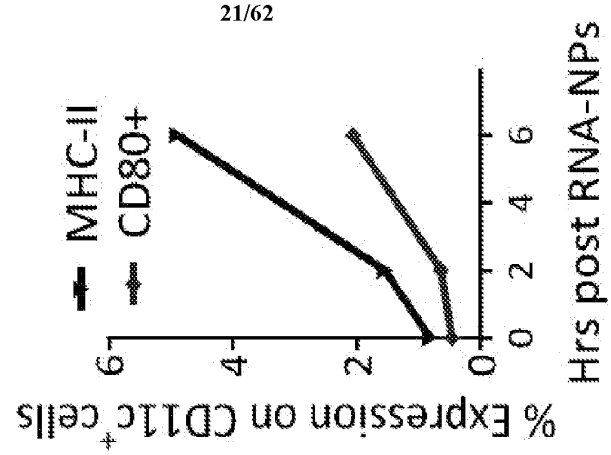

MHC-II
CD80+
% Expression on CD11c+ cells
6
4
2
0
0 2 4 6
Hrs post RNA-NPs

FIGURE 15



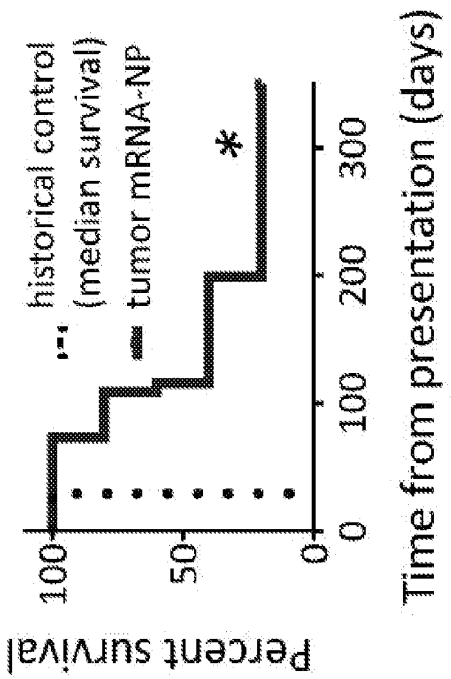

historical control
(median survival)
tumor mRNA-NP
*
Percent survival
100
50
0
0
100
200
300
Time from presentation (days)

FIGURE 16

FIGURE 17

charles river

AUDITED INTERIM DRAFT PATHOLOGY REPORT
(NOT FOR REGULATORY SUBMISSION)

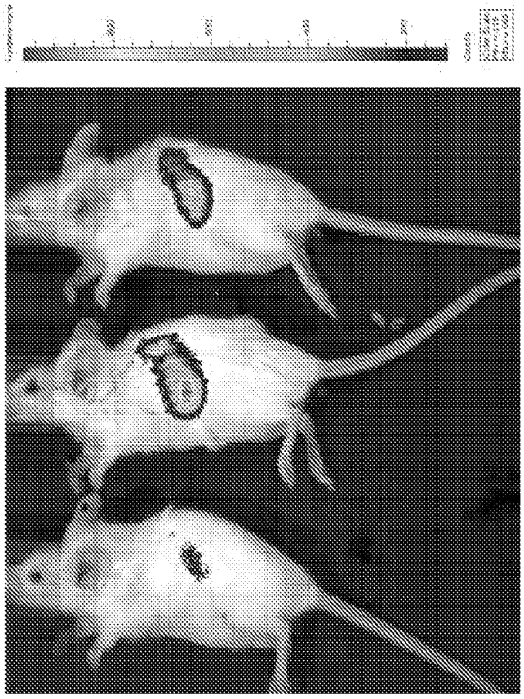
Test Site Reference No. 002018-4988

Testing Facility Protocol No. 2018-01-RNA-LP

Toxicology study of murine glioma mRNA and pp65 mRNA encapsulated in liposomes after intravenous delivery to C57BL/6 mice

APPROVAL

FDA-IND4 19300. Sayour



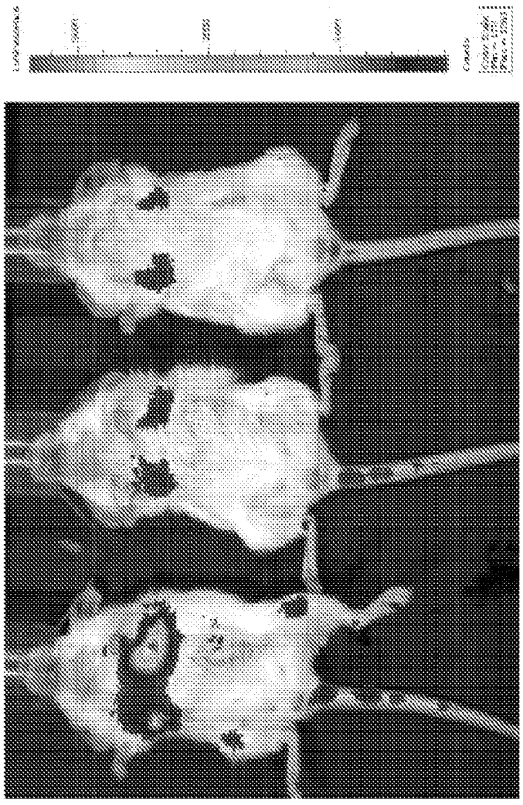


FIGURE 18A

FIGURE 18B

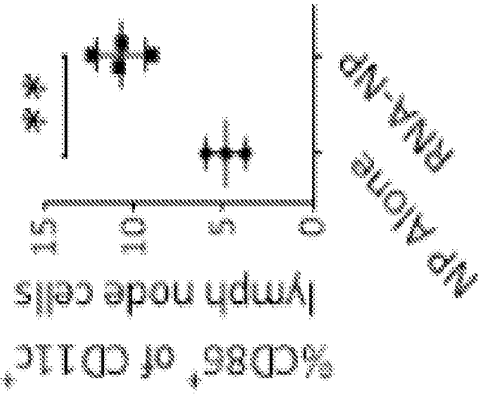


FIGURE 18C

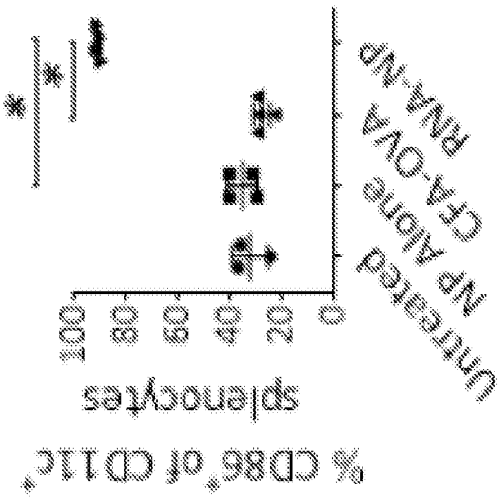
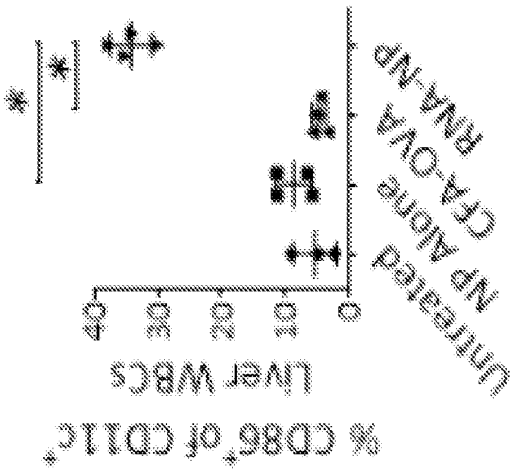


FIGURE 18D



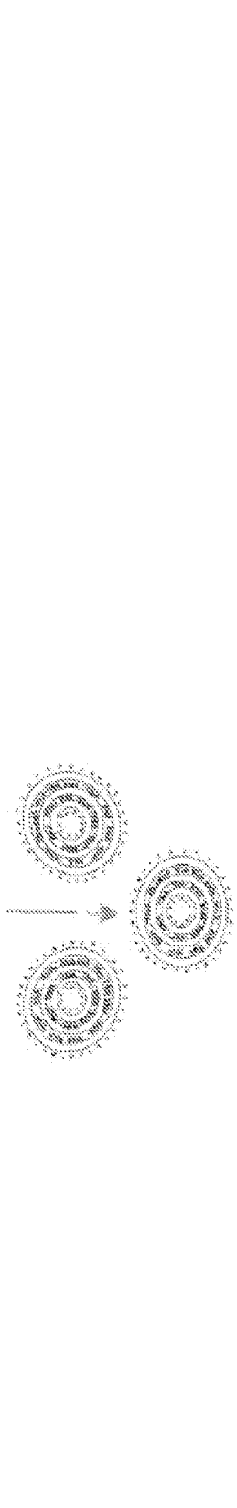

5'UTR
SARS-CoV-2 spike, membrane envelope or nucleocapsid mRNA
3'UTR
Poly(A)tail

FIGURE 19

SEQ	
1	Complete amino acid sequence of ORF1ab polyprotein of SARS-CoV-2 isolate Wuhan-Hu-1 (GenBank Accession No. YP_009725297.1)
2	Complete Genomic Sequence of SARS-CoV-2 isolate Wuhan-Hu-1 (GenBank Accession No. NC_045512)
3	Amino acid sequence of Spike glycoprotein of SARS-CoV-2 isolate Wuhan-Hu-1 (GenBank Accession No. YP_009724390.1)
4	Complete amino acid sequence of ORF1a polyprotein of SARS-CoV-2 isolate Wuhan-Hu-1 (GenBank Accession No. YP_009725295.1)
5	Amino acid sequence of Orf3a protein of SARS-CoV-2 isolate Wuhan-Hu-1 (GenBank Accession No. YP_009724391.1)
6	Amino Acid sequence of Envelope protein of SARS-CoV-2 isolate Wuhan-Hu-1 (GenBank Accession No. YP_009724392.1)
7	Amino Acid sequence of Membrane glycoprotein of SARS-CoV-2 isolate Wuhan-Hu-1 (GenBank Accession No. YP_009724393.1)
8	Amino Acid sequence of ORF6 protein of SARS-CoV-2 isolate Wuhan-Hu-1 (GenBank Accession No. YP_009724394.1)
9	Amino Acid sequence of Orf7a protein of SARS-CoV-2 isolate Wuhan-Hu-1 (GenBank Accession No. YP_009724395.1)
10	Amino Acid sequence of Orf7b protein of SARS-CoV-2 isolate Wuhan-Hu-1 (GenBank Accession No. YP_009725318.1)
11	Amino Acid sequence of Orf8 protein of SARS-CoV-2 isolate Wuhan-Hu-1 (GenBank Accession No. YP_009724396.1)
12	Amino Acid sequence of Nucleocapsid phosphoprotein of SARS-CoV-2 isolate Wuhan-Hu-1 (GenBank Accession No. YP_009724397.2)
13	Amino Acid sequence of Orf10 protein of SARS-CoV-2 isolate Wuhan-Hu-1 (GenBank Accession No. YP_009725255.1)

FIGURE 20

FIGURE 21A

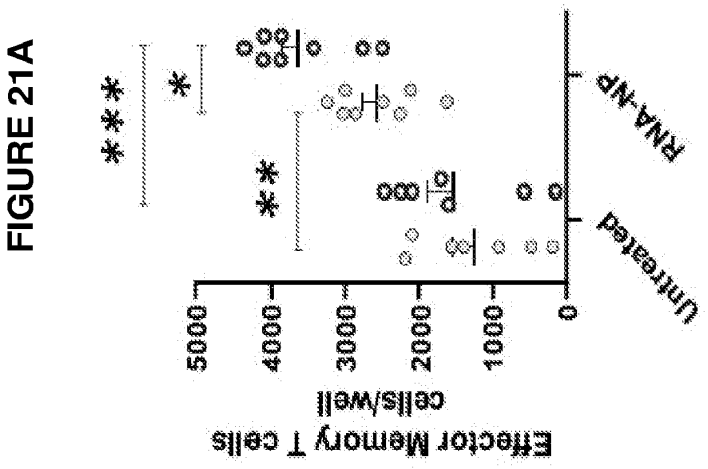


FIGURE 21B

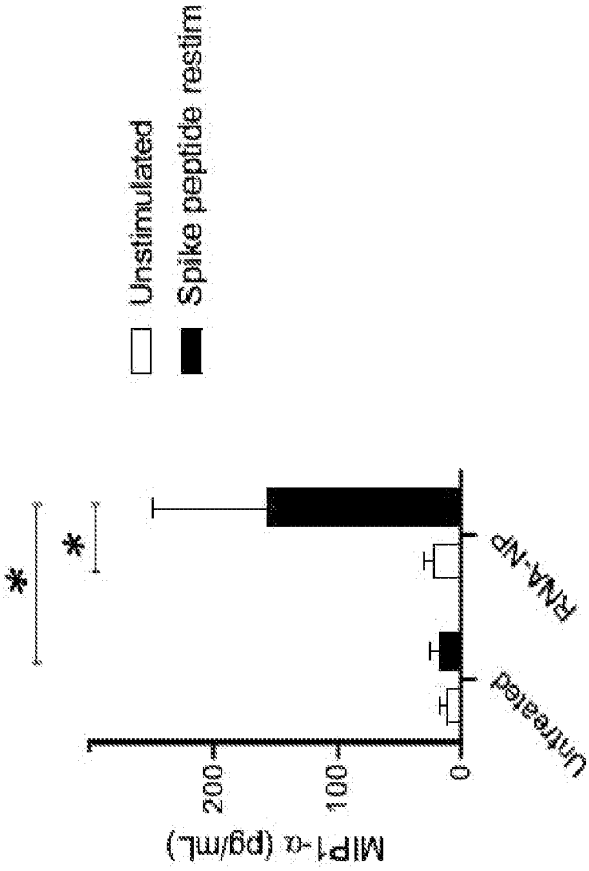


FIGURE 22A: p19GEM4Z-Spike Sequence

```
TCGTAGTTAT CTACACGACG GGGAGTCAGG CAACTATGGA TGAACGAAAT AGACAGATCG   60
CTGAGATAGG TGCCTCACTG ATTAAGCATT GGTAACTGTC AGACCAAGTT TACTCATATA  120
TACTTTAGAT TGATTTAAAA CTTCATTTTT AATTTAAAAG GATCTAGGTG AAGATCCTTT  180
TTGATAATCT CATGACCAAA ATCCCTTAAC GTGAGTTTTC GTTCCACTGA GCGTCAGACC  240
CCGTAGAAAA GATCAAAGGA TCTTCTTGAG ATCCTTTTTT TCTGCGCGTA ATCTGCTGCT  300
TGCAAACAAA AAAACCACCG CTACCAGCGG TGGTTTGTTT GCCGGATCAA GAGCTACCAA  360
CTCTTTTTCC GAAGGTAACT GGCTTCAGCA GAGCGCAGAT ACCAAATACT GTTCTTCTAG  420
TGTAGCCGTA GTTAGGCCAC CACTTCAAGA ACTCTGTAGC ACCGCCTACA TACCTCGCTC  480
TGCTAATCCT GTTACCAGTG GCTGCTGCCA GTGGCGATAA GTCGTGTCTT ACCGGGTTGG  540
ACTCAAGACG ATAGTTACCG GATAAGGCGC AGCGGTCGGG CTGAACGGGG GGTTCGTGCA  600
CACAGCCCAG CTTGGAGCGA ACGACCTACA CCGAACTGAG ATACCTACAG CGTGAGCTAT  660
GAGAAAGCGC CACGCTTCCC GAAGGGAGAA AGGCGGACAG GTATCCGGTA AGCGGCAGGG  720
TCGGAACAGG AGAGCGCACG AGGGAGCTTC CAGGGGGAAA CGCCTGGTAT CTTTATAGTC  780
CTGTCGGGTT TCGCCACCTC TGACTTGAGC GTCGATTTTT GTGATGCTCG TCAGGGGGGC  840
GGAGCCTATG GAAAAACGCC AGCAACGCGG CCTTTTTACG GTTCCTGGCC TTTTGCTGGC  900
CTTTTGCTCA CATGTTCTTT CCTGCGTTAT CCCCTGATTC TGTGGATAAC CGTATTACCG  960
CCTTTGAGTG AGCTGATACC GCTCGCCGCA GCCGAACGAC CGAGCGCAGC GAGTCAGTGA 1020
GCGAGGAAGC GGAAGAGCGC CCAATACGCA AACCGCCTCT CCCCGCGCGT TGGCCGATTC 1080
ATTAATGCAG CTGGCACGAC AGGTTTCCCG ACTGGAAAGC GGGCAGTGAG CGCAACGCAA 1140
TTAATGTGAG TTAGCTCACT CATTAGGCAC CCCAGGCTTT ACACTTTATG CTTCCGGCTC 1200
GTATGTTGTG TGGAATTGTG AGCGGATAAC AATTTCACAC AGGAAACAGC TATGACCATG 1260
ATTACGCCAA GCTCTAATAC GACTCACTAT AGGGAGACAA GCTTGGTACC ATGTTTGTGT 1320
TCCTGGTGCT GCTGCCACTG GTGTCCAGCC AGTGTGTGAA CCTGACCACC AGGACCCAAC 1380
TTCCTCCTGC CTACACCAAC TCCTTCACCA GGGGAGTCTA CTACCCTGAC AAGGTGTTCA 1440
GGTCCTCTGT GCTGCACAGC ACCCAGGACC TGTTCCTGCC ATTCTTCAGC AATGTGACCT 1500
GGTTCCATGC CATCCATGTG TCTGGCACCA ATGGCACCAA GAGGTTTGAC AACCCTGTGC 1560
TGCCATTCAA TGATGGAGTC TACTTTGCCA GCACAGAGAA GAGCAACATC ATCAGGGGCT 1620
GGATTTTTGG CACCACCCTG GACAGCAAGA CCCAGTCCCT GCTGATTGTG AACAATGCCA 1680
CCAATGTGGT GATTAAGGTG TGTGAGTTCC AGTTCTGTAA TGACCCATTC CTGGGAGTCT 1740
ACTACCACAA GAACAACAAG TCCTGGATGG AGTCTGAGTT CAGGGTCTAC TCCTCTGCCA 1800
ACAACTGTAC CTTTGAATAT GTGAGCCAAC CATTCCTGAT GGACTTGGAG GGCAAGCAGG 1860
GCAACTTCAA GAACCTGAGG GAGTTTGTGT TCAAGAACAT TGATGGCTAC TTCAAGATTT 1920
ACAGCAAACA CACACCAATC AACCTGGTGA GGGACCTGCC ACAGGGCTTC TCTGCCTTGG 1980
AACCACTGGT GGACCTGCCA ATTGGCATCA ACATCACCAG GTTCCAGACC CTGCTGGCTC 2040
TGCACAGGTC CTACCTGACA CCTGGAGACT CCTCCTCTGG CTGGACAGCA GGAGCAGCAG 2100
CCTACTATGT GGGCTACCTC CAACCAAGGA CCTTCCTGCT GAAATACAAT GAGAATGGCA 2160
CCATCACAGA TGCTGTGGAC TGTGCCCTGG ACCCACTGTC TGAGACCAAG TGTACCCTGA 2220
AATCCTTCAC AGTGGAGAAG GGCATCTACC AGACCAGCAA CTTCAGGGTC CAACCAACAG 2280
AGAGCATTGT GAGGTTTCCA AACATCACCA ACCTGTGTCC ATTTGGAGAG GTGTTCAATG 2340
CCACCAGGTT TGCCTCTGTC TATGCCTGGA ACAGGAAGAG GATTAGCAAC TGTGTGGCTG 2400
ACTACTCTGT GCTCTACAAC TCTGCCTCCT TCAGCACCTT CAAGTGTTAT GGAGTGAGCC 2460
CAACCAAACT GAATGACCTG TGTTTCACCA ATGTCTATGC TGACTCCTTT GTGATTAGGG 2520
GAGATGAGGT GAGACAGATT GCCCCTGGAC AAACAGGCAA GATTGCTGAC TACAACTACA 2580
AACTGCCTGA TGACTTCACA GGCTGTGTGA TTGCCTGGAA CAGCAACAAC CTGGACAGCA 2640
AGGTGGGAGG CAACTACAAC TACCTCTACA GACTGTTCAG GAAGAGCAAC CTGAAACCAT 2700
TTGAGAGGGA CATCAGCACA GAGATTTACC AGGCTGGCAG CACACCATGT AATGGAGTGG 2760
AGGGCTTCAA CTGTTACTTT CCACTCCAAT CCTATGGCTT CCAACCAACC AATGGAGTGG 2820
GCTACCAACC ATACAGGGTG GTGGTGCTGT CCTTTGAACT GCTCCATGCC CCTGCCACAG 2880
TGTGTGGACC AAAGAAGAGC ACCAACCTGG TGAAGAACAA GTGTGTGAAC TTCAACTTCA 2940
ATGGACTGAC AGGCACAGGA GTGCTGACAG AGAGCAACAA GAAGTTCCTG CCATTCCAAC 3000
AGTTTGGCAG GGACATTGCT GACACCACAG ATGCTGTGAG GGACCCACAG ACCTTGGAGA 3060
TTCTGGACAT CACACCATGT TCCTTTGGAG GAGTGTCTGT GATTACACCT GGCACCAACA 3120
CCAGCAACCA GGTGGCTGTG CTCTACCAGG ATGTGAACTG TACTGAGGTG CCTGTGGCTA 3180
TCCATGCTGA CCAACTTACA CCAACCTGGA GGGTCTACAG CACAGGCAGC AATGTGTTCC 3240
```

FIGURE 22A - CONTINUED

```
AGACCAGGGC TGGCTGTCTG ATTGGAGCAG AGCATGTGAA CAACTCCTAT GAGTGTGACA 3300
TCCCAATTGG AGCAGGCATC TGTGCCTCCT ACCAGACCCA GACCAACAGC CCAAGGAGGG 3360
CAAGGTCTGT GGCAAGCCAG AGCATCATTG CCTACACAAT GAGTCTGGGA GCAGAGAACT 3420
CTGTGGCTTA CAGCAACAAC AGCATTGCCA TCCCAACCAA CTTCACCATC TCTGTGACCA 3480
CAGAGATTCT GCCTGTGAGT ATGACCAAGA CCTCTGTGGA CTGTACAATG TATATCTGTG 3540
GAGACAGCAC AGAGTGTAGC AACCTGCTGC TCCAATATGG CTCCTTCTGT ACCCAACTTA 3600
ACAGGGCTCT GACAGGCATT GCTGTGGAAC AGGACAAGAA CACCCAGGAG GTGTTTGCCC 3660
AGGTGAAGCA GATTTACAAG ACACCTCCAA TCAAGGACTT TGGAGGCTTC AACTTCAGCC 3720
AGATTCTGCC TGACCCAAGC AAGCCAAGCA AGAGGTCCTT CATTGAGGAC CTGCTGTTCA 3780
ACAAGGTGAC CCTGGCTGAT GCTGGCTTCA TCAAGCAATA TGGAGACTGT CTGGGAGACA 3840
TTGCTGCCAG GGACCTGATT TGTGCCCAGA AGTTCAATGG ACTGACAGTG CTGCCTCCAC 3900
TGCTGACAGA TGAGATGATT GCCCAATACA CCTCTGCCCT GCTGGCTGGC ACCATCACCT 3960
CTGGCTGGAC CTTTGGAGCA GGAGCAGCCC TCCAAATCCC ATTTGCTATG CAGATGGCTT 4020
ACAGGTTCAA TGGCATTGGA GTGACCCAGA ATGTGCTCTA TGAGAACCAG AAACTGATTG 4080
CCAACCAGTT CAACTCTGCC ATTGGCAAGA TTCAGGACTC CCTGTCCAGC ACAGCCTCTG 4140
CCCTGGGCAA ACTCCAAGAT GTGGTGAACC AGAATGCCCA GGCTCTGAAC ACCCTGGTGA 4200
AGCAACTTTC CAGCAACTTT GGAGCCATCT CCTCTGTGCT GAATGACATC CTGAGCAGAC 4260
TGGACAAGGT GGAGGCTGAG GTCCAGATTG ACAGACTGAT TACAGGCAGA CTCCAATCCC 4320
TCCAAACCTA TGTGACCCAA CAACTTATCA GGGCTGCTGA GATTAGGGCA TCTGCCAACC 4380
TGGCTGCCAC CAAGATGAGT GAGTGTGTGC TGGGACAAAG CAAGAGGGTG GACTTCTGTG 4440
GCAAGGGCTA CCACCTGATG AGTTTTCCAC AGTCTGCCCC TCATGGAGTG GTGTTCCTGC 4500
ATGTGACCTA TGTGCCTGCC CAGGAGAAGA ACTTCACCAC AGCCCCTGCC ATCTGCCATG 4560
ATGGCAAGGC TCACTTTCCA AGGGAGGGAG TGTTTGTGAG CAATGGCACC CACTGGTTTG 4620
TGACCCAGAG GAACTTCTAT GAACCACAGA TTATCACCAC AGACAACACC TTTGTGTCTG 4680
GCAACTGTGA TGTGGTGATT GGCATTGTGA ACAACACAGT CTATGACCCA CTCCAACCTG 4740
AACTGGACTC CTTCAAGGAG GAACTGGACA AATACTTCAA GAACCACACC AGCCCTGATG 4800
TGGACCTGGG AGACATCTCT GGCATCAATG CCTCTGTGGT GAACATCCAG AAGGAGATTG 4860
ACAGACTGAA TGAGGTGGCT AAGAACCTGA ATGAGTCCCT GATTGACCTC CAAGAACTGG 4920
GCAAATATGA ACAATACATC AAGTGGCCAT GGTACATCTG GCTGGGCTTC ATTGCTGGAC 4980
TGATTGCCAT TGTGATGGTG ACCATAATGC TGTGTTGTAT GACCTCCTGT TGTTCCTGTC 5040
TGAAAGGCTG TTGTTCCTGT GGCTCCTGTT GTAAGTTTGA TGAGGATGAC TCTGAACCTG 5100
TGCTGAAAGG AGTGAAACTG CACTACACCT GAATCTAGAG CGGCCGCCGA ATTCTTAATT 5160
AAAAAAAAAA AAAAAAAAAA AAAAAAAAAA AAAAAAAAAA AAAAAAAAAA AAAAAAAAAA 5220
AACTAGTGGC GCCTGATGCG GTATTTTCTC CTTACGCATC TGTGCGGTAT TTCACACCGC 5280
ATATGGTGCA CTCTCAGTAC AATCTGCTCT GATGCCGCAT AGTTAAGCCA GCCCCGACAC 5340
CCGCCAACAC CCGCTGACGC GCCCTGACGG GCTTGTCTGC TCCCGGCATC CGCTTACAGA 5400
CAAGCTGTGA CCGTCTCCGG GAGCTGCATG TGTCAGAGGT TTTCACCGTC ATCACCGAAA 5460
CGCGCGAGAC GAAAGGGCCT CGTGATACGC CTATTTTTAT AGGTTAATGT CATGATAATA 5520
ATGGTTTCTT AGACGTCAGG TGGCACTTTT CGGGGAAATG TGCGCGGAAC CCCTATTTGT 5580
TTATTTTTCT AAATACATTC AAATATGTAT CCGCTCATGA GACAATAACC CTGATAAATG 5640
CTTCAATAAT ATTGAAAAAG GAAGAGTATG AGTATTCAAC ATTTCCGTGT CGCCCTTATT 5700
CCCTTTTTTG CGGCATTTTG CCTTCCTGTT TTTGCTCACC CAGAAACGCT GGTGAAAGTA 5760
AAAGATGCTG AAGATCAGTT GGGTGCACGA GTGGGTTACA TCGAACTGGA TCTCAACAGC 5820
GGTAAGATCC TTGAGAGTTT TCGCCCCGAA GAACGTTTTC CAATGATGAG CACTTTTAAA 5880
GTTCTGCTAT GTGGCGCGGT ATTATCCCGT ATTGACGCCG GGCAAGAGCA ACTCGGTCGC 5940
CGCATACACT ATTCTCAGAA TGACTTGGTT GAGTACTCAC CAGTCACAGA AAAGCATCTT 6000
ACGGATGGCA TGACAGTAAG AGAATTATGC AGTGCTGCCA TAACCATGAG TGATAACACT 6060
GCGGCCAACT TACTTCTGAC AACGATCGGA GGACCGAAGG AGCTAACCGC TTTTTTGCAC 6120
AACATGGGGG ATCATGTAAC TCGCCTTGAT CGTTGGGAAC CGGAGCTGAA TGAAGCCATA 6180
CCAAACGACG AGCGTGACAC CACGATGCCT GTAGCAATGG CAACAACGTT GCGCAAACTA 6240
TTAACTGGCG AACTACTTAC TCTAGCTTCC CGGCAACAAT TAATAGACTG GATGGAGGCG 6300
GATAAAGTTG CAGGACCACT TCTGCGCTCG GCCCTTCCGG CTGGCTGGTT TATTGCTGAT 6360
AAATCTGGAG CCGGTGAGCG TGGGTCTCGC GGTATCATTG CAGCACTGGG GCCAGATGGT 6420
AAGCCCTCCC GTA                                                    6433
```

FIGURE 22B: p19GEM4Z-Spike Map

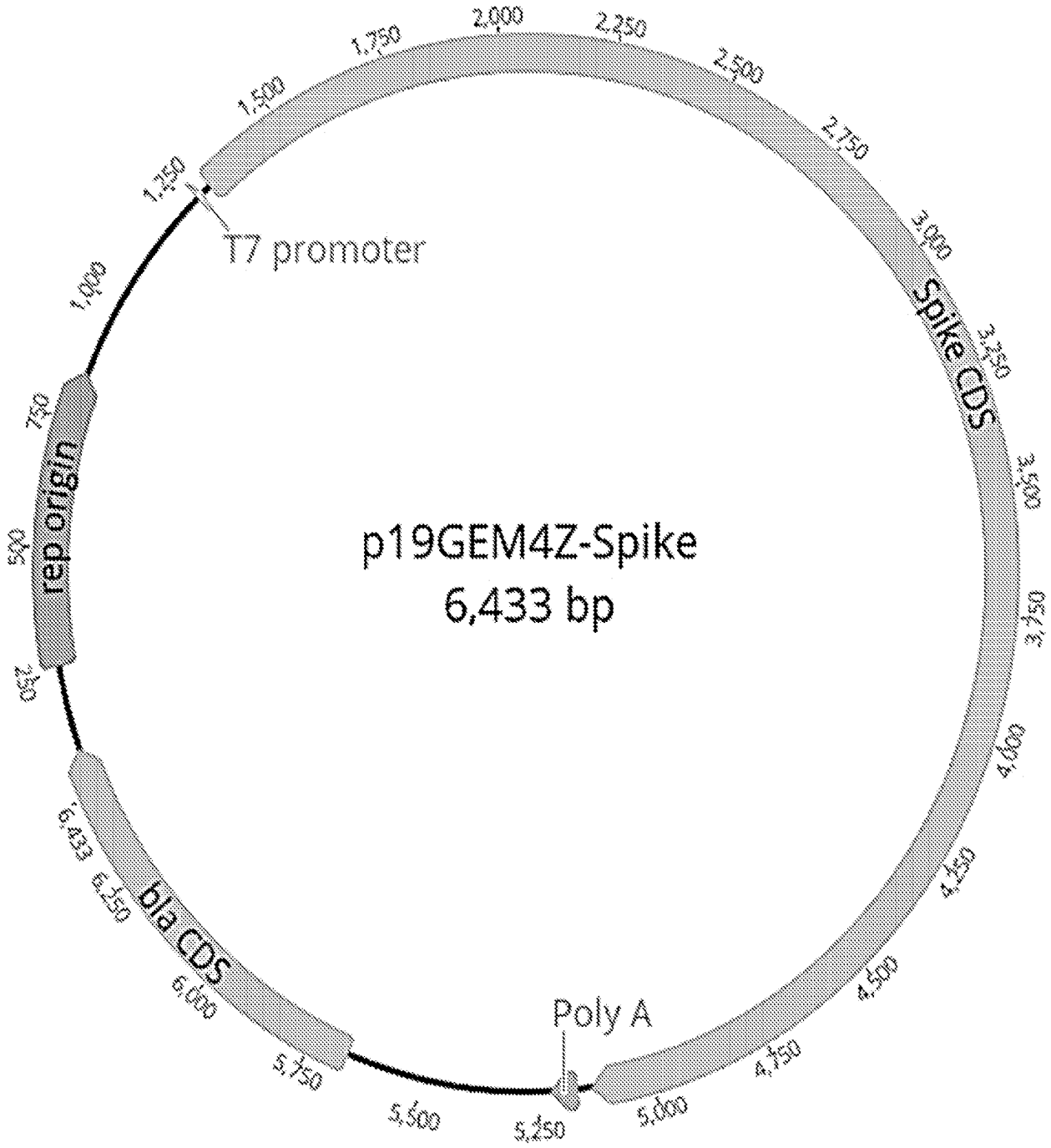


FIGURE 22C

```
p19GEM4Z-Spike                   TCGTAGTTATCTACACGACGGGGAGTCAGGCAACTATGGATGAACGAAATAGACAGATCG    60
sq15_14-GMCSF_R3.ab1 (reversed)  ------------------------------------------------------------
sq13_4-GMCSF_F2.ab1              ------------------------------------------------------------
sq14_3-GMCSF_F1.ab1              ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1            ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1            ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1           ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed)  ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1           ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1             ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1            ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                   CTGAGATAGGTGCCTCACTGATTAAGCATTGGTAACTGTCAGACCAAGTTTACTCATATA   120
sq15_14-GMCSF_R3.ab1 (reversed)  -NNNNTGNNNANNNGNNNCNNNNNTGNTAGCNTGNTAANTGTCAGNNCNAAGTTANTNNN    59
sq13_4-GMCSF_F2.ab1              ------------------------------------------------------------
sq14_3-GMCSF_F1.ab1              ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1            ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1            ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1           ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed)  ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1           ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1             ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1            ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                   TACTTTAGATTGATTTAAAACTTCATTTTTAATTTAAAAGGATCTAGGTGAAGATCCTTT   180
sq15_14-GMCSF_R3.ab1 (reversed)  NNNTNCTTAGNTGATTNAAAANTCATTTTNATTNAAAAGGATCTAGGNNGAAGATCCTTT   119
sq13_4-GMCSF_F2.ab1              ------------------------------------------------------------
sq14_3-GMCSF_F1.ab1              ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1            ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1            ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1           ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed)  ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1           ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1             ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1            ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                   TTGATAATCTCATGACCAAAATCCCTTAACGTGAGTTTTCGTTCCACTGAGCGTCAGACC   240
sq15_14-GMCSF_R3.ab1 (reversed)  TTGATAATNTCATGACCAAAANCC-TTAACGTGAGTTTTCGTTCCNCTGAGCGTCAGACC   178
sq13_4-GMCSF_F2.ab1              ------------------------------------------------------------
sq14_3-GMCSF_F1.ab1              ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1            ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1            ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1           ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed)  ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1           ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1             ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1            ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                   CCGTAGAAAAGATCAAAGGATCTTCTTGAGATCCTTTTTTTCTGCGCGTAATCTGCTGCT   300
sq15_14-GMCSF_R3.ab1 (reversed)  CN-TAGAAAAGATCAAAGGATCTTCTTGAGATCCTTTTTTTCTGCGCGTAATCTGCTGCT   237
sq13_4-GMCSF_F2.ab1              ------------------------------------------------------------
sq14_3-GMCSF_F1.ab1              ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1            ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1            ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1           ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed)  ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1           ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1             ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1            ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------
```

FIGURE 22C- CONTINUED

```
p19GEM4Z-Spike                  TGCAAACAAAAAAACCACCGCTACCAGCGGTGGTTTGTTTGCCGGATCAAGAGCTACCAA   360
sq15_14-GMCSF_R3.ab1 (reversed) TGCAAACAAAAAAACCACCGCTACCAGCGGTGGTTTGTTTGCCGGATCAAGAGCTACCAA   297
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  CTCTTTTTCCGAAGGTAACTGGCTTCAGCAGAGCGCAGATACCAAATACTGTTCTTCTAG   420
sq15_14-GMCSF_R3.ab1 (reversed) CTCTTTTTCCGAAGGTAACTGGCTTCAGCAGAGCGCAGATACCAAATACTGTTCTTCTAG   357
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  TGTAGCCGTAGTTAGGCCACCACTTCAAGAACTCTGTAGCACCGCCTACATACCTCGCTC   480
sq15_14-GMCSF_R3.ab1 (reversed) TGTAGCCGTAGTTAGGCCACCACTTCAAGAACTCTGTAGCACCGCCTACATACCTCGCTC   417
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  TGCTAATCCTGTTACCAGTGGCTGCTGCCAGTGGCGATAAGTCGTGTCTTACCGGGTTGG   540
sq15_14-GMCSF_R3.ab1 (reversed) TGCTAATCCTGTTACCAGTGGCTGCTGCCAGTGGCGATAAGTCGTGTCTTACCGGGTTGG   477
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  ACTCAAGACGATAGTTACCGGATAAGGCGCAGCGGTCGGGCTGAACGGGGGGTTCGTGCA   600
sq15_14-GMCSF_R3.ab1 (reversed) ACTCAAGACGATAGTTACCGGATAAGGCGCAGCGGTCGGGCTGAACGGGGGGTTCGTGCA   537
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------
```

FIGURE 22C- CONTINUED

```
p19GEM4Z-Spike                  CACAGCCCAGCTTGGAGCGAACGACCTACACCGAACTGAGATACCTACAGCGTGAGCTAT   660
sq15_14-GMCSF_R3.ab1 (reversed) CACAGCCCAGCTTGGAGCGAACGACCTACACCGAACTGAGATACCTACAGCGTGAGCTAT   597
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  GAGAAAGCGCCACGCTTCCCGAAGGGAGAAAGGCGGACAGGTATCCGGTAAGCGGCAGGG   720
sq15_14-GMCSF_R3.ab1 (reversed) GAGAAAGCGCCACGCTTCCCGAAGGGAGAAAGGCGGACAGGTATCCGGTAAGCGGCAGGG   657
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  TCGGAACAGGAGAGCGCACGAGGGAGCTTCCAGGGGGAAACGCCTGGTATCTTTATAGTC   780
sq15_14-GMCSF_R3.ab1 (reversed) TCGGAACAGGAGAGCGCACGAGGGAGCTTCCAGGGGGAAACGCCTGGTATCTTTATAGTC   717
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  CTGTCGGGTTTCGCCACCTCTGACTTGAGCGTCGATTTTTGTGATGCTCGTCAGGGGGGC   840
sq15_14-GMCSF_R3.ab1 (reversed) CTGTCGGGTTTCGCCACCTCTGACTTGAGCGTCGATTTTTGTGATGCTCGTCAGGGGGGC   777
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  GGAGCCTATGGAAAAACGCCAGCAACGCGGCCTTTTTACGGTTCCTGGCCTTTTGCTGGC   900
sq15_14-GMCSF_R3.ab1 (reversed) GGAGCCTATGGAAAAACGCCAGCAACGCGGCCTTTTTACGGTTCCTGGCCTTTTGCTGGC   837
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------
```

FIGURE 22C- CONTINUED

```
p19GEM4Z-Spike                  CTTTTGCTCACATGTTCTTTCCTGCGTTATCCCCTGATTCTGTGGATAACCGTATTACCG   960
sq15_14-GMCSF_R3.ab1 (reversed) CTTTTGCTCACATGTTCTTTCCTGCGTTATCCCCTGATTCTGTGGATAACCGTATTACCG   897
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  CCTTTGAGTGAGCTGATACCGCTCGCCGCAGCCGAACGACCGAGCGCAGCGAGTCAGTGA  1020
sq15_14-GMCSF_R3.ab1 (reversed) CCTTTGAGTGAGCTGATACCGCTCGCCGCAGCCGAACGACCGAGCGCAGCGAGTCAGTGA   957
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  GCGAGGAAGCGGAAGAGCGCCCAATACGCAAACCGCCTCTCCCCGCGCGTTGGCCGATTC  1080
sq15_14-GMCSF_R3.ab1 (reversed) GCGAGGAAGCGGAAGAGCGCCCAATACGCAAACCGCCTCTCCCCGCGCGTTGGCCGATTC  1017
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  ATTAATGCAGCTGGCACGACAGGTTTCCCGACTGGAAAGCGGGCAGTGAGCGCAACGCAA  1140
sq15_14-GMCSF_R3.ab1 (reversed) ATTAATGCAGCTGGCACGACAGGTTTCCCGACTGGAAAGCGGGCAGTGAGCGCAACGCAA  1077
sq13_4-GMCSF_F2.ab1             ----------------------------------------NNNNNNNNNNNNCGCA-CGCAN    21
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  TTAATGTGAGTTAGCTCACTCATTAGGCACCCCAGGCTTTACACTTTATGCTTCCGGCTC  1200
sq15_14-GMCSF_R3.ab1 (reversed) TTAATGTGAGTTAGCTCACTCATTAGGCACCCCAGGNNNNCACNTNNNNNNNNNN-----  1137
sq13_4-GMCSF_F2.ab1             TTAATGTGAGTTAGCTCACTCATTAGGCACCCCAGGCTTTACACTTTATGCTTCCGGCTC    81
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------
```

FIGURE 22C- CONTINUED

```
p19GEM4Z-Spike                  GTATGTTGTGTGGAATTGTGAGCGGATAACAATTTCACACAGGAAACAGCTATGACCATG  1260
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  1197
sq13_4-GMCSF_F2.ab1             GTATGTTGTGTGGAATTGTGAGCGGATAACAATTTCACACAGGAAACAGCTATGACCATG   141
sq14_3-GMCSF_F1.ab1             ----------------------------------NNNNNNNGNNNNNCTATGACCATG    24
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  ATTACGCCAAGCTCTAATACGACTCACTATAGGGAGACAAGCTTGGTACCATGTTTGTGT  1320
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  1257
sq13_4-GMCSF_F2.ab1             ATTACGCCAAGCTCTAATACGACTCACTATAGGGAGACAAGCTTGGTACCATGTTTGTGT   201
sq14_3-GMCSF_F1.ab1             ATTACGCCAAGCTCTAATACGACTCACTATAGGGAGACAAGCTTGGTACCATGTTTGTGT    84
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  TCCTGGTGCTGCTGCCACTGGTGTCCAGCCAGTGTGTGAACCTGACCACCAGGACCCAAC  1380
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  1317
sq13_4-GMCSF_F2.ab1             TCCTGGTGCTGCTGCCACTGGTGTCCAGCCAGTGTGTGAACCTGACCACCAGGACCCAAC   261
sq14_3-GMCSF_F1.ab1             TCCTGGTGCTGCTGCCACTGGTGTCCAGCCAGTGTGTGAACCTGACCACCAGGACCCAAC   144
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  TTCCTCCTGCCTACACCAACTCCTTCACCAGGGGAGTCTACTACCCTGACAAGGTGTTCA  1440
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  1377
sq13_4-GMCSF_F2.ab1             TTCCTCCTGCCTACACCAACTCCTTCACCAGGGGAGTCTACTACCCTGACAAGGTGTTCA   321
sq14_3-GMCSF_F1.ab1             TTCCTCCTGCCTACACCAACTCCTTCACCAGGGGAGTCTACTACCCTGACAAGGTGTTCA   204
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  GGTCCTCTGTGCTGCACAGCACCCAGGACCTGTTCCTGCCATTCTTCAGCAATGTGACCT  1500
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  1437
sq13_4-GMCSF_F2.ab1             GGTCCTCTGTGCTGCACAGCACCCAGGACCTGTTCCTGCCATTCTTCAGCAATGTGACCT   381
sq14_3-GMCSF_F1.ab1             GGTCCTCTGTGCTGCACAGCACCCAGGACCTGTTCCTGCCATTCTTCAGCAATGTGACCT   264
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------
```

FIGURE 22C- CONTINUED

```
p19GEM4Z-Spike                  GGTTCCATGCCATCCATGTGTCTGGCACCAATGGCACCAAGAGGTTTGACAACCCTGTGC  1560
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  1497
sq13_4-GMCSF_F2.ab1             GGTTCCATGCCATCCATGTGTCTGGCACCAATGGCACCAAGAGGTTTGACAACCCTGTGC   441
sq14_3-GMCSF_F1.ab1             GGTTCCATGCCATCCATGTGTCTGGCACCAATGGCACCAAGAGGTTTGACAACCCTGTGC   324
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  TGCCATTCAATGATGGAGTCTACTTTGCCAGCACAGAGAAGAGCAACATCATCAGGGGCT  1620
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  1557
sq13_4-GMCSF_F2.ab1             TGCCATTCAATGATGGAGTCTACTTTGCCAGCACAGAGAAGAGCAACATCATCAGGGGCT   501
sq14_3-GMCSF_F1.ab1             TGCCATTCAATGATGGAGTCTACTTTGCCAGCACAGAGAAGAGCAACATCATCAGGGGCT   384
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  GGATTTTTGGCACCACCCTGGACAGCAAGACCCAGTCCCTGCTGATTGTGAACAATGCCA  1680
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  1617
sq13_4-GMCSF_F2.ab1             GGATTTTTGGCACCACCCTGGACAGCAAGACCCAGTCCCTGCTGATTGTGAACAATGCCA   561
sq14_3-GMCSF_F1.ab1             GGATTTTTGGCACCACCCTGGACAGCAAGACCCAGTCCCTGCTGATTGTGAACAATGCCA   444
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  CCAATGTGGTGATTAAGGTGTGTGAGTTCCAGTTCTGTAATGACCCATTCCTGGGAGTCT  1740
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  1677
sq13_4-GMCSF_F2.ab1             CCAATGTGGTGATTAAGGTGTGTGAGTTCCAGTTCTGTAATGACCCATTCCTGGGAGTCT   621
sq14_3-GMCSF_F1.ab1             CCAATGTGGTGATTAAGGTGTGTGAGTTCCAGTTCTGTAATGACCCATTCCTGGGAGTCT   504
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  ACTACCACAAGAACAACAAGTCCTGGATGGAGTCTGAGTTCAGGGTCTACTCCTCTGCCA  1800
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  1737
sq13_4-GMCSF_F2.ab1             ACTACCACAAGAACAACAAGTCCTGGATGGAGTCTGAGTTCAGGGTCTACTCCTCTGCCA   681
sq14_3-GMCSF_F1.ab1             ACTACCACAAGAACAACAAGTCCTGGATGGAGTCTGAGTTCAGGGTCTACTCCTCTGCCA   564
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------
```

FIGURE 22C- CONTINUED

```
p19GEM4Z-Spike                  ACAACTGTACCTTTGAATATGTGAGCCAACCATTCCTGATGGACTTGGAGGGCAAGCAGG  1860
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  1797
sq13_4-GMCSF_F2.ab1             ACAACTGTACCTTTGAATATGTGAGCCAACCATTCCTGATGGACTTGGAGGGCAAGCAGG   741
sq14_3-GMCSF_F1.ab1             ACAACTGTACCTTTGAATATGTGAGCCAACCATTCCTGATGGACTTGGAGGGCAAGCAGG   624
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  GCAACTTCAAGAACCTGAGGGAGTTTGTGTTCAAGAACATTGATGGCTACTTCAAGATTT  1920
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  1857
sq13_4-GMCSF_F2.ab1             GCAACTTCAAGAACCTGAGGGAGTTTGTGTTCAAGAACATTGATGGCTACTTCAAGATTT   801
sq14_3-GMCSF_F1.ab1             GCAACTTCAAGAACCTGAGGGAGTTTGTGTTCAAGAACATTGATGGCTACTTCAAGATTT   684
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  ACAGCAAACACACACCAATCAACCTGGTGAGGGACCTGCCACAGGGCTTCTCTGCCTTGG  1980
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  1917
sq13_4-GMCSF_F2.ab1             ACAGCAAACACACACCAATCAACCTGGTGAGGGACCTGCCACAGGGCTTCTCTGCCTTGG   861
sq14_3-GMCSF_F1.ab1             ACAGCAAACACACACCAATCAACCTGGTGAGGGACCTGCCACAGGGCTTCTCTGCCTTGG   744
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  AACCACTGGTGGACCTGCCAATTGGCATCAACATCACCAGGTTCCAGACCCTGCTGGCTC  2040
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  1977
sq13_4-GMCSF_F2.ab1             AACCACTGGTGGACCTGCCAATTGGCATCAACATCACCAGGTTCCAGACCCTGCTGGCTC   921
sq14_3-GMCSF_F1.ab1             AACCACTGGTGGACCTGCCAATTGGCATCAACATCACCAGGTTCCAGACCCTGCTGGCTC   804
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  TGCACAGGTCCTACCTGACACCTGGAGACTCCTCCTCTGGCTGGACAGCAGGAGCAGCAG  2100
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  2037
sq13_4-GMCSF_F2.ab1             TGCACAGGTCCTACCTGACACCTGGNNACTCCTCCTCTGGCTGGNCAGCNN-AGCAGCAG   980
sq14_3-GMCSF_F1.ab1             TGCACAGGTCCTACCTGACACCTGGAGACTCCTCCTCTGGCTGGACAGCAGGAGCAGCAG   864
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------
```

FIGURE 22C- CONTINUED

```
p19GEM4Z-Spike                  CCTACTATGTGGGCTACCTCCAACCAAGGACCTTCCTGCTGAAATACAATGAGAATGGCA  2160
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  2097
sq13_4-GMCSF_F2.ab1             CCTACTATGTGGNTACNNNNNNNNACNTCNGCTGAANTACNATGAGATGGCACNTCACNG  1040
sq14_3-GMCSF_F1.ab1             CCTACTATGTGGGCTACCTCCAACCAAGGACCTTCCTGCTGAAATACAATGAGAATGGCA   924
sq15_8-SBSpike_F1.ab1           --------NNNNNNNNNCNNNNNNNCNNGGACCTTCCTGCTGAATACAATGAGAATGGCA    52
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  CCATCACAGATGCTGTGGACTGTGCCCTGGACCCACTGTCTGAGACCAAGTGTACCCTGA  2220
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  2157
sq13_4-GMCSF_F2.ab1             ATGCTGNNGNNTGTGCCCNNNNCCACNNNCTGANANNNNNNNACCNNAANNNNCNNNNNNN  1100
sq14_3-GMCSF_F1.ab1             CCATCACAGATGCTGTGGACTGTGCCCTGGNCCCACTGTCTGAGACCAAGTGTACCCTGA   984
sq15_8-SBSpike_F1.ab1           CCATCACAGATGCTGTGGACTGTGCCCTGGACCCACTGTCTGAGACCAAGTGTACCCTGA   112
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  AATCCTTCACAGTGGAGAAGGGCATCTACCAGACCAGCAACTTCAGGGTCCAACCAACAG  2280
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  2217
sq13_4-GMCSF_F2.ab1             NNNAAANGNNTNNNANCNNANN----------------------------------------  1160
sq14_3-GMCSF_F1.ab1             AATCCTTCACAGNGGANNNNGNATCTACCAGANCAGCAACNTTCNNNNCCNACCAACAGA  1044
sq15_8-SBSpike_F1.ab1           AATCCTTCACAGTGGAGAAGGGCATCTACCAGACCAGCAACTTCAGGGTCCAACCAACAG   172
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  AGAGCATTGTGAGGTTTCCAAACATCACCAACCTGTGTCCATTTGGAGAGGTGTTCAATG  2340
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  2277
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  1220
sq14_3-GMCSF_F1.ab1             NAGCNATTNNGAGGTTTCCCAAACATCACCNACCCTGNNGTCCNT---------------  1104
sq15_8-SBSpike_F1.ab1           AGAGCATTGTGAGGTTTCCAAACATCACCAACCTGTGTCCATTTGGAGAGGTGTTCAATG   232
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  CCACCAGGTTTGCCTCTGTCTATGCCTGGAACAGGAAGAGGATTAGCAACTGTGTGGCTG  2400
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  2337
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  1280
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  1164
sq15_8-SBSpike_F1.ab1           CCACCAGGTTTGCCTCTGTCTATGCCTGGAACAGGAAGAGGATTAGCAACTGTGTGGCTG   292
sq16_2-SBSpike_R1.ab1 (reversed) --------------------ATGCCTGGAACAGGAAGAGGATTAGCAACTGTGTGGCTG    39
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------
```

FIGURE 22C- CONTINUED

```
p19GEM4Z-Spike                  ACTACTCTGTGCTCTACAACTCTGCCTCCTTCAGCACCTTCAAGTGTTATGGAGTGAGCC  2460
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  2397
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  1340
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  1224
sq15_8-SBSpike_F1.ab1           ACTACTCTGTGCTCTACAACTCTGCCTCCTTCAGCACCTTCAAGTGTTATGGAGTGAGCC   352
sq16_2-SBSpike_R1.ab1 (reversed) ANTACTCTGTGCTCTACAACTCTGCCTCCTTCAGCACCTTCAAGTGTTATGGAGTGAGCC   99
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  CAACCAAACTGAATGACCTGTGTTTCACCAATGTCTATGCTGACTCCTTTGTGATTAGGG  2520
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  2457
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  1400
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  1284
sq15_8-SBSpike_F1.ab1           CAACCAAACTGAATGACCTGTGTTTCACCAATGTCTATGCTGACTCCTTTGTGATTAGGG   412
sq16_2-SBSpike_R1.ab1 (reversed) CAACCAAACTGAATGACCTGTGTTTCACCAATGTCTATGCTGACTCCTTTGTGATTAGGG  159
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  GAGATGAGGTGAGACAGATTGCCCCTGGACAAACAGGCAAGAT^GCTGACTACAACTACA  2580
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  2517
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  1460
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  1344
sq15_8-SBSpike_F1.ab1           GAGATGAGGTGAGACAGATTGCCCCTGGACAAACAGGCAAGAT^GCTGACTACAACTACA   472
sq16_2-SBSpike_R1.ab1 (reversed) GAGATGAGGTGAGACAGATTGCCCCTGGACAAACAGGCAAGAT^GCTGACTACAACTACA  219
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  AACTGCCTGA^GACTTCACAGGCTGTGTGATTGCCTGGAACAGCAACAACCTGGACAGCA  2640
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  2577
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  1520
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  1404
sq15_8-SBSpike_F1.ab1           AACTGCCTGA^GACTTCACAGGCTGTGTGATTGCCTGGAACAGCAACAACCTGGACAGCA   532
sq16_2-SBSpike_R1.ab1 (reversed) AACTGCCTGA^GACTTCACAGGCTGTGTGATTGCCTGGAACAGCAACAACCTGGACAGCA  279
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  AGGTGGGAGGCAACTACAACTACCTCTACAGACTGTTCAGGAAGAGCAACCTGAAACCAT  2700
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  2637
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  1580
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  1464
sq15_8-SBSpike_F1.ab1           AGGTGGGAGGCAACTACAACTACCTCTACAGACTGTTCAGGAAGAGCAACCTGAAACCAT   592
sq16_2-SBSpike_R1.ab1 (reversed) AGGTGGGAGGCAACTACAACTACCTCTACAGACTGTTCAGGAAGAGCAACCTGAAACCAT  339
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------
```

FIGURE 22C- CONTINUED

```
p19GEM4Z-Spike                  TTGAGAGGGACATCAGCACAGAGATTTACCAGGCTGGCAGCACACCATGTAATGGAGTGG  2760
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  2697
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  1640
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  1524
sq15_8-SBSpike_F1.ab1           TTGAGAGGGACATCAGCACAGAGATTTACCAGGCTGGCAGCACACCATGTAATGGAGTGG   652
sq16_2-SBSpike_R1.ab1 (reversed) TTGAGAGGGACATCAGCACAGAGATTTACCAGGCTGGCAGCACACCATGTAATGGAGTGG  399
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  AGGGCTTCAACTGTTACTTTCCACTCCAATCCTATGGCTTCCAACCAACCAATGGAGTGG  2820
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  2757
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  1700
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  1584
sq15_8-SBSpike_F1.ab1           AGGGCTTCAACTGTTACTTTCCACTCCAATCCTATGGCTTCCAACCAACCAATGGAGTGG   712
sq16_2-SBSpike_R1.ab1 (reversed) AGGGCTTCAACTGTTACTTTCCACTCCAATCCTATGGCTTCCAACCAACCAATGGAGTGG  459
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  GCTACCAACCATACAGGGTGGTGGTGCTGTCCTTTGAACTGCTCCATGCCCCTGCCACAG  2880
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  2817
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  1760
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  1644
sq15_8-SBSpike_F1.ab1           GCTACCAACCATACAGGGTGGTGGTGCTGTCCTTTGAACTGCTCCATGCCCCTGCCACAG   772
sq16_2-SBSpike_R1.ab1 (reversed) GCTACCAACCATACAGGGTGGTGGTGCTGTCCTTTGAACTGCTCCATGCCCCTGCCACAG  519
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  TGTGTGGACCAAAGAAGAGCACCAACCTGGTGAAGAACAAGTGTGTGAACTTCAACTTCA  2940
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  2877
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  1820
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  1704
sq15_8-SBSpike_F1.ab1           TGTGTGGACCAAAGAAGAGCACCAACCTGGTGAAGAACAAGTGTGTGAACTTCAACTTCA   832
sq16_2-SBSpike_R1.ab1 (reversed) TGTGTGGACCAAAGAAGAGCACCAACCTGGTGAAGAACAAGTGTGTGAACTTCAACTTCA  579
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  ATGGACTGACAGGCACAGGAGTGCTGACAGAGAGCAACAAGAAGTTCCTGCCATTCCAAC  3000
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  2937
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  1880
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  1764
sq15_8-SBSpike_F1.ab1           ATGGACTGACAGGCACAGGAGTGCTGACAGANAGCAACAAGAAGTTCCTGCCATTCCAAC   892
sq16_2-SBSpike_R1.ab1 (reversed) ATGGACTGACAGGCACAGGAGTGCTGACAGAGAGCAACAAGAAGTTCCTGCCATTCCAAC  639
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------
```

FIGURE 22C- CONTINUED

```
p19GEM4Z-Spike                  AGTTTGGCAGGGACATTGCTGACACCACAGATGCTGTGAGGGACCCACAGACCTTGGAGA  3060
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  2997
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  1940
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  1824
sq15_8-SBSpike_F1.ab1           AGTTTGGCAGG-NCATTGCTGACACCACAGATGCTGTGAGGGACCCACAGACCTTGGNNA   951
sq16_2-SBSpike_R1.ab1 (reversed) AGTTTGGCAGGGACATTGCTGACACCACAGATGCTGTGAGGGACCCACAGACCTTGGAGA  699
sq15_9-SBSpike_F2.ab1           ---------------------------------GNNNNNNNNANNNNNNAGACCTTGGAGA   28
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  TTCTGGACATCACACCATGTTCCTTTGGAGGAGTGTCTGTGATNACACCTGGCACCAACA  3120
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  3057
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  2000
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  1884
sq15_8-SBSpike_F1.ab1           TTCTGGACATCACACCATGTTCCTTTGGAGGAGTGTCTGTGATNACACCTGGNANCNACN  1011
sq16_2-SBSpike_R1.ab1 (reversed) TTCTGGACATCACACCATGTTCCTTTGGAGGAGTGTCTGTGATNACACCTGGCACCAACA  759
sq15_9-SBSpike_F2.ab1           NTCTGGACATCACACCATGTTCCTTTGGAGGAGTGTCTGTGATNACACCTGGCACCAACA   88
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  CCAGCAACCAGGTGGCTGTGCTCTACCAGGATGTGAACTGTACNGAGGTGCCTGTGGCTA  3180
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  3117
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  2060
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  1944
sq15_8-SBSpike_F1.ab1           NNGCANNAGNNGCTGTGCTCTACCNNNATGTGAACTNNACTGANGNNNNCNGNNNGNNTT  1071
sq16_2-SBSpike_R1.ab1 (reversed) CCAGCAACCAGGTGGCTGTGCTCTACCAGGATGTGAACTGTACNGAGGTGCCTGTGGCTA  819
sq15_9-SBSpike_F2.ab1           CCAGCAACCAGGTGGCTGTGCTCTACCAGGATGTGAACTGTACNGAGGTGCCTGTGGCTA   148
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  TCCATGCTGACCAACTTACACCAACCTGGAGGGTCTACAGCACAGGCAGCAATGTGTTCC  3240
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  3177
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  2120
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  2004
sq15_8-SBSpike_F1.ab1           NCATGCTGACCNNN------------------------------------------------  1131
sq16_2-SBSpike_R1.ab1 (reversed) TCCATGCTGACCAACTTACACCAACCTGGAGGGTCTACAGCACAGGCAGCAATGTGTTCC  879
sq15_9-SBSpike_F2.ab1           TCCATGCTGACCAACTTACACCAACCTGGAGGGTCTACAGCACAGGCAGCAATGTGTTCC   208
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  AGACCAGGGCNGGCTGTCTGATTGGAGCAGAGCATGTGAACAACTCCTATGAGTGTGACA  3300
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  3237
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  2180
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  2064
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  1191
sq16_2-SBSpike_R1.ab1 (reversed) AGACCAGGGCNGGCTGTCTGATTGGAGCAGAGCATGTGAACAACTCCTATGAGTGTGNNN  939
sq15_9-SBSpike_F2.ab1           AGACCAGGGCNGGCTGTCTGATTGGAGCAGAGCATGTGAACAACTCCTATGAGTGTGACA   268
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------
```

FIGURE 22C- CONTINUED

```
p19GEM4Z-Spike                  TCCCAATTGGAGCAGGCATCTGTGCCTCCTACCAGACCCAGACCAACAGCCCAAGGAGGG  3360
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  3297
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  2240
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  2124
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  1251
sq16_2-SBSpike_R1.ab1 (reversed) NNCAANGAGCNGNNNNNNN----------------------------------------  999
sq15_9-SBSpike_F2.ab1           TCCCAATTGGAGCAGGCATCTGTGCCTCCTACCAGACCCAGACCAACAGCCCAAGGAGGG  328
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  CAAGGTCTGTGGCAAGCCAGAGCATCATTGCCTACACAATGAGCCTGGGAGCAGAGAACT  3420
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  3357
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  2300
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  2184
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  1311
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  1059
sq15_9-SBSpike_F2.ab1           CAAGGTCTGTGGCAAGCCAGAGCATCATTGCCTACACAATGAGCCTGGGAGCAGAGAACT  388
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  CTGTGGCTTACAGCAACAACAGCATTGCCATCCCAACCAACTTCACCATCTCTGTGACCA  3480
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  3417
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  2360
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  2244
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  1371
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  1119
sq15_9-SBSpike_F2.ab1           CTGTGGCTTACAGCAACAACAGCATTGCCATCCCAACCAACTTCACCATCTCTGTGACCA  448
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  CAGAGATTCTGCCTGTGAGTATGACCAAGACCTCTGTGGACTGCACAATGTATATCTGTG  3540
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  3477
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  2420
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  2304
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  1431
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  1179
sq15_9-SBSpike_F2.ab1           CAGAGATTCTGCCTGTGAGTATGACCAAGACCTCTGTGGACTGCACAATGTATATCTGTG  508
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  GAGACAGCACAGAGTGTAGCAACCTGCTGCTCCAATATGGCTCCTTCTGTACCCAACTTA  3600
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  3537
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  2480
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  2364
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  1491
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  1239
sq15_9-SBSpike_F2.ab1           GAGACAGCACAGAGTGTAGCAACCTGCTGCTCCAATATGGCTCCTTCTGTACCCAACTTA  568
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------
```

FIGURE 22C- CONTINUED

```
p19GEM4Z-Spike                  ACAGGGCTCTGACAGGCATTGCTGTGGAACAGGACAAGAACACCCAGGAGGTGTTTGCCC  3660
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  3597
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  2540
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  2424
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  1551
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  1299
sq15_9-SBSpike_F2.ab1           ACAGGGCTCTGACAGGCATTGCTGTGGAACAGGACAAGAACACCCAGGAGGTGTTTGCCC   628
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  AGGTGAAGCAGATTTACAAGACACCTCCAATCAAGGACTTTGGAGGCTTCAACTTCAGCC  3720
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  3657
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  2600
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  2484
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  1611
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  1359
sq15_9-SBSpike_F2.ab1           AGGTGAAGCAGATTTACAAGACACCTCCAATCAAGGACTTTGGAGGCTTCAACTTCAGCC   688
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  AGATTCTGCCTGACCCAAGCAAGCCAAGCAAGAGGTCCTTCATTGAGGACCTGCTGTTCA  3780
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  3717
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  2660
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  2544
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  1671
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  1419
sq15_9-SBSpike_F2.ab1           AGATTCTGCCTGACCCAAGCAAGCCAAGCAAGAGGTCCTTCATTGAGGACCTGCTGTTCA   748
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  ACAAGGTGACCCTGGCTGATGCTGGCTTCATCAAGCAATATGGAGACTGTCTGGGAGACA  3840
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  3777
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  2720
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  2604
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  1731
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  1479
sq15_9-SBSpike_F2.ab1           ACAAGGTGACCCTGGCTGATGCTGGCTTCATCAAGCAATATGGAGACTGTCTGGGAGACA   808
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  TTGCTGCCAGGGACCTGATTTGTGCCCAGAAGTTCAATGGACTGACAGTGCTGCCTCCAC  3900
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  3837
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  2780
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  2664
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  1791
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  1539
sq15_9-SBSpike_F2.ab1           TTGCTGCCAGGGACCTGATTTGTGCCCAGAAGTTCAATGGACTGACAGTGCTGCCTCCAC   868
sq15_10-SBSpike_F3.ab1          --------------------------------GNNNNNNNNNNNGNNNTGCTGCCTCCAC    28
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------
```

FIGURE 22C- CONTINUED

```
p19GEM4Z-Spike                  TGCTGACAGA GAGATGATTGCCCAATACACCTCTGCCCTGCTGGCTGGCACCATCACCT  3960
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  3897
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  2840
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  2724
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  1851
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------  1599
sq15_9-SBSpike_F2.ab1           TGCTGACAGA GAGATGATTGCCCAATACACCTCTGCCCTGCTGGCTGGCACCATCACCT   928
sq15_10-SBSpike_F3.ab1          TGCTGACAGA GAGATGATTGCCCAATACACCTCTGCCCTGCTGGCTGGCACCATCACCT    88
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  CTGGCTGGACCTTT-GGAGCAGGAGCAGCCCTCCAAATCCCATT TGCTATGCAGATGGCT  4019
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  3957
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  2900
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  2784
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  1911
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------  1659
sq15_9-SBSpike_F2.ab1           CTGGCTGGACCTTTNGGAGCAGGAGCAGCCCTCCAAATCCCATT TGCTATGCAGATGGCT   988
sq15_10-SBSpike_F3.ab1          CTGGCTGGACCTTT-GGAGCAGGAGCAGCCCTCCAAATCCCATT TGCTATGCAGATGGCT   147
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  TACAGGTTCAATGGCATTGGAGTGACCCAGAATGTGCTCTATGAGAACCAGAAACTGATT  4079
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  4017
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  2960
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  2844
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  1971
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------  1719
sq15_9-SBSpike_F2.ab1           TACAGGTTCAATGGNATTNNAGTGACCCANANNNGCTCTATGAGANNNAAACTGATTGNC  1048
sq15_10-SBSpike_F3.ab1          TACAGGTTCAATGGCATTGGAGTGACCCAGAATGTGCTCTATGAGAACCAGAAACTGATT   207
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  GCCAACCAGTT CAACTCTGCCATTGGCAAGATTCAGGACTCCC GTCCAGCACAGCCTCT  4139
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  4077
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  3020
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  2904
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  2031
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------  1779
sq15_9-SBSpike_F2.ab1           NACCANTTCAACTCTGCCATTGNCANNNANNNNNGANTCCCNGNNCAGCNNNNNN-----  1108
sq15_10-SBSpike_F3.ab1          GCCAACCAGTT CAACTCTGCCATTGGCAAGATTCAGGACTCCC GTCCAGCACAGCCTCT   267
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  GCCCTGGGCAAACTCCAAGATGTGGTGAACCAGAATGCCCAGGCTCTGAACACCCTGGTG  4199
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  4137
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  3080
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  2964
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  2091
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------  1839
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  1168
sq15_10-SBSpike_F3.ab1          GCCCTGGGCAAACTCCAAGATGTGGTGAACCAGAATGCCCAGGCTCTGAACACCCTGGTG   327
sq15_13-GMCSF_R2.ab1 (reversed) ----------------------------------------------NNNNNNNNNCNNNA    14
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ------------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------
```

FIGURE 22C- CONTINUED

```
p19GEM4Z-Spike                  AAGCAACTTTCCAGCAACTTTGGAGCCATCTCCTCTGTGCTGAATGACATCCTGAGCAGA  4259
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  4197
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  3140
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  3024
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  2151
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  1899
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  1228
sq15_10-SBSpike_F3.ab1          AAGCAACTTTCCAGCAACTTTGGAGCCATCTCCTCTGTGCTGAATGACATCCTGAGCAGA   387
sq15_13-GMCSF_R2.ab1 (reversed) NNCCNGNNTNNANCNCCNGNNANNNNNNNNNNNNNNNCNNTNNCTNNGNGNNGANGNCN    74
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  CTGGACAAGGTGGAGGCTGAGGTCCAGATTGACAGACTGATTACAGGCAGACTCCAATCC  4319
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  4257
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  3200
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  3084
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  2211
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  1959
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  1288
sq15_10-SBSpike_F3.ab1          CTGGACAAGGTGGAGGCTGAGGTCCAGATTGACAGACTGATTACAGGCAGACTCCAATCC   447
sq15_13-GMCSF_R2.ab1 (reversed) TCTGANCNGNNTNNANNGNGNGGNNGNGNNCNGNTGNCAGNNTGNTTNNNGCAGANNNNN   134
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  CTCCAAACCTATGTGACCCAACAACTTATCAGGGCTGCTGAGATTAGGGCATCTGCCAAC  4379
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  4317
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  3260
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  3144
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  2271
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  2019
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  1348
sq15_10-SBSpike_F3.ab1          CTCCAAACCTATGTGACCCAACAACTTATCAGGGCTGCTGAGATTAGGGCATCTGCCAAC   507
sq15_13-GMCSF_R2.ab1 (reversed) TCNTNNNNNNATGNNNNNNNNANTTNTCNGGNNNTGNNNNTAGGCATNTGCCAANNTGNN   194
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  CTGGCTGCCACCAAGATGAGTGAGTGTGTGCTGGGACAAAGCAAGAGGGTGGACTTCTGT  4439
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  4377
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  3320
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  3204
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  2331
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  2079
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  1408
sq15_10-SBSpike_F3.ab1          CTGGCTGCCACCAAGATGAGTGAGTGTGTGCTGGGACAAAGCAAGAGGGTGGACTTCTGT   567
sq15_13-GMCSF_R2.ab1 (reversed) GCNNNNNAAGANGANNGNNNGTGNNNNNNNCAAANNNAAGAGGGNGGANTTTNNNGGCCA   254
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  GGCAAGGGCTACCACCTGATGAGTTTTCCACAGTCTGCCCCTCATGGAGTGGTGTTCCTG  4499
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  4437
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  3380
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  3264
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  2391
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  2139
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  1468
sq15_10-SBSpike_F3.ab1          GGCAAGGGCTACCACCTGATGAGTTTTCCACAGTCTGCCCCTCATGGAGTGGTGTTCCTG   627
sq15_13-GMCSF_R2.ab1 (reversed) GGGGNTACCNCCTGANGANNTTTCCACANTNTGCCCCTCNNGGANGNGGNNTTNCNTGCA   314
sq15_11-SBSpike_F4.ab1          ----------------------------------------------------------NNNNN     5
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------
```

FIGURE 22C- CONTINUED

```
p19GEM4Z-Spike                  CATGTGACCTATGTGCCTGCCCAGGAGAAGAACTTCACCACAGCCCCTGCCATCTGCCAT  4559
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  4497
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  3440
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  3324
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  2451
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  2199
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  1528
sq15_10-SBSpike_F3.ab1          CATGTGACCTATGTGCCTGCCCAGGAGAAGAACTTCACCACAGCCCCTGCCATCTGCCAT   687
sq15_13-GMCSF_R2.ab1 (reversed) TGTGACCTATGNGCCTGCCCAGGAGAAGAATTTNACCNNCAGCCCNNNCCNTTTGCCANN  374
sq15_11-SBSpike_F4.ab1          GGCNNNNNNCTATGTGCCTGCCCNGGAGAAGACTTCACCACAGCCCCTGCCATCTGCCAT   65
sq16_4-SBSpike_R3.ab1 (reversed) ----------
sq15_12-GMCSF_F3.ab1            ----------
sq16_1-SBSpike_F5.ab1           ----------
sq16_3-SBSpike_R2.ab1 (reversed) ----------

p19GEM4Z-Spike                  GATGGCAAGGCTCACTTTCCAAGGGAGGGAGTGTTTGTGAGCAATGGCACCCACTGGTTT  4619
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  4557
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  3500
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  3384
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  2511
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  2259
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  1588
sq15_10-SBSpike_F3.ab1          GATGGCAAGGCTCACTTTCCAAGGGAGGGAGTGTTTGTGAGCAATGGCACCCACTGGTTT   747
sq15_13-GMCSF_R2.ab1 (reversed) ANGGCAAGNNNNNTTTCCAAGGGNGGGAGNNTTTNNGAGCAATGGCACCCACTGGTTTGT  434
sq15_11-SBSpike_F4.ab1          GATGGCAAGGCTCACTTTCCAAGGGAGGGAGTGTTTGTGAGCAATGGCACCCACTGGTTT   125
sq16_4-SBSpike_R3.ab1 (reversed) ----------NNNCAANGNNNGGANNNNTNNN  22
sq15_12-GMCSF_F3.ab1            ----------
sq16_1-SBSpike_F5.ab1           ----------
sq16_3-SBSpike_R2.ab1 (reversed) ----------

p19GEM4Z-Spike                  GTGACCCAGAGGAACTTCTATGAACCACAGATTATCACCACAGACAACACCTTTGTGTCT  4679
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  4617
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  3560
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  3444
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  2571
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  2319
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  1648
sq15_10-SBSpike_F3.ab1          GTGACCCAGAGGAACTTCTATGAACCACAGATTATCACCACAGACAACACCTTTGTGTCT   807
sq15_13-GMCSF_R2.ab1 (reversed) GACCCAGAGGAATTTNTATGAACCNCAGATTNNCNCCNCAGANANCNCCTTTGTNTTTGG  494
sq15_11-SBSpike_F4.ab1          GTGACCCAGAGGAACTTCTATGAACCACAGATTATCACCACAGACAACACCTTTGTGTCT   185
sq16_4-SBSpike_R3.ab1 (reversed) ANCAATGNCNNCCNNNGNTTNTGNNCNGNGNANTTNNNGANNNNGATTNNNNCCNNNGAC  82
sq15_12-GMCSF_F3.ab1            ----------
sq16_1-SBSpike_F5.ab1           ----------
sq16_3-SBSpike_R2.ab1 (reversed) ----------

p19GEM4Z-Spike                  GGCAACTGTGATGTGGTGATTGGCATTGTGAACAACACAGTCTATGACCCACTCCAACCT  4739
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  4677
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  3620
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  3504
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  2631
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  2379
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  1708
sq15_10-SBSpike_F3.ab1          GGCAACTGTGATGTGGTGATTGGCATTGTGAACAACACAGTCTATGACCCACTCCAACCT   867
sq15_13-GMCSF_R2.ab1 (reversed) CAANTGTGANNTGGNGATTGNCATTGNGAACAACCCANTNTNTGACCCCNTCCAACNTGA  554
sq15_11-SBSpike_F4.ab1          GGCAACTGTGATGTGGTGATTGGCATTGTGAACAACACAGTCTATGACCCACTCCAACCT   245
sq16_4-SBSpike_R3.ab1 (reversed) ANNCCNNNNNTTGGCAACTGNANGNNNNNNGGCATNNGANNAACNCNNTNTTNNCCCANT  142
sq15_12-GMCSF_F3.ab1            ----------
sq16_1-SBSpike_F5.ab1           ----------
sq16_3-SBSpike_R2.ab1 (reversed) ----------

p19GEM4Z-Spike                  GAACTGGACTCCTTCAAGGAGGAACTGGACAAATACTTCAAGAACCACACCAGCCCTGAT  4799
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  4737
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  3680
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  3564
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  2691
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  2439
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  1768
sq15_10-SBSpike_F3.ab1          GAACTGGACTCCTTCAAGGAGGAACTGGACAAATACTTCAAGAACCACACCAGCCCTGAT   927
sq15_13-GMCSF_R2.ab1 (reversed) ANNGGNNTCCTTCAAGGGGGAANNGGNNAAATNNTTNAANANCCCCCCCNNCCCTNANNN  614
sq15_11-SBSpike_F4.ab1          GAACTGGACTCCTTCAAGGAGGAACTGGACAAATACTTCAAGAACCACACCAGCCCTGAT   305
sq16_4-SBSpike_R3.ab1 (reversed) CNNCNGANTGGATNCNTNNNGGNGGNNNGNNNAANNNTTCAANAACNNNNCNNNCCNNNN  202
sq15_12-GMCSF_F3.ab1            ----------
sq16_1-SBSpike_F5.ab1           ----------
sq16_3-SBSpike_R2.ab1 (reversed) ----------
```

FIGURE 22C- CONTINUED

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p19GEM4Z-Spike                  GTGGACCTGGGAGACATCTCTGGCATCAATGCCTCTGTGGTGAACATCCAGAAGGAGATT  4859
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  4797
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  3740
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  3624
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  2751
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------  2499
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  1828
sq15_10-SBSpike_F3.ab1          GTGGACCTGGGANACNTCTCTGGCATCAATGCCTCTGTGGTGAACATCCAGANNANATTG   987
sq15_13-GMCSF_R2.ab1 (reversed) GGNCNTGGGNGANATTTTTGGCNTNAANNCNTTNNNGGNGAACNTCCAAAAGGNNNNNNN  674
sq15_11-SBSpike_F4.ab1          GTGGACCTGGGAGACATCTCTGGCATCAATGCCTCTGTGGTGAACATCCAGAAGGAGATT   365
sq16_4-SBSpike_R3.ab1 (reversed) NNGGNNNNGGNNACNTNTNTGGCATCAATGCNTNNNGGNGANCATCCANANNGNGANTNN  262
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  GACAGACTGAATGAGGTGGCTAAGAACCTGAATGAGTCCCTGATTGACCTCCAAGAACTG  4919
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  4857
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  3800
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  3684
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  2811
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------  2559
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  1888
sq15_10-SBSpike_F3.ab1          ACAGACTGAATGNNNNNTANNNNNNANNANTCCCTGATTGACCTNCANANTGGGCAANAT  1047
sq15_13-GMCSF_R2.ab1 (reversed) CAGNNNGAANNNGGNGGNTAAAAACNNNAAAGANTCCCTGATTNNCCTCCAAAAANTGGG   734
sq15_11-SBSpike_F4.ab1          GACAGACTGAATGAGGTGGCTAAGAACCTGAATGAGTCCCTGATTGACCTCCAAGAACTG   425
sq16_4-SBSpike_R3.ab1 (reversed) NAGNCTGAATNNGGTGGTTAANAACCTNAATGNNTNCCTGATTGACCTCCAANANNTGNG  322
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  GGCAAATATGAACAATACATCAAGTGGCCATGGTACATCTGGCTGGGCTTCATTGCTGGA  4979
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  4917
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  3860
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  3744
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  2871
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------  2619
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  1948
sq15_10-SBSpike_F3.ab1          GACATACATCAGNNNNNATNNNNNNTCTGNTGGGCTNNTGNTGNCTGANNCNTNGNGANG  1107
sq15_13-GMCSF_R2.ab1 (reversed) NAAANNNNNNNAAAACNTNAAGNGNCCATGGNNCNTTNGGNGGGGGTTCATTNNNGGNNN   794
sq15_11-SBSpike_F4.ab1          GGCAAATATGAACAATACATCAAGTGGCCATGGTACATCTGGCTGGGCTTCATTGCTGGA   485
sq16_4-SBSpike_R3.ab1 (reversed) CAAANATNANNNNNNCATCAAGTGGCCATNGNNCNTTTGGNNGGGNTTCATTNNNGGNNN  382
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  CTGATTGCCACTGTGATGGTGACCATAATGCTGTGTTGTATGACCTCCTGTTGTTCCTGT  5039
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  4977
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  3920
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  3804
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  2931
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------  2679
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  2008
sq15_10-SBSpike_F3.ab1          NNANNTNANGNNNNNNNNTNNNNTGNACCNNCNNNNNNTCCCNNNNNNNA----------  1167
sq15_13-GMCSF_R2.ab1 (reversed) GNTTNCCNTTGGGNNGGNGNCNNNAATNNNNTTTTGTANGNNNNCNTNTTGTTCCTTTTT  854
sq15_11-SBSpike_F4.ab1          CTGATTGCCACTGTGATGGTGACCATAATGCTGTGTTGTATGACCTCCTGTTGTTCCTGT   545
sq16_4-SBSpike_R3.ab1 (reversed) GATTNCCCTTGGGANGGGGNCCANAANNNTGNGTNGTANNCCNNCNNNTTNTTCCTTTTT  442
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------

p19GEM4Z-Spike                  CTGAAAGGCTGTTGTTCCTGTGGCTCCTGTTGTAAGTTTGATGAGGATGACTCTGAACCT  5099
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  5037
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  3980
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  3864
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  2991
sq16_2-SBSpike_R1.ab1 (reversed) ------------------------------------------------------------  2739
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  2068
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  1227
sq15_13-GMCSF_R2.ab1 (reversed) NAAAGGNGGTTGTTCCTGGGGNNCCNNTTGTAAGTTTGAGGNGGATGATTTTGANCCTGG  914
sq15_11-SBSpike_F4.ab1          CTGAAAGGCTGTTGTTCCTGTGGCTCCTGTTGTAAGTTTGATGAGGATGACTCTGAACCT   605
sq16_4-SBSpike_R3.ab1 (reversed) NAAAGGNNNTTNTTCCNGGGGNNCCNNTTGTAANTTTGANGNGGANGATTTTGAACCNGG  502
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ------------------------------------------------------------
```

FIGURE 22C- CONTINUED

```
p19GEM4Z-Spike                  GTGCTGAAAGGAGTGAAACTGCACTACACCTGAATCTAGAGCGGCCGCCGAATTCTTAAT  5159
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  5097
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  4040
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  3924
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  3051
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  2799
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  2128
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  1287
sq15_13-GMCSF_R2.ab1 (reversed) GNTGAAAGGNNNGAAANTCCATTNCCCNTNAATTTNNNNNGGCCCCNNAATTTTTTTTTN   974
sq15_11-SBSpike_F4.ab1          GTGCTGAAAGGAGTGAAACTGCACTACACCTGAATCTAGAGCGGCCGCCGAATTCTTAAT   665
sq16_4-SBSpike_R3.ab1 (reversed) GNNGAAAGGNNNNAAANNNCCNNNCCCCNNNNTTTNGNNNGNCCCCNNNNTTTTTNTTTT  562
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  TAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  5219
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  5157
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  4100
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  3984
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  3111
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  2859
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  2188
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  1347
sq15_13-GMCSF_R2.ab1 (reversed) NAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  1034
sq15_11-SBSpike_F4.ab1          TAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAANNAAAA   725
sq16_4-SBSpike_R3.ab1 (reversed) AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA  622
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  AAACTAGTGGCGCCTGATGCGGTATTTTCTCCTTACGCATCTGTGCGGTATTTCACACCG  5279
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  5217
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  4160
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  4044
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  3171
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  2919
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  2248
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  1407
sq15_13-GMCSF_R2.ab1 (reversed) NANCTAGTGGCGCCTGATGCGGTATTTTCTCCTTACGCATCTGTGCGGTATT-CACACCG  1093
sq15_11-SBSpike_F4.ab1          ANNCTNNNGGNCGCCNNGANGCGGTATTTTCTCCTTACGCATCTGTGCGGTATTTCACAC   785
sq16_4-SBSpike_R3.ab1 (reversed) AAACTAGTGGCGCCTGATGCGGTATTTTCTCCTTACGCATCTGTGCGGTATTTCACACCG  682
sq15_12-GMCSF_F3.ab1            ----------------------------------------NNNNNNNNNNNTTNCNNCCG   20
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  CATATGGTGCACTCTCAGTACAATCTGCTCTGATGCCGCATAGTTAAGCCAGCCCCGACA  5339
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  5277
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  4220
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  4104
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  3231
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  2979
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  2308
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  1467
sq15_13-GMCSF_R2.ab1 (reversed) CATANNNNNNNNN----------------------------------------------  1153
sq15_11-SBSpike_F4.ab1          CCGCATATGGNGCACTCTCANTACAATCTGCTCTGATGCCGCATANTTAANCCAGCCCCG   845
sq16_4-SBSpike_R3.ab1 (reversed) CATATGGTGCACTCTCAGTACAATCTGCTCTGATGCCGCATAGTTAAGCCAGCCCCGACA  742
sq15_12-GMCSF_F3.ab1            CATATGGTGCACTCTCAGTACAATCTGCTCTGATGCCGCATAGTTAAGCCAGCCCCGACA   80
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  CCCGCCAACACCCGCTGACGCGCCCTGACGGGCTTGTCTGCTCCCGGCATCCGCTTACAG  5399
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  5337
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  4280
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  4164
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  3291
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  3039
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  2368
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  1527
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------  1213
sq15_11-SBSpike_F4.ab1          ACNNCCNGNNNNNNNNGCTGACNCGCCNGACGGGCTNGTCTGCTCCNNCATCNCTTANNG   905
sq16_4-SBSpike_R3.ab1 (reversed) CCCGCCAACACCCGCTGACGCGCCCTGACGGGCTTGTCTGCTCCCGGCATCCGCTTACAG  802
sq15_12-GMCSF_F3.ab1            CCCGCCAACACCCGCTGACGCGCCCTGACGGGCTTGTCTGCTCCCGGCATCCGCTTACAG   140
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------
```

FIGURE 22C- CONTINUED

```
p19GEM4Z-Spike                  ACAAGCTGTGACCGTCTCCGGGAGCTGCATGTGTCAGAGGTTTTCACCGTCATCACCGAA  5459
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  5397
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  4340
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  4224
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  3351
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  3099
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  2428
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  1587
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------  1273
sq15_11-SBSpike_F4.ab1          ANANCTGNGACGNCTCGGANCTGCATGNNTCNNNNNTTNCNCGTCNTNNCGANNNNNNNN   965
sq16_4-SBSpike_R3.ab1 (reversed) ACAAGCTGTGACCGTCTCCGGGAGCTGCATGTGTCAGAGGTTTTCACCGTCATCACCGAA  862
sq15_12-GMCSF_F3.ab1            ACAAGCTGTGACCGTCTCCGGGAGCTGCATGTGTCAGAGGTTTTCACCGTCATCACCGAA   200
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  ACGCGCGAGACGAAAGGGCCTCGTGATACGCCTATTTTTATAGGTTAATGTCATGATAAT  5519
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  5457
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  4400
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  4284
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  3411
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  3159
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  2488
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  1647
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------  1333
sq15_11-SBSpike_F4.ab1          NCNNNNNNNNNNNNNNCNCNANTTNNNNGTANNNCNNGNNNNANNNNTNNNNNTNNNNNN  1025
sq16_4-SBSpike_R3.ab1 (reversed) ACGCGCGAGACGAAAGGGCCTCGTGATACGCCTATTTTTATAGGTTAATGTCATGATAAT  922
sq15_12-GMCSF_F3.ab1            ACGCGCGAGACGAAAGGGCCTCGTGATACGCCTATTTTTATAGGTTAATGTCATGATAAT   260
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  AATGGTTTCTTAGACGTCAGGTGGCACTTTTCGGGGAAATGTGCGCGGAACCCCTATTTG  5579
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  5517
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  4460
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  4344
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  3471
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  3219
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  2548
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  1707
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------  1393
sq15_11-SBSpike_F4.ab1          NNNNNGAANNNNGNNNNNNNNTTTNNNNNNANNNNNNCNNNNNGANNANNNCN-------  1085
sq16_4-SBSpike_R3.ab1 (reversed) AANNNTNTAGANNNNNNNNN--------------------------------------  982
sq15_12-GMCSF_F3.ab1            AATGGTTTCTTAGACGTCAGGTGGCACTTTTCGGGGAAATGTGCGCGGAACCCCTATTTG   320
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  TTTATTTTTCTAAATACATTCAAATATGTATCCGCTCATGAGACAATAACCCTGATAAAT  5639
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  5577
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  4520
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  4404
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  3531
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  3279
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  2608
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  1767
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------  1453
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------  1145
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------  1042
sq15_12-GMCSF_F3.ab1            TTTATTTTTCTAAATACATTCAAATATGTATCCGCTCATGAGACAATAACCCTGATAAAT   380
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------

p19GEM4Z-Spike                  GCTTCAATAATATTGAAAAAGGAAGAGTATGAGTATTCAACATTTCCGTGTCGCCCTTAT  5699
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  5637
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  4580
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  4464
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  3591
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  3339
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  2668
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  1827
sq15_13-GMCSF_R2.ab1 (reversed) ------------------------------------------------------------  1513
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------  1205
sq16_4-SBSpike_R3.ab1 (reversed) ----------------------------------------------------------  1102
sq15_12-GMCSF_F3.ab1            GCTTCAATAATATTGAAAAAGGAAGAGTATGAGTATTCAACATTTCCGTGTCGCCCTTAT   440
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------------------------
```

FIGURE 22C- CONTINUED

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p19GEM4Z-Spike                  TCCCTTTTTTGCGGCATTTTGCCTTCCTGTTTTTGCTCACCCAGAAACGCTGGTGAAAGT  5759
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  5697
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  4640
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  4524
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  3651
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  3399
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  2728
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  1887
sq15_13-GMCSF_R2.ab1 (reversed) ----------------------------------------------------------  1573
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------  1265
sq16_4-SBSpike_R3.ab1 (reversed) ---------------------------------------------------------  1162
sq15_12-GMCSF_F3.ab1            TCCCTTTTTTGCGGCATTTTGCCTTCCTGTTTTTGCTCACCCAGAAACGCTGGTGAAAGT   500
sq16_1-SBSpike_F5.ab1           ------------------------------------------------------------
sq16_3-SBSpike_R2.ab1 (reversed) ---------------------------------------------------------

p19GEM4Z-Spike                  AAAAGATGCTGAAGATCAGTTGGGTGCACGAGTGGGTTACATCGAACTGGATCTCAACAG  5819
sq15_14-GMCSF_R3.ab1 (reversed) ----------------------------------------------------------  5757
sq13_4-GMCSF_F2.ab1             ----------------------------------------------------------  4700
sq14_3-GMCSF_F1.ab1             ----------------------------------------------------------  4584
sq15_8-SBSpike_F1.ab1           ----------------------------------------------------------  3711
sq16_2-SBSpike_R1.ab1 (reversed) ---------------------------------------------------------  3459
sq15_9-SBSpike_F2.ab1           ----------------------------------------------------------  2788
sq15_10-SBSpike_F3.ab1          ----------------------------------------------------------  1947
sq15_13-GMCSF_R2.ab1 (reversed) ----------------------------------------------------------  1633
sq15_11-SBSpike_F4.ab1          ----------------------------------------------------------  1325
sq16_4-SBSpike_R3.ab1 (reversed) ---------------------------------------------------------  1222
sq15_12-GMCSF_F3.ab1            AAAAGATGCTGAAGATCAGTTGGGTGCACGAGTGGGTTACATCGAACTGGATCTCAACAG   560
sq16_1-SBSpike_F5.ab1           ----------------------------------------NNNNNNNNNTGGNNCTCA-CAG    21
sq16_3-SBSpike_R2.ab1 (reversed) ---------------------------------------------------------

p19GEM4Z-Spike                  CGGTAAGATCCTTGAGAGTTTTCGCCCCGAAGAACGTTTTCCAATGATGAGCACTTTTAA  5879
sq15_14-GMCSF_R3.ab1 (reversed) ----------------------------------------------------------  5817
sq13_4-GMCSF_F2.ab1             ----------------------------------------------------------  4760
sq14_3-GMCSF_F1.ab1             ----------------------------------------------------------  4644
sq15_8-SBSpike_F1.ab1           ----------------------------------------------------------  3771
sq16_2-SBSpike_R1.ab1 (reversed) ---------------------------------------------------------  3519
sq15_9-SBSpike_F2.ab1           ----------------------------------------------------------  2848
sq15_10-SBSpike_F3.ab1          ----------------------------------------------------------  2007
sq15_13-GMCSF_R2.ab1 (reversed) ----------------------------------------------------------  1693
sq15_11-SBSpike_F4.ab1          ----------------------------------------------------------  1385
sq16_4-SBSpike_R3.ab1 (reversed) ---------------------------------------------------------  1282
sq15_12-GMCSF_F3.ab1            CGGTAAGATCCTTGAGAGTTTTCGCCCCGAAGAACGTTTTCCAATGATGAGCACTTTTAA   620
sq16_1-SBSpike_F5.ab1           CGGTAAGATCCTTGAGAGTTTTCGCCCCGAAGAACGTTTTCCAATGATGAGCACTTTTAA    81
sq16_3-SBSpike_R2.ab1 (reversed) ---------------------------------------------------------

p19GEM4Z-Spike                  AGTTCTGCTATGTGGCGCGGTATTATCCCGTATTGACGCCGGGCAAGAGCAACTCGGTCG  5939
sq15_14-GMCSF_R3.ab1 (reversed) ----------------------------------------------------------  5877
sq13_4-GMCSF_F2.ab1             ----------------------------------------------------------  4820
sq14_3-GMCSF_F1.ab1             ----------------------------------------------------------  4704
sq15_8-SBSpike_F1.ab1           ----------------------------------------------------------  3831
sq16_2-SBSpike_R1.ab1 (reversed) ---------------------------------------------------------  3579
sq15_9-SBSpike_F2.ab1           ----------------------------------------------------------  2908
sq15_10-SBSpike_F3.ab1          ----------------------------------------------------------  2067
sq15_13-GMCSF_R2.ab1 (reversed) ----------------------------------------------------------  1753
sq15_11-SBSpike_F4.ab1          ----------------------------------------------------------  1445
sq16_4-SBSpike_R3.ab1 (reversed) ---------------------------------------------------------  1342
sq15_12-GMCSF_F3.ab1            AGTTCTGCTATGTGGCGCGGTATTATCCCGTATTGACGCCGGGCAAGAGCAACTCGGTCG   680
sq16_1-SBSpike_F5.ab1           AGTTCTGCTATGTGGCGCGGTATTATCCCGTATTGACGCCGGGCAAGAGCAACTCGGTCG   141
sq16_3-SBSpike_R2.ab1 (reversed) ----------------------------------------NNGGGCAAGAGCAACTCGGTCG    22

p19GEM4Z-Spike                  CCGCATACACTATTCTCAGAATGACTTGGTTGAGTACTCACCAGTCACAGAAAAGCATCT  5999
sq15_14-GMCSF_R3.ab1 (reversed) ----------------------------------------------------------  5937
sq13_4-GMCSF_F2.ab1             ----------------------------------------------------------  4880
sq14_3-GMCSF_F1.ab1             ----------------------------------------------------------  4764
sq15_8-SBSpike_F1.ab1           ----------------------------------------------------------  3891
sq16_2-SBSpike_R1.ab1 (reversed) ---------------------------------------------------------  3639
sq15_9-SBSpike_F2.ab1           ----------------------------------------------------------  2968
sq15_10-SBSpike_F3.ab1          ----------------------------------------------------------  2127
sq15_13-GMCSF_R2.ab1 (reversed) ----------------------------------------------------------  1813
sq15_11-SBSpike_F4.ab1          ----------------------------------------------------------  1505
sq16_4-SBSpike_R3.ab1 (reversed) ---------------------------------------------------------  1402
sq15_12-GMCSF_F3.ab1            CCGCATACACTATTCTCAGAATGACTTGGTTGAGTACTCACCAGTCACAGNNA-GCATCT   739
sq16_1-SBSpike_F5.ab1           CCGCATACACTATTCTCAGAATGACTTGGTTGAGTACTCACCAGTCACAGAAAAGCATCT   201
sq16_3-SBSpike_R2.ab1 (reversed) CCGCATACACTATTCTCAGAATGACTTGGTTGAGTACTCACCAGTCACAGAAAAGCATNT    82
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FIGURE 22C- CONTINUED

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p19GEM4Z-Spike                  TACGGATGGCATGACAGTAAGAGAATTATGCAGTGCTGCCATAACCATGAGTGATAACAC  6059
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  5997
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  4940
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  4824
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  3951
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  3699
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  3028
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  2187
sq15_13-GMCSF_R2.ab1 (reversed) ----------------------------------------------------------  1873
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------  1565
sq16_4-SBSpike_R3.ab1 (reversed) ---------------------------------------------------------  1462
sq15_12-GMCSF_F3.ab1            TACGGATGGCATGACAGTAAGAGAATTATGCAGTGCTGCCATAACCATGAGTGATAACAC   799
sq16_1-SBSpike_F5.ab1           TACGGATGGCATGACAGTAAGAGAATTATGCAGTGCTGCCATAACCATGAGTGATAACAC   261
sq16_3-SBSpike_R2.ab1 (reversed) TACGGATGGCATGACAGTAAGAGAATTATGCAGTGCTGCCATAACCATGAGTGATAACAC  142

p19GEM4Z-Spike                  TGCGGCCAACTTACTTCTGACAACGATCGGAGGACCGAAGGAGCTAACCGCTTTTTTGCA  6119
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  6057
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  5000
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  4884
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  4011
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  3759
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  3088
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  2247
sq15_13-GMCSF_R2.ab1 (reversed) ----------------------------------------------------------  1933
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------  1625
sq16_4-SBSpike_R3.ab1 (reversed) ---------------------------------------------------------  1522
sq15_12-GMCSF_F3.ab1            TGCGGCCAACTTACTTCTGACAACGATCGGAGGACCGAAGGAGCTAACCGCTTTTTTGCA   859
sq16_1-SBSpike_F5.ab1           TGCGGCCAACTTACTTCTGACAACGATCGGAGGACCGAAGGAGCTAACCGCTTTTTTGCA   321
sq16_3-SBSpike_R2.ab1 (reversed) TGCGGCCAACTTACTTNTGACAACGATCGGAGGACCGAAGGAGCTAACCGCTTTTTTGCA  202

p19GEM4Z-Spike                  CAACATGGGGGATCATGTAACTCGCCTTGATCGTTGGGAACCGGAGCTGAATGAAGCCAT  6179
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  6117
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  5060
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  4944
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  4071
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  3819
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  3148
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  2307
sq15_13-GMCSF_R2.ab1 (reversed) ----------------------------------------------------------  1993
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------  1685
sq16_4-SBSpike_R3.ab1 (reversed) ---------------------------------------------------------  1582
sq15_12-GMCSF_F3.ab1            CAACATGGGGGATCATGTAACTCGCCTTGATCGTTGGGAACCGGAGCTGAATGAAGCCAT   919
sq16_1-SBSpike_F5.ab1           CAACATGGGGGATCATGTAACTCGCCTTGATCGTTGGGAACCGGAGCTGAATGAAGCCAT   381
sq16_3-SBSpike_R2.ab1 (reversed) CAACATGGGGGATCATGTAACTCGCCTTGATCGTTGGGAACCGGAGCTGAATGAAGCCAT  262

p19GEM4Z-Spike                  ACCAAACGACGAGCGTGACACCACGATGCCTGTAGCAATGGCAACAACGTTGCGCAAACT  6239
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  6177
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  5120
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  5004
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  4131
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  3879
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  3208
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  2367
sq15_13-GMCSF_R2.ab1 (reversed) ----------------------------------------------------------  2053
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------  1745
sq16_4-SBSpike_R3.ab1 (reversed) ---------------------------------------------------------  1642
sq15_12-GMCSF_F3.ab1            ACCAAACGACGAGCGTGACACCACGATGCCTGTAGCAATGGCAACAACGTTGCGCAAACT   979
sq16_1-SBSpike_F5.ab1           ACCAAACGACGAGCGTGACACCACGATGCCTGTAGCAATGGCAACAACGTTGCGCAAACT   441
sq16_3-SBSpike_R2.ab1 (reversed) ACCAAACGACGAGCGTGACACCACGATGCCTGTAGCAATGGCAACAACGTTGCGCAAACT  322

p19GEM4Z-Spike                  ATTAACTGGCGAACTACTTACTCTAGCTTCCCGGCAACAATTAATAGACTGGATGGAGGC  6299
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  6237
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  5180
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  5064
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  4191
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  3939
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  3268
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  2427
sq15_13-GMCSF_R2.ab1 (reversed) ----------------------------------------------------------  2113
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------  1805
sq16_4-SBSpike_R3.ab1 (reversed) ---------------------------------------------------------  1702
sq15_12-GMCSF_F3.ab1            ATTNACTGGNGAACTACTTACTCTAGCTTCCNG-CAACATTANANACTGGNTGGAGGNNG  1038
sq16_1-SBSpike_F5.ab1           ATTAACTGGCGAACTACTTACTCTAGCTTCCCGGCAACAATTAATAGACTGGATGGAGGC   501
sq16_3-SBSpike_R2.ab1 (reversed) ATTAACTGGCGAACTACTTACTCTAGCTTCCCGGCAACAATTAATAGACTGGATGGAGGC  382
```

FIGURE 22C- CONTINUED

```
p19GEM4Z-Spike                  GGATAAAGTTGCAGGACCACTTCTGCGCTCGGCCCTTCCGGCTGGCTGGTTTATTGCTGA  6359
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  6297
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  5240
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  5124
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  4251
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  3999
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  3328
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  2487
sq15_13-GMCSF_R2.ab1 (reversed) ----------------------------------------------------------  2173
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------  1865
sq16_4-SBSpike_R3.ab1 (reversed) ---------------------------------------------------------  1762
sq15_12-GMCSF_F3.ab1            ATAAANTNCNNNCCACTTCTGCGCTCGGCCCTTCNNCTGNTNNNNNTGCTGATAAATCTG  1098
sq16_1-SBSpike_F5.ab1           GGATAAAGTTGCAGGACCACTTCTGCGCTCGGCCCTTCCGGCTGGCTGGTTTATTGCTGA   561
sq16_3-SBSpike_R2.ab1 (reversed) GGATAAAGTTGCAGGACCACTTCTGCGCTCGGCCCTTCCGGCTGGCTGGTTTATTGCTGA  442

p19GEM4Z-Spike                  TAAATCTGGAGCCGGTGAGCGTGGGTCTCGCGGTATCATTGCAGCACTGGGGCCAGATGG  6419
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  6357
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  5300
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  5184
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  4311
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  4059
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  3388
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  2547
sq15_13-GMCSF_R2.ab1 (reversed) ----------------------------------------------------------  2233
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------  1925
sq16_4-SBSpike_R3.ab1 (reversed) ---------------------------------------------------------  1822
sq15_12-GMCSF_F3.ab1            NANCNNNNGANCGNNNNNNNNNNNNNNNANNNATTNCNN--------------------  1158
sq16_1-SBSpike_F5.ab1           TAAATCTGGAGCCGGTGAGCGTGGGTCTCGCGGTATCATTGCAGCACTGGGGCCAGATGG   621
sq16_3-SBSpike_R2.ab1 (reversed) TAAATCTGGAGCCGGTGAGCGTGGGTCTCGCGGTATCATTGCAGCACTGGGGCCAGATGG  502

p19GEM4Z-Spike                  TAAGCCCTCCCGTA----------------------------------------------  6479
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  6417
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  5360
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  5244
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  4371
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  4119
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  3448
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  2607
sq15_13-GMCSF_R2.ab1 (reversed) ----------------------------------------------------------  2293
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------  1985
sq16_4-SBSpike_R3.ab1 (reversed) ---------------------------------------------------------  1882
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------  1218
sq16_1-SBSpike_F5.ab1           TAAGCCCTCCCGTATCGTAGTTATCTACACGACGGGGAGTCAGGCAACTATGGATGAACG   681
sq16_3-SBSpike_R2.ab1 (reversed) TAAGCCCTCCCGTATCGTAGTTATCTACACGACGGGGAGTCAGGCAACTATGGATGAACG  562

p19GEM4Z-Spike                  ------------------------------------------------------------  6539
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  6477
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  5420
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  5304
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  4431
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  4179
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  3508
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  2667
sq15_13-GMCSF_R2.ab1 (reversed) ----------------------------------------------------------  2353
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------  2045
sq16_4-SBSpike_R3.ab1 (reversed) ---------------------------------------------------------  1942
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------  1278
sq16_1-SBSpike_F5.ab1           AAATAGACAGATCGCTGAGATAGGTGCCTCACTGATTAAGCATTGGTAACTGTCAGACCA   741
sq16_3-SBSpike_R2.ab1 (reversed) AAATAGACAGATCGCTGAGATAGGTGCCTCACTGATTAAGCATTGGTAACTGTCAGACCA  622

p19GEM4Z-Spike                  ------------------------------------------------------------  6599
sq15_14-GMCSF_R3.ab1 (reversed) ------------------------------------------------------------  6537
sq13_4-GMCSF_F2.ab1             ------------------------------------------------------------  5480
sq14_3-GMCSF_F1.ab1             ------------------------------------------------------------  5364
sq15_8-SBSpike_F1.ab1           ------------------------------------------------------------  4491
sq16_2-SBSpike_R1.ab1 (reversed) ----------------------------------------------------------  4239
sq15_9-SBSpike_F2.ab1           ------------------------------------------------------------  3568
sq15_10-SBSpike_F3.ab1          ------------------------------------------------------------  2727
sq15_13-GMCSF_R2.ab1 (reversed) ----------------------------------------------------------  2413
sq15_11-SBSpike_F4.ab1          ------------------------------------------------------------  2105
sq16_4-SBSpike_R3.ab1 (reversed) ---------------------------------------------------------  2002
sq15_12-GMCSF_F3.ab1            ------------------------------------------------------------  1338
sq16_1-SBSpike_F5.ab1           AGTTTACTCATATATACTTTAGATTGATTTAAAACTTCATTTTTAATTTAAAAGGATCTA   801
sq16_3-SBSpike_R2.ab1 (reversed) AGTTTACTCATATATACTTTAGATTGATTTAAAACTTCATTTTTAATTTAAAAGGATCTA  682
```

FIGURE 22C- CONTINUED

```
p19GEM4Z-Spike                    ------------------------------------------------------------  6659
sq15_14-GMCSF_R3.ab1 (reversed)   ------------------------------------------------------------  6597
sq13_4-GMCSF_F2.ab1               ------------------------------------------------------------  5540
sq14_3-GMCSF_F1.ab1               ------------------------------------------------------------  5424
sq15_8-SBSpike_F1.ab1             ------------------------------------------------------------  4551
sq16_2-SBSpike_R1.ab1 (reversed)  ------------------------------------------------------------  4299
sq15_9-SBSpike_F2.ab1             ------------------------------------------------------------  3628
sq15_10-SBSpike_F3.ab1            ------------------------------------------------------------  2787
sq15_13-GMCSF_R2.ab1 (reversed)   ------------------------------------------------------------  2473
sq15_11-SBSpike_F4.ab1            ------------------------------------------------------------  2165
sq16_4-SBSpike_R3.ab1 (reversed)  ------------------------------------------------------------  2062
sq15_12-GMCSF_F3.ab1              ------------------------------------------------------------  1398
sq16_1-SBSpike_F5.ab1             NGTGAAGATCCTTTTTGATAATCTCATGACCAAAATCCCTTAACGTGAGTTTTCGTTCCA   861
sq16_3-SBSpike_R2.ab1 (reversed)  GGTGAAGATCCTTTTTGATAATCTCATGACCAAAATCCCTTAACGTGAGTTTTCGTTCCA   742

p19GEM4Z-Spike                    ------------------------------------------------------------  6719
sq15_14-GMCSF_R3.ab1 (reversed)   ------------------------------------------------------------  6657
sq13_4-GMCSF_F2.ab1               ------------------------------------------------------------  5600
sq14_3-GMCSF_F1.ab1               ------------------------------------------------------------  5484
sq15_8-SBSpike_F1.ab1             ------------------------------------------------------------  4611
sq16_2-SBSpike_R1.ab1 (reversed)  ------------------------------------------------------------  4359
sq15_9-SBSpike_F2.ab1             ------------------------------------------------------------  3688
sq15_10-SBSpike_F3.ab1            ------------------------------------------------------------  2847
sq15_13-GMCSF_R2.ab1 (reversed)   ------------------------------------------------------------  2533
sq15_11-SBSpike_F4.ab1            ------------------------------------------------------------  2225
sq16_4-SBSpike_R3.ab1 (reversed)  ------------------------------------------------------------  2122
sq15_12-GMCSF_F3.ab1              ------------------------------------------------------------  1458
sq16_1-SBSpike_F5.ab1             CTGAGCGTCAGACCCCGTAGAAAAGATCAAAGNATCTTCTTGANATCCTTTTTTTCTGCG   921
sq16_3-SBSpike_R2.ab1 (reversed)  CTGAGCGTCAGACCCCGTAGAAAAGATCAAAGGATCTTCTTGAGATCCTTTTTTTCTGCG   802

p19GEM4Z-Spike                    ------------------------------------------------------------  6779
sq15_14-GMCSF_R3.ab1 (reversed)   ------------------------------------------------------------  6717
sq13_4-GMCSF_F2.ab1               ------------------------------------------------------------  5660
sq14_3-GMCSF_F1.ab1               ------------------------------------------------------------  5544
sq15_8-SBSpike_F1.ab1             ------------------------------------------------------------  4671
sq16_2-SBSpike_R1.ab1 (reversed)  ------------------------------------------------------------  4419
sq15_9-SBSpike_F2.ab1             ------------------------------------------------------------  3748
sq15_10-SBSpike_F3.ab1            ------------------------------------------------------------  2907
sq15_13-GMCSF_R2.ab1 (reversed)   ------------------------------------------------------------  2593
sq15_11-SBSpike_F4.ab1            ------------------------------------------------------------  2285
sq16_4-SBSpike_R3.ab1 (reversed)  ------------------------------------------------------------  2182
sq15_12-GMCSF_F3.ab1              ------------------------------------------------------------  1518
sq16_1-SBSpike_F5.ab1             CGTAATCTGCTGCTTGCAAACAAAAAA-CCACCN--------------------------   980
sq16_3-SBSpike_R2.ab1 (reversed)  CGTAATCTGCTGCTTGCAAACAAAAAAACCACCGCTACCAGCGGTGGTTTGTTTGCCGGA   862

p19GEM4Z-Spike                    ------------------------------------------------------------  6839
sq15_14-GMCSF_R3.ab1 (reversed)   ------------------------------------------------------------  6777
sq13_4-GMCSF_F2.ab1               ------------------------------------------------------------  5720
sq14_3-GMCSF_F1.ab1               ------------------------------------------------------------  5604
sq15_8-SBSpike_F1.ab1             ------------------------------------------------------------  4731
sq16_2-SBSpike_R1.ab1 (reversed)  ------------------------------------------------------------  4479
sq15_9-SBSpike_F2.ab1             ------------------------------------------------------------  3808
sq15_10-SBSpike_F3.ab1            ------------------------------------------------------------  2967
sq15_13-GMCSF_R2.ab1 (reversed)   ------------------------------------------------------------  2653
sq15_11-SBSpike_F4.ab1            ------------------------------------------------------------  2345
sq16_4-SBSpike_R3.ab1 (reversed)  ------------------------------------------------------------  2242
sq15_12-GMCSF_F3.ab1              ------------------------------------------------------------  1578
sq16_1-SBSpike_F5.ab1             ------------------------------------------------------------  1040
sq16_3-SBSpike_R2.ab1 (reversed)  TCAAGAGCTACCAACTCTTTTTCCGAAGGTAACTGGCTTCAGCAGAGCGCAGATACCAAA   922

p19GEM4Z-Spike                    ----------------------------------------------              6433
sq15_14-GMCSF_R3.ab1 (reversed)   ----------------------------------------------              1132
sq13_4-GMCSF_F2.ab1               ----------------------------------------------              1122
sq14_3-GMCSF_F1.ab1               ----------------------------------------------              1089
sq15_8-SBSpike_F1.ab1             ----------------------------------------------              1085
sq16_2-SBSpike_R1.ab1 (reversed)  ----------------------------------------------               958
sq15_9-SBSpike_F2.ab1             ----------------------------------------------              1103
sq15_10-SBSpike_F3.ab1            ----------------------------------------------              1157
sq15_13-GMCSF_R2.ab1 (reversed)   ----------------------------------------------              1107
sq15_11-SBSpike_F4.ab1            ----------------------------------------------              1078
sq16_4-SBSpike_R3.ab1 (reversed)  ----------------------------------------------               942
sq15_12-GMCSF_F3.ab1              ----------------------------------------------              1137
sq16_1-SBSpike_F5.ab1             ----------------------------------------------               954
sq16_3-SBSpike_R2.ab1 (reversed)  TACTGTTCTTCTAGTGTAGCCGTAGT-AG-CCACCANT-CANNNNNNNN           968
```

FIGURE 23

Enrollment must occur prior to subjects undergoing standard of care radiation. All the following inclusion criteria need to be met in order to enroll the subject.

- Age >/= 21 years.
- Histopathologically proven newly-diagnosed de novo GBM (WHO Grade IV glioma) (secondary GBM not eligible) that is MGMT unmethylated.
- The tumor must have a supratentorial component.
- Residual post-surgical disease burden < 3 cm as defined by longest perpendicular diameter of tumor on post-operative MRI.
- Patient must have been enrolled on a screening consent and have had sterile collection of tumor material in a manner suitable for RNA extraction, amplification, and loading of lipid particles (LPs).
- Patients must have recovered from the effects of surgery, postoperative infection, and other complications.
- A diagnostic contrast-enhanced MRI of the brain must be performed preoperatively and postoperatively. Post-op MRI must be performed within 28 days prior to study enrollment. If no post op MRI within 28 days of enrollment is available, a new brain MRI must be obtained in order to determine residual burden and eligibility. Preoperative and postoperative scans must be the same type.
- Karnofsky Performance Status (KPS) ≥ 60
- Bone Marrow: a. ANC (Absolute neutrophil count) ≥ 1,500µl (unsupported); b. Platelets ≥ 150,000/µl (unsupported for at least 3 days); c. Hemoglobin > 8 g/dL
- Renal: a. BUN ≤ 25 mg/dl; b. Creatinine ≤ 1.7 mg/dl
- Hepatic: a. Bilirubin ≤ 2.0 mg/dl; b. ALT ≤ 5 times institutional upper limits of normal for age; c. AST ≤ 5 times institutional upper limits of normal for age
- Signed informed consent. If the patient's mental status precludes his/her giving informed consent, written informed consent may be given by the legally authorized representative.
- For women of childbearing potential (WOCBP), negative serum/urine pregnancy test at enrollment (test will be repeated within 72 hours prior to starting TMZ in Stratum 1 patients).
- WOCBP must be willing to use acceptable contraceptive methods to avoid pregnancy throughout the study and for at least 24 weeks after the last dose of study drug. Refer to Appendix E for definition of WOCBP and guidance on acceptable contraceptive methods.
- Males with female partners of childbearing potential must agree to use physician-approved contraceptive methods (e.g., abstinence, condoms, vasectomy) throughout the study and should avoid conceiving children for 24 weeks following the last dose of study drug.

FIGURE 24

• Prior invasive malignancy (except for non-melanomatous skin cancer) unless disease free for ≥ 3 years. (For example, carcinoma in situ of the breast, oral cavity, and cervix are all permissible.)
• MGMT Methylated tumors
• Metastases detected below the tentorium or beyond the cranial vault and leptomeningeal involvement.
• Recurrent or multifocal malignant gliomas.
• Metastatic or leptomeningeal disease
• Residual post-surgical disease burden > 3 cm as defined by longest perpendicular diameter on MRI.
• HIV, Hepatitis B, or Hepatitis C seropositive.
• Known active infection or immunosuppressive disease.
• Prior chemotherapy or radiosensitizers (including Gliadel wafers) for cancers of the head and neck region, other than TMZ prescribed during radiation for GBM (prior chemotherapy for a different cancer is allowable).
• Prior radiotherapy to the head or neck, resulting in overlap of radiation fields. Radiosurgery is not permitted.
• Severe, active co-morbidity, defined as follows:
    o Unstable angina and/or congestive heart failure requiring hospitalization.
    o Unstable cardiac arrhythmias, abnormalities, or transmural myocardial infarction within the last 6 months.
    o Acute bacterial or fungal infection requiring intravenous antibiotics at initiation of XRT/TMZ.
    o Chronic Obstructive Pulmonary Disease exacerbation or other respiratory illness requiring hospitalization or precluding study therapy at initiation of XRT/TMZ.
    o Hepatic insufficiency resulting in clinical jaundice and/or coagulation defects.
    o Acquired Immune Deficiency Syndrome (AIDS) based upon current CDC definition. The need to exclude patients with AIDS from this protocol is necessary because the treatments involved in this protocol may be significantly immunosuppressive.
    o Patients with autoimmune disease requiring medical management with immunosuppressants.
    o Major medical illnesses or psychiatric impairments that, in the investigator's opinion, will prevent administration or completion of protocol therapy.
    o Active connective tissue disorders such as lupus or scleroderma that, in the investigator's opinion, place the patient at high risk for radiation toxicity.
    o Pregnancy or women of childbearing potential and men who are sexually active and who are unwilling or unable to use an acceptable method of contraception for the entire study period; this exclusion is necessary because the treatment involved in this study may be significantly teratogenic.
• Women of childbearing potential must not be pregnant or breast-feeding.
• Prior history of brachial neuritis or Guillain-Barré syndrome.
• Subjects who require corticosteroids above physiologic doses or not weaned to physiologic dosing within 1 week of scheduled vaccination.
• Subjects who are receiving any other investigational agents or who have been treated on any other therapeutic clinical protocols within 30 days prior to study entry.

FIGURE 25

Study Day/Visit	Surgery	Treament Consent & Screening	Standard of Care Radiation	Vaccines #1-3 (every 2 weeks)	Cycles 1+, Day 1 (vaccines #4-15)	End of Treatment	30 day Tox	Follow-up
Clinical procedures								
Screening Consent Form	X							
Consent Form		X						
Physical & Neurological Exam		X		X	X	X	X	X
Vital Signs		X		X	X	X	X	X
Medical History		X		X	X	X	X	X
Toxicity assessment				X	X	X	X	X
Performance Status		X		X	X			
Concomitant Medications				X	X	X	X	X
Surgery	X							
Radiation			X					
Survival								X
Treatment Administration								
RNA-LP Vaccine				X	X			
Laboratory procedures								
CBC w/ Diff		X		X	X	X	X	X
CD4/CD8 Panel		X		X[1]	X	X	X	
Comprehensive metabolic panel		X		X	X	X	X	X
CMV titers		X						
Serum or urine pregnancy test		X		X	X			
Imaging procedures								
Brain MRI	X	X	X	X	X			X
ECHO/ EKG		X						
Specimen Collection								
Blood for immune monitoring				X	X	X	X	X
Blood for ctDNA		X		X	X			
Tumor Tissue Collection	X							

FIGURE 26

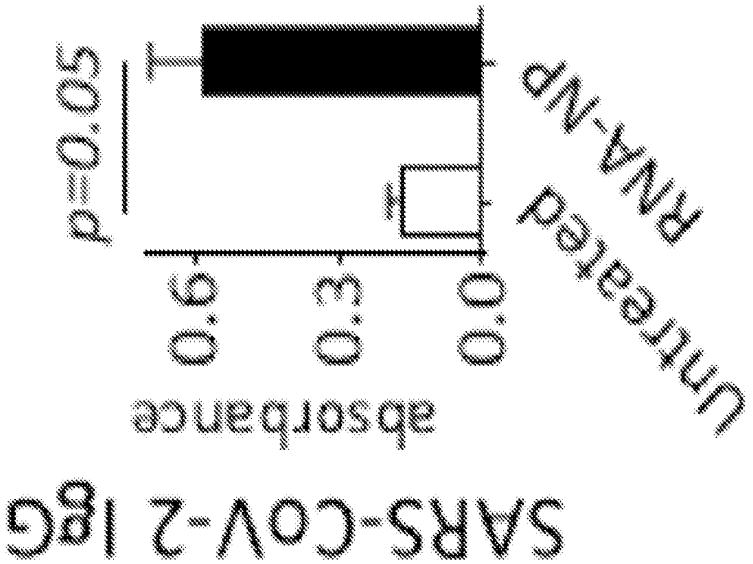
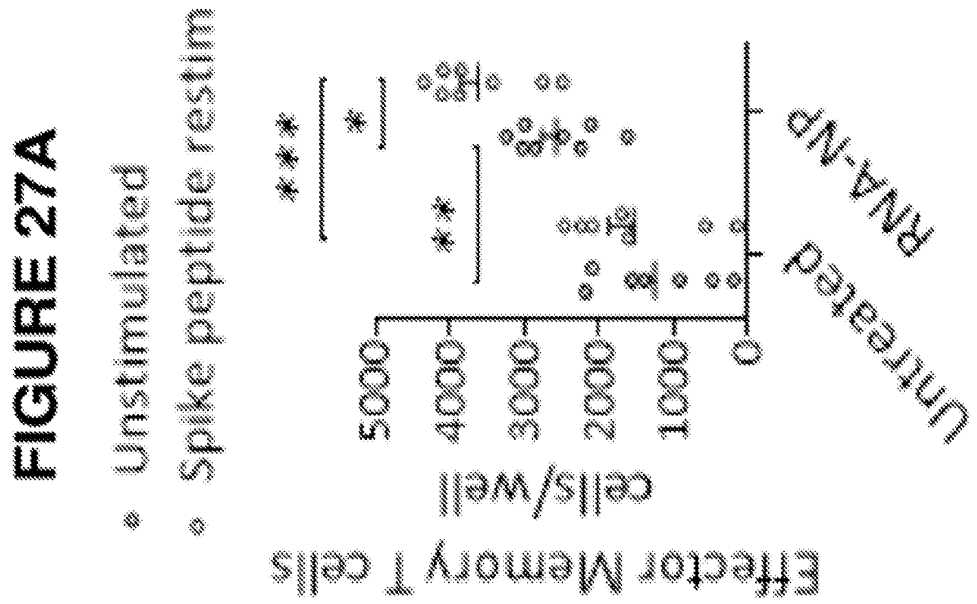


FIGURE 27A



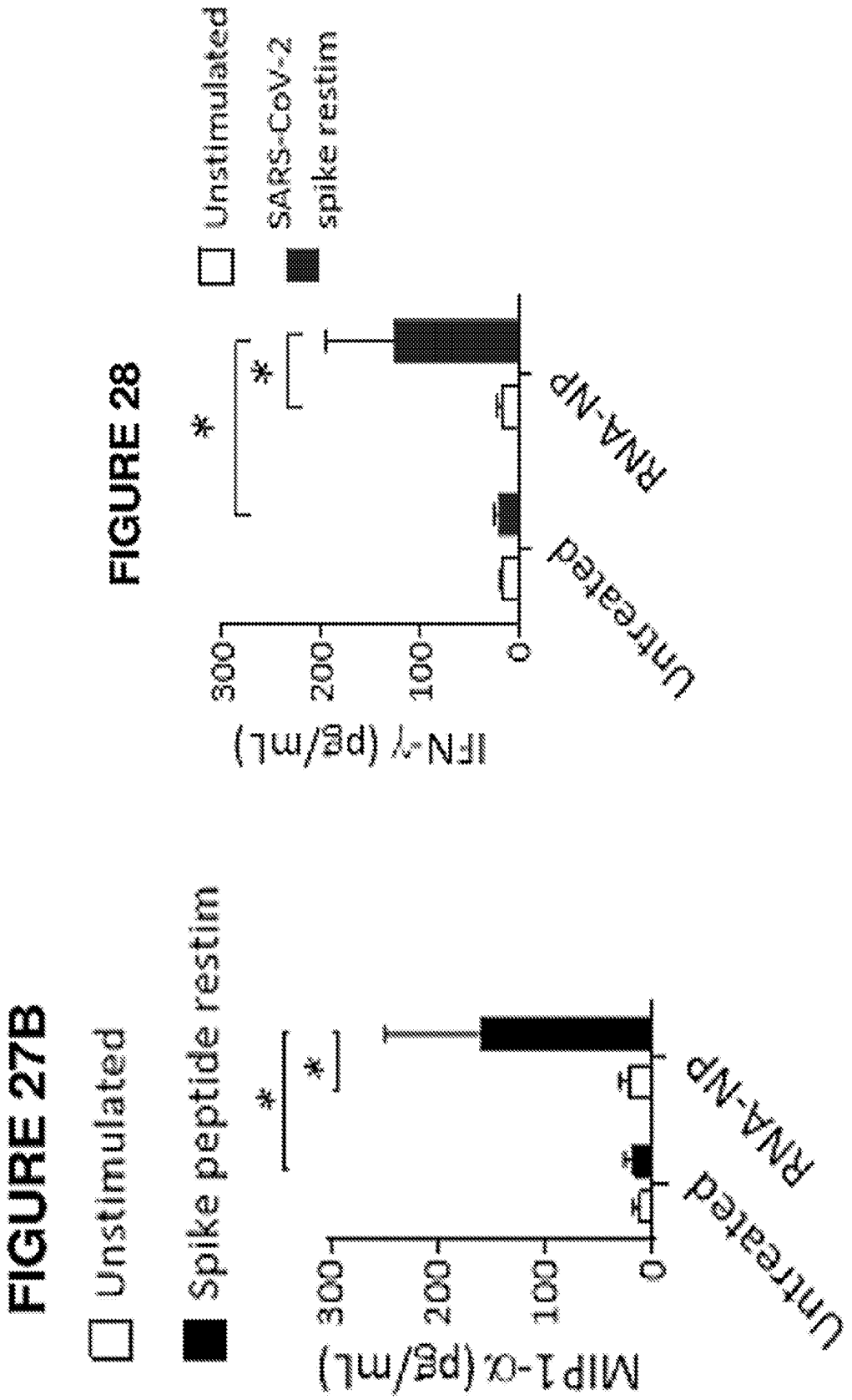

FIGURE 27B
Unstimulated
Spike peptide restim
MIP 1-α (pg/mL)
300
200
100
0
*
*
Untreated
RNA-Np
FIGURE 28
Unstimulated
SARS-CoV-2 spike restim
IFN-γ (pg/mL)
300
200
100
0
*
*
Untreated
RNA-Np

FIGURE 29B

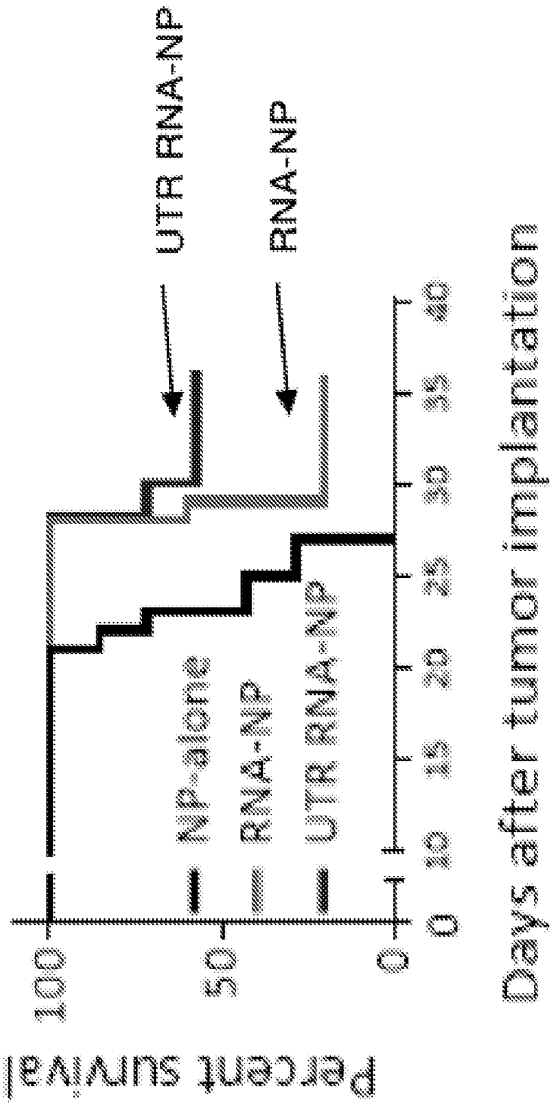


FIGURE 29A

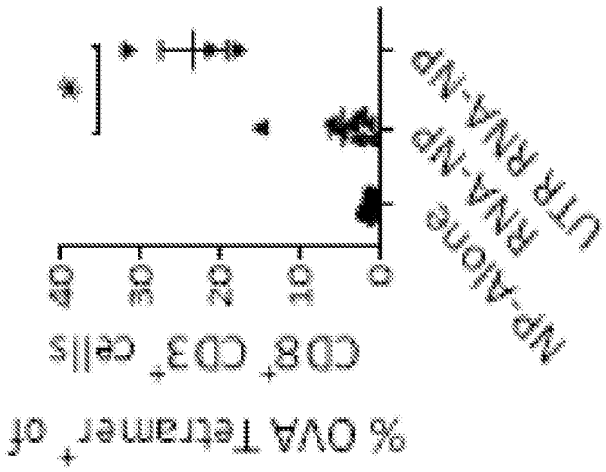


FIGURE 31

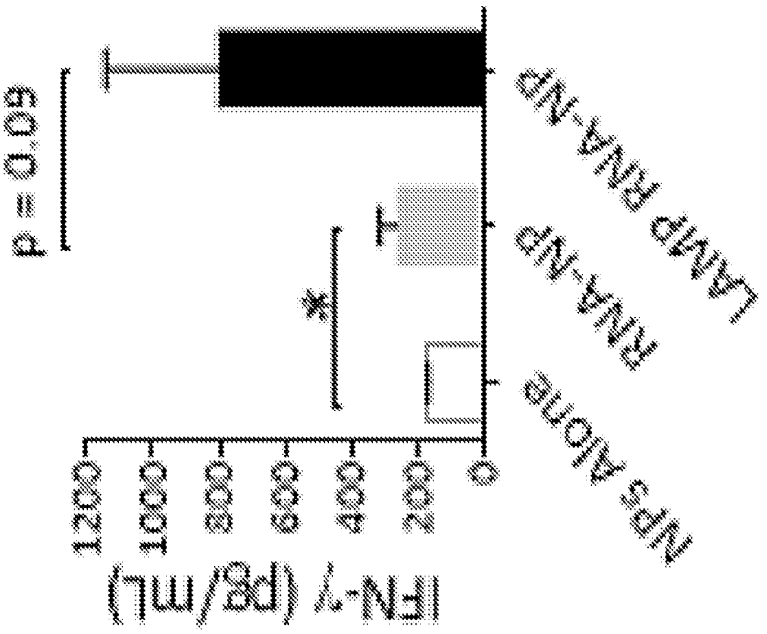


FIGURE 30

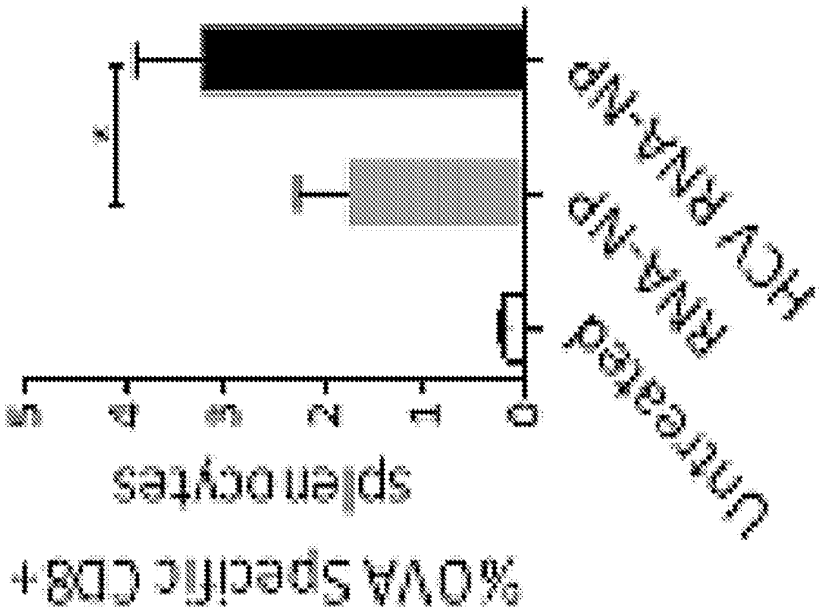


FIGURE 32A

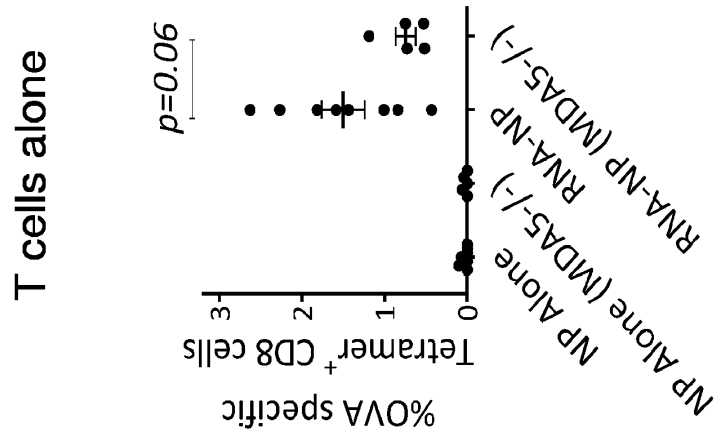


FIGURE 32B

