

FIGURE 1**CA170_1519 Ab sequences****CDRH1**

GFTFSNYGMV SEQ ID NO: 1

CDRH2

YIDSDGDNTYYRDSVKG SEQ ID NO: 2

CDRH3

GIVRPFLY SEQ ID NO: 3

CDRL1

KSSQSLVGASGKTYLY SEQ ID NO: 4

CDRL2

LVSTLDS SEQ ID NO: 5

CDRL3

LQGTHFPHT SEQ ID NO: 6

Rat Ab 1519 VL region SEQ ID NO: 7

DVVMQTPLS LSVALGQPAS ISCKSSQSLV GASGKTYLYW LFQRSGQSPK
 RLIYLVSTLD SGIPDRFSGS GAETDFTLKI RRVEADDLGV YYCLQGTHFP
 HTFGAGTKLE LK

Rat Ab 1519 VL region SEQ ID NO: 8

gatgttgatga tgaccagac tccactgtct ttgtcggttg cccttgagaca
 accagcctcc atctcttgca agtcaagtca gagcctcgta ggtgctagt
 gaaagacata tttgtattgg ttatttcaga ggtccggcca gtctccaaag
 cgactaatct atctgggtgc cacactggac tctggaattc ctgatagggt
 cagtggcagt ggagcagaga cagattttac tcttaaaatc cgcagagtgg
 aagccgatga tttgggagtt tattactgct tgcaagggtac acattttcct
 cacacgtttg gagctgggac caagctggaa ttgaaa

Rat Ab 1519 VL region with signal sequence underlined and italicised SEQ ID NO: 9

MMSPAQLFL *LMLWIQGTSG* DVVMQTPLS LSVALGQPAS ISCKSSQSLV
 GASGKTYLYW LFQRSGQSPK RLIYLVSTLD SGIPDRFSGS GAETDFTLKI
 RRVEADDLGV YYCLQGTHFP HTFGAGTKLE LK

FIGURE 1A

Rat Ab 1519 VL region with signal sequence underlined and italicised SEQ ID NO: 10

atgatgagtc ctgcccagtt cctgtttctg ctgatgctct ggattcaggg
aaccagtggg gatgttgatga tgaccacagac tccactgtct ttgtcgggtg
 cccttgagaca accagcctcc atctcttgca agtcaagtca gagcctcgta
 ggtgctagtga gaaagacata tttgtattgg ttatttcaga ggtccggcca
 gtctccaaag cgactaatct atctgggtgc cacactggac tctggaattc
 ctgatagggt cagtggcagt ggagcagaga cagattttac tcttaaaatc
 cgcagagtgg aagccgatga tttgggagtt tattactgct tgcaagggtac
 acatttttctt cacacgtttg gagctgggac caagctggaa ttgaaa

Rat Ab 1519 VH region SEQ ID NO: 11

EVPLVESGGG SVQPGRSMKL SCVVS GF TFS NYGMVWVRQA PKKGLEWVAY
 IDSDGDNTYY RDSVKGRFTI SRNNAKSTLY LQMDSLRSED TATYYCTTGI
 VRPFlyWGQG TTVTVS

Rat Ab 1519 VH region SEQ ID NO: 12

gaggtgcccgc tgggtggagtc tggggggcggc tcagtgcagc ctgggaggtc
 catgaaactc tcctgtgtag tctcaggatt cactttcagt aattatggca
 tgggtctgggt ccgccaggct ccaaagaagg gtctggagtg ggtcgcatat
 attgattctg atggtgataa tacttactac cgagattccg tgaagggccg
 attcactatc tccagaaata atgcaaaaag caccctatat ttgcaaatgg
 acagtctgag gtctgaggac acggccactt attactgtac aacagggatt
 gtccggccct ttctctattg gggccaagga accacgggtca ccgtctcg

Rat Ab 1519 VH region with signal sequence underlined and italicised SEQ ID NO: 13

MDISLSLAFL VLFIKGVRCE VPLVESGGGS VQPGRSMKLS CVVSGFTFSN
 YGMVWVRQAP KKGLEWVAYI DSDGDNTYYR DSVKGRFTIS RNNAKSTLYL
 QMDSLRSED TATYYCTTGIV RPFlyWGQGT TTVTVS

Rat Ab 1519 VH region with signal sequence underlined and italicised SEQ ID NO: 14

atggacatca gtctcagctt ggctttcctt gtccttttca taaaagggtgt
ccggtgtgag gtgccgctgg tggagtctgg gggcggctca gtgcagcctg
 ggaggtccat gaaactctcc tgtgtagtct caggattcac tttcagtaat
 tatggcatgg tctgggtccg ccaggctcca aagaagggtc tggagtgggt
 cgcataatatt gattctgatg gtgataatac ttactaccga gattccgtga
 agggccgatt cactatctcc agaaataatg caaaaagcac cctatatattg
 caaatggaca gtctgaggtc tgaggacacg gccacttatt actgtacaac
 agggattgtc cggccctttc tctattgggg ccaaggaacc acggtcaccg
 tctcg

FIGURE 1B

1519 gL20 V-region SEQ ID NO: 15

DIQMTQSPSS LSASVGDRV ITCKSSQSLV GASGKTYLYW LFQKPGKAPK
RLIYLVSTLD SGIPSRFSGS GSGTEFTLTI SSLQPEDFAT YYCLQGTHFP
HTFGQGTKLE IK

1519 gL20 V-region (*E. coli* expression) SEQ ID NO: 16

gatatccaga tgaccagag tccaagcagt ctctccgcca gcgtaggcga
tcgtgtgact attacctgta aaagctccca gtccctgggtg ggtgcaagcg
gcaaaaccta cctgtactgg ctcttcagaa aaccgggcaa agctccgaaa
cgctgatct atctgggtgc taccctggat agcgggtattc cgtctcgttt
ctccggtagc ggtagcggta ccgaattcac gctgaccatt agctccctcc
agccggagga ctttgctacc tattactgcc tccagggcac tcattttccg
cacactttcg gccagggtac caaactggaa atcaaa

1519 gL20 V-region (mammalian expression) SEQ ID NO: 17

gatatccaga tgaccagag cccatctagc ttatccgctt ccgttggtga
tcgcgtgaca attacgtgta agagctccca atctctcgtg ggtgcaagtg
gcaagaccta tctgtactgg ctctttcaga agcctggcaa ggcacaaaaa
cggctgatct atctgggtgc tacccttgac tctgggatac cgtcacgatt
ttccggatct gggagcggaa ctgagttcac actcacgatt tcacgcgtgc
aaccggagga ctttgctacc tactactgcc tgcaaggcac tcattttccct
cacactttcg gccaggggac aaaactcgaa atcaaa

1519 gL20 V-region with signal sequence underlined and italicized (*E. coli* expression) SEQ ID NO: 18

MKKTAAIAIAV ALAGFATVAQ ADIQMTQSPS SLSASVGDRV TITCKSSQSL
VGASGKTYLY WLFQKPGKAP KRLIYLVSTL DSGIPSRFSG SSGSGTEFTLT
ISSLQPEDFA TYYCLQGTHF PHTFGQGTKL EIK

1519 gL20 V-region with signal sequence underlined and italicized (*E. coli* expression) SEQ ID NO: 19

atgaaaaaga cagctatcgc aattgcagtg gccttggctg gtttcgctac
cgtagcgcaa gctgatatcc agatgaccca gagtccaagc agtctctccg
ccagcgtagg cgatcgtgtg actattacct gtaaaagctc ccagtccttg
gtgggtgcaa gcggcaaaac ctacctgtac tggctcttcc agaaaccggg
caaagctccg aaacgcctga tctatctggt gtctaccctg gatagcggta
ttccgtctcg tttctccggt agcggtagcg gtaccgaatt cacgctgacc
attagctccc tccagccgga ggactttgct acctattact gcctccaggg
cactcatttt ccgcacactt tcggccaggg taccaaactg gaaatcaaa

FIGURE 1C

1519 gL20 V-region with signal sequence underlined and italicized (mammalian expression)

SEQ ID NO: 20

MSVPTQVLGL LLLWLTDARC DIQMTQSPSS LSASVGDRV ITCKSSQSLV
 GASGKTYLYW LFQKPGKAPK RLIYLVSTLD SGIPSRFSGS GSGTEFTLTI
 SSLQPEDFAT YYCLQGTHFP HTFGQGTKLE IK

1519 gL20 V-region with signal sequence underlined and italicized (mammalian expression)

SEQ ID NO: 21

atgtctgtcc ccaccaagt cctcggactc ctgctactct ggcttacaga
tgccagatgc gatatccaga tgaccagag cccatctagc ttatccgctt
 ccgttggtga tcgctgaca attacgtgta agagctccca atctctcgtg
 ggtgcaagtg gcaagaccta tctgtactgg ctctttcaga agcctggcaa
 ggcacaaaaa cggctgatct atctggtgtc tacccttgac tctgggatac
 cgtcacgatt ttccggatct gggagcggaa ctgagttcac actcacgatt
 tcatcgctgc aaccgagga ctttgctacc tactactgcc tgcaaggcac
 tcattttccct cacactttcg gccaggggac aaaactcgaa atcaaa

1519 gL20 light chain (V + constant) SEQ ID NO: 22

DIQMTQSPSS LSASVGDRV ITCKSSQSLV GASGKTYLYW LFQKPGKAPK
 RLIYLVSTLD SGIPSRFSGS GSGTEFTLTI SSLQPEDFAT YYCLQGTHFP
 HTFGQGTKLE IKRTVAAPSV FIFPPSDEQL KSGTASVVCL LNNFYPREAK
 VQWKVDNALQ SGNSQESVTE QDSKDYSL SSSLTSLKAD YEKHKVYACE
 VTHQGLSSPV TKSFNREGC

1519 gL20 light chain (V + constant, *E. coli* expression) SEQ ID NO: 23

gatatccaga tgaccagag tccaagcagt ctctccgcca gcgtaggcga
 tcgtgtgact attacctgta aaagctccca gtccctggtg ggtgcaagcg
 gcaaaaccta cctgtactgg ctcttcaga aaccgggcaa agctccgaaa
 cgctgatct atctggtgtc taccctggat agcgggtattc cgtctcgttt
 ctccggtagc ggtagcggta ccgaattcac gctgaccatt agctccctcc
 agccggagga ctttgctacc tattactgcc tccagggcac tcattttccg
 cacactttcg gccagggtac caaactggaa atcaaacgta cggtagcggc
 cccatctgtc ttcactttcc cgccatctga tgagcagttg aaatctggaa
 ctgcctctgt tgtgtgctg ctgaataact tctatcccag agaggccaaa
 gtacagtggg aggtggataa cgccctccaa tcgggtaact cccaggagag
 tgtcacagag caggacagca aggacagcac ctacagcctc agcagcacc
 tgacgtgag caaagcagac tacgagaaac acaaagtcta cgctgcgaa
 gtcacccatc agggcctgag ctaccagta acaaaaagtt ttaatagagg ggagtgt

FIGURE 1D

1519 gL20 light chain (V + constant, mammalian expression) SEQ ID NO: 24

gatatccaga tgaccagag tccaagcagt ctctccgcca gcgtaggcga
 tcgtgtgact attacctgta aaagctccca gtccctgggtg ggtgcaagcg
 gcaaaaccta cctgtactgg ctcttccaga aaccgggcaa agctccgaaa
 cgctgatct atctgggtgc taccctggat agcgggtattc cgtctcgttt
 ctccggtagc ggtagcggta ccgaattcac gctgaccatt agctccctcc
 agccggagga ctttgctacc tattactgcc tccagggcac tcattttccg
 cacactttcg gccagggtac caaactggaa atcaaacgta cggtagcggc
 cccatctgtc ttcactctcc cgccatctga tgagcagttg aaatctggaa
 ctgcctctgt tgtgtgcctg ctgaataact tctatcccag agaggccaaa
 gtacagtggg aggtggataa cgccctccaa tcgggtaact cccaggagag
 tgtcacagag caggacagca aggacagcac ctacagcctc agcagcacc
 tgacgctgag caaagcagac tacgagaaac acaaagtcta cgctgcgaa
 gtcacccatc agggcctgag ctgcgccgtc acaaagagct tcaacagggg agagtgt

1519 gL20 light chain with signal sequence underlined and italicized (*E. coli* expression)

SEQ ID NO: 25

MKKTAIATAV *ALAGFATVAQ* *ADIQMTQSPS* *SLSASVGDRV* *TITCKSSQSL*
VGASGKTYLY *WLFQKPGKAP* *KRLIYLVSTL* *DSGIPSRFSG* *SGSGTEFTLT*
ISSLQPEDFA *TYYCLQGTHF* *PHTFGQGTKL* *EIKRTVAAPS* *VFIFPPSDEQ*
LKSGTASVVC *LLNNFYPREA* *KVQWKVDNAL* *QSGNSQESVT* *EQDSKDSTYS*
LSSTLTLSKA *DYEKHKVYAC* *EVTHQGLSSP* *VTKSFNRGEC*

1519 gL20 light chain with signal sequence underlined and italicized (*E. coli* expression)

SEQ ID NO: 26

atgaaaaaga *cagctatcgc* *aattgcagtg* *gccttggctg* *gtttcgctac*
cgtagcgcaa *gctgatatcc* *agatgaccca* *gagtccaagc* *agtctctccg*
ccagcgtagg *cgatcgtgtg* *actattacct* *gtaaaagctc* *ccagtccttg*
gtgggtgcaa *gcggaacaaac* *ctacctgtac* *tggctcttcc* *agaaaccggg*
caaagctccg *aaacgcctga* *tctatctggg* *gtctaccctg* *gatagcggta*
ttccgtctcg *tttctccggg* *agcggtagcg* *gtaccgaatt* *cacgctgacc*
attagctccc *tccagccgga* *ggactttgct* *acctattact* *gcctccaggg*
cactcatttt *ccgcacactt* *tcggccaggg* *taccaaactg* *gaaatcaaac*
gtacggtagc *ggcccatct* *gtcttcatct* *tcccgccatc* *tgatgagcag*
ttgaaatctg *gaactgcctc* *tgttggtgtgc* *ctgctgaata* *acttctatcc*
cagagaggcc *aaagtacagt* *ggaaggtgga* *taacgcctc* *caatcgggta*
actcccagga *gagtgtcaca* *gagcaggaca* *gcaaggacag* *cacctacagc*
ctcagcagca *ccctgacgct* *gagcaaagca* *gactacgaga* *aacacaaagt*
ctacgcctgc *gaagtcaccc* *atcagggcct* *gagctcacca* *gtaacaaaaa*
gttttaatatg *aggggagtg*

FIGURE 1E

1519 gL20 light chain with signal sequence underlined and italicized (mammalian expression) SEQ ID NO: 27

MSVPTQVLGL LLLWLTDARC DIQMTQSPSS LSASVGDRVT ITCKSSQSLV
 GASGKTYLYW LFQKPGKAPK RLIYLVSTLD SGIPSRFSGS GSGTEFTLTI
 SSLQPEDFAT YYCLQGTHFP HTFGQGTKLE IKRTVAAPSV FIFPPSDEQL
 KSGTASVVCL LNNFYPREAK VQWKVDNALQ SGNSQESVTE QDSKDSTYSL
 SSTLTLSKAD YEKHKVYACE VTHQGLSSPV TKSFNRGEC

1519 gL20 light chain with signal sequence underlined and italicized (mammalian expression) SEQ ID NO: 28

atgtctgtcc ccaccaagt cctcggactc ctgctactct ggcttacaga
tgccagatgc gatatccaga tgaccagag cccatctagc ttatccgctt
 ccgttggtga tcgcgtgaca attacgtgta agagctccca atctctcgtg
 ggtgcaagtg gcaagaccta tctgtactgg ctctttcaga agcctggcaa
 ggcacaaaaa cggctgatct atctggtgtc tacccttgac tctgggatac
 cgtcacgatt ttccggatct gggagcggaa ctgagttcac actcacgatt
 tcatcgtctgc aaccggagga ctttgctacc tactactgcc tgcaaggcac
 tcattttccct cacactttcg gccaggggac aaaactcgaa atcaaacgta
 cggtagcggc cccatctgtc ttcactctcc cgccatctga tgagcagttg
 aaatctggaa ctgcctctgt tgtgtgcctg ctgaataact tctatcccag
 agaggccaaa gtacagtgga aggtggataa cgccctccaa tcgggtaact
 cccaggagag tgtcacagag caggacagca aggacagcac ctacagcctc
 agcagcaccc tgacgctgag caaagcagac tacgagaaac acaaagtcta
 cgcttgcgaa gtcacccatc agggcctgag ctcgcccgtc acaaagagct
 tcaacagggg agagtgt

1519 gH20 V-region SEQ ID NO: 29

EVPLVESGGG LVQPGGSLRL SCAVSGFTFS NYGMVWVRQA PGKGLEWVAY
 IDSDGDNTYY RDSVKGRFTI SRDNAKSSLY LQMNSLRAED TAVYYCTTGI
 VRPFLYWGQG TLVTVS

1519 gH20 V-region (*E. coli* expression) SEQ ID NO: 30

gaggttccgc tggtcgagtc tggaggcggg cttgtccagc ctggagggag
 cctgcgtctc tcttgtgcag tatctggctt cacgttctcc aactacggta
 tgggtgtgggt tcgtcaggct ccaggtaaag gtctggaatg ggtggcgtat
 attgactccg acggcgacaa cacctactat cgcgactctg tgaaaggctc
 cttcaccatt tcccgcgata acgccaatc cagcctgtac ctgcagatga
 acagcctgcg tgctgaagat actgcggtgt actattgcac cactggcatc
 gtgcgtccgt ttctgtattg gggtcagggt accctcggtta ctgtctcg

FIGURE 1F (signal sequences underlined and italicized)

1519 gH20 V-region (mammalian expression) SEQ ID NO: 31

gaggtaccac ttgtggaaag cggaggaggt cttgtgcagc ctggaggaag
 tttacgtctc tcttgtgctg tgtctggctt caccttctcc aattacggaa
 tggctctgggt cagacaagca cctggaaagg gtcttgaatg ggtggcctat
 attgactctg acggggacaa cacctactat cgggattccg tgaaaggacg
 cttcacaatc tcccagagata acgccaagag ctcaactgtac ctgcagatga
 atagcctgag agccgaggat actgccgtgt actattgcac aacgggaatc
 gttaggcctt ttctgtactg gggacagggc accttggtta ctgtctcg

1519 gH20 V-region (*E. coli* expression) SEQ ID NO: 32

MKKTAIAIAV ALAGFATVAQ AEVPLVESGG GLVQPGGSLR LSCAVSGFTF
 SNYGMVWVRQ APGKGLEWVA YIDSDGDNTRY YRDSVKGRFT ISRDNAKSSL
 YLQMNSLRAE DTA VYYCTTG IVRPFLYWQG GTLVTVS

1519 gH20 V-region (*E. coli* expression) SEQ ID NO: 33

atgaagaaga ctgctatagc aattgcagtg gcgctagctg gtttcgccac
cgtggcgcaa gctgaggttc cgctggtcga gtctggaggc gggcttgctc
 agcctggagg gagcctgcgt ctctcttggtg cagtatctgg cttcacgttc
 tccaactacg gtatgggtgtg ggttcgtcag gctccaggta aaggctctgga
 atgggtggcg tatattgact ccgacggcga caacacctac tatcgcgact
 ctgtgaaagg tcgcttcacc atttcccgcg ataacgccaa atccagcctg
 tacctgcaga tgaacagcct gcgtgctgaa gatactgcgg tgtactattg
 caccactggc atcgtgcgtc cgtttctgta ttgggggtcag ggtaccctcg
 ttactgtctc g

1519 gH20 V-region (mammalian expression) SEQ ID NO: 34

MEWSWVFLFF LSVTTGVHSE VPLVESGGGL VQPGGSLRLS CAVSGFTFSN
 YGMVWVRQAP GKGLEWVAYI DSDGDNTYYR DSVKGRFTIS RDNKSSLYL
 QMNSLRAEDT AVYYCTTGIV RPFLYWQGT LTVS

1519 gH20 V-region with signal sequence underlined and italicized (mammalian expression)

SEQ ID NO: 35

atggaatgga gctgggtctt tctcttcttc ctgtcagtaa ctacaggagt
ccattctgag gtaccacttg tggaaagcgg aggaggtctt gtgcagcctg
 gaggaagtth acgtctctct tgtgctgtgt ctggcttcac cttctccaat
 tacggaatgg tctgggtcag acaagcacct ggaaagggtc ttgaatgggt
 ggcctatatt gactctgacg gggacaacac ctactatcgg gattccgtga
 aaggacgctt cacaatctcc cgagataacg ccaagagctc actgtacctg
 cagatgaata gcctgagagc cgaggatact gccgtgtact attgcacaac
 gggaaatcgtt aggccttttc tgtactgggg acagggcacc ttggttactg tctcg

FIGURE 1G

1519gH20 Fab' heavy chain (V + human gamma-1 CH1 + hinge) SEQ ID NO: 36

```
EVPLVESGGG LVQPGGSLRL SCAVSGFTFS NYGMVWVRQA PGKGLEWVAY
IDSDGDNTYY RDSVKGRFTI SRDNAKSSLY LQMNSLRAED TAVYYCTTGI
VRPFLYWGGG TLVTVSSAST KGPSVFPLAP SSKSTSGGTA ALGCLVKDYF
PEPVTVSWNS GALTSGVHTF PAVLQSSGLY SLSSVTVPS SSLGTQTYIC
NVNHNKPSNTK VDKKVEPKSC DKTHTCAA
```

1519gH20 Fab' heavy chain (V + human gamma-1 CH1 + hinge, *E.coli* expression) SEQ ID NO: 37

```
gaggttccgc tggtcgagtc tggaggcggg cttgtccagc ctggagggag
cctgcgtctc tcttgtgcag tatctggctt cacgttctcc aactacggta
tgggtgtgggt tcgtcaggct ccaggtaaag gtctggaatg ggtggcgtat
attgactccg acggcgacaa cacctactat cgcgactctg tgaaaggctg
cttcaccatt tcccgcgata acgccaatc cagcctgtac ctgcagatga
acagcctgcg tgctgaagat actgcggtgt actattgcac cactggcatc
gtgcgtccgt ttctgtattg gggtcagggt accctcgta ctgtctcgag
cgcttctaca aagggcccat cggctctccc cctggcacc tctccaaga
gcacctctgg gggcacagcg gccctgggct gcctgggtaa ggactacttc
cccgaaccgg tgacgggtgc gtggaactca ggcgccctga ccagcggcgt
gcacaccttc cggctgtcc tacagtctc aggactctac tccctcagca
gcgtgggtgac cgtgccctcc agcagcttgg gcacccagac ctacatctgc
aacgtgaatc acaagcccag caacaccaag gtcgacaaga aagttgagcc
caaatcttgt gacaaaactc acacatgcgc cgcg
```

1519gH20 Fab' heavy chain (V + human gamma-1 CH1 + hinge, mammalian expression) SEQ ID NO: 38

```
gaggtaccac ttgtggaaag cggaggaggt cttgtgcagc ctggaggaag
tttacgtctc tcttgtgctg tgtctggctt caccttctcc aattacggaa
tgggtctgggt cagacaagca cctggaaagg gtcttgaatg ggtggcctat
attgactctg acggggacaa cacctactat cgggattccg tgaaaggacg
cttcacaatc tcccagata acgccaagag ctcaactgtac ctgcagatga
atagcctgag agccgaggat actgccgtgt actattgcac aacgggaatc
gttaggcctt ttctgtactg gggacagggc accttggtta ctgtctcgag
cgcttctaca aagggcccat cggctctccc cctggcacc tctccaaga
gcacctctgg gggcacagcg gccctgggct gcctgggtaa ggactacttc
cccgaaccgg tgacgggtgc gtggaactca ggcgccctga ccagcggcgt
gcacaccttc cggctgtcc tacagtctc aggactctac tccctcagca
gcgtgggtgac cgtgccctcc agcagcttgg gcacccagac ctacatctgc
aacgtgaatc acaagcccag caacaccaag gtcgacaaga aagttgagcc
caaatcttgt gacaaaactc acacatgcgc cgcg
```

FIGURE 1H

1519 gH20 Fab' heavy chain with signal sequence underlined and italicized (*E. coli* expression) SEQ ID NO: 39

MKKTAIAIAV ALAGFATVAQ AEVPLVESGG GLVQPGGSLR LSCAVSGFTF
 SNYGMVWVRQ APGKGLEWVA YIDSDGDNTY YRDSVKGRFT ISRDNAKSSL
 YLQMNSLRAE DTAVYYCTTG IVRPFLYWQ GTLVTVSSAS TKGPSVFPLA
 PSSKSTSGGT AALGCLVKDY FPEPVTVSWN SGALTSGVHT FPAVLQSSGL
 YSLSSVVTVP SSSLGTQTYI CNVNHKPSNT KVDKKVEPKS CDKTHTCOA

1519 gH20 Fab' heavy chain with signal sequence underlined and italicized (*E. coli* expression) SEQ ID NO: 40

atgaagaaga ctgctatagc aattgcagtg gcgctagctg gtttcgccac
cgtggcgcaa gctgaggttc cgctggtcga gtctggaggc gggcttgctc
 agcctggagg gaggctgcgt ctctcttggt cagtatctgg cttcacgttc
 tccaactacg gtatggtgtg gggttcgtcag gctccaggta aaggctctgga
 atgggtggcg tatattgact ccgacggcga caacacctac tatcgcgact
 ctgtgaaagg tcgcttcacc atttcccgcg ataacgcaa atccagcctg
 tacctgcaga tgaacagcct gcgtgctgaa gatactgcgg tgtactattg
 caccactggc atcgtgcgtc cgtttctgta ttgggggtcag ggtaccctcg
 ttactgtctc gaggcgttct acaaagggcc catcggtctt ccccttgga
 ccctcctcca agagcacctc tgggggcaca gcggccctgg gctgcctggg
 caaggactac ttccccgaac cgggtgacggg gtcgtggaac tcaggcgccc
 tgaccagcgg cgtgcacacc ttcccggctg tcctacagtc ctcaggactc
 tactccctca gcagcgtggg gaccgtgccc tccagcagct tgggcaccca
 gacctacatc tgcaacgtga atcacaagcc cagcaacacc aaggctcgaca
 agaaagttga gcccaaattc tgtgacaaaa ctcacacatg cgccgcg

1519 gH20 Fab' heavy chain with signal sequence underlined and italicized (mammalian expression) SEQ ID NO: 41

MEWSWVFLFF LSVTTGVIHSE VPLVESGGGL VQPGGSLRLS CAVSGFTFSN
 YGMVWVRQAP GKGLEWVAYI DSDGDNTYYR DSVKGRFTIS RDNAAKSSLYL
 QMNSLRAEDT AVYYCTTGIV RPFLYWQGT LTVTVSSASTK GPSVFPLAPS
 SKSTSGGTAA LGCLVKDYFP EPVTVSWNSG ALTSGVHTFP AVLQSSGLYS
 LSSVVTVPSS SLGTQTYICN VNHKPSNTKV DKKVEPKSCD KTHTCOA

FIGURE 11

1519 gH20 Fab' heavy chain with signal sequence underlined and italicized (mammalian expression) SEQ ID NO: 42

atggaatgga gctgggtctt tctcttcttc ctgtcagtaa ctacaggagt
ccattctgag gtaccacttg tggaaagcgg aggaggtctt gtgcagcctg
gaggaagttt acgtctctct tgtgctgtgt ctggcttcac cttctccaat
tacggaatgg tctgggtcag acaagcacct ggaaagggc ttgaatgggt
ggcctatatatt gactctgacg gggacaacac ctactatcgg gattccgtga
aaggacgctt cacaatctcc cgagataacg ccaagagctc actgtacctg
cagatgaata gcctgagagc cgaggatact gccgtgtact attgcacaac
gggaatcggt aggccttttc tgtactgggg acagggcacc ttggttactg
tctcgagcgc ttctacaaag ggcccatcgg tcttccccct ggcaccctcc
tccaagagca cctctggggg cacagcggcc ctgggctgcc tggtaagga
ctacttcccc gaaccggtga cgggtgtcgtg gaactcaggc gccctgacca
gcggcgtgca caccttcccg gctgtcctac agtcctcagg actctactcc
ctcagcagcg tggtgaccgt gccctccagc agcttgggca cccagaccta
catctgcaac gtgaatcaca agcccagcaa caccaaggct gacaagaaag
ttgagcccaa atcttgtgac aaaactcaca catgcgccgc g

1519gH20 IgG4 heavy chain (V + human gamma-4P constant) SEQ ID NO: 43

EVPLVESGGG LVQPGGSLRL SCAVSGFTFS NYGMVWVRQA PGKGLEWVAY
IDSDGDNTYY RDSVKGRFTI SRDNAKSSLY LQMNSLRAED TAVYYCTTGI
VRPFLYWQGQ TLVTVSSAST KGPSVFPLAP CSRSTSESTA ALGCLVKDYF
PEPVTVSWNS GALTSGVHTF PAVLQSSGLY SLSSVVTVPS SSLGTKTYTC
NVDHKPSNTK VDKRVESKYG PPCPPCPAPE FLGGPSVFLF PPKPKDTLMI
SRTPEVTCVV VDVSQEDPEV QFNWYVDGVE VHNAKTKPRE EQFNSTYRVV
SVLTVLHQDW LNGKEYKCKV SNKGLPSSIE KTISKAKGQP REPQVYTLPP
SQEEMTKNQV SLTCLVKGFY PSDIAVEWES NGQPENNYKT TPPVLDSDGS
FFLYSRLTVD KSRWQEGNVF SCSVMHEALH NHYTQKSLSL SLGK

FIGURE 1J

1519gH20 IgG4 heavy chain (V + human gamma-4P constant, exons underlined) SEQ ID

NO: 44

gaggtaccac ttgtggaaag cggaggaggt cttgtgcagc ctggaggaag
tttacgtctc tcttgtgctg tgtctggctt caccttctcc aattacggaa
tggctctgggt cagacaagca cctggaaagg gtcttgaatg ggtggcctat
attgactctg acggggacaa cacctactat cgggattccg tgaaaggacg
cttcacaatc tcccagata acgccaagag ctactgtac ctgcagatga
atagcctgag agccgaggat actgccgtgt actattgcac aacgggaatc
gttaggcctt ttctgtactg gggacagggc accttggtta ctgtctcgag
cgcttctaca aagggcccat ccgtcttccc cctggcgccc tgctccagga
gcacctcga gagcacagcc gccctgggct gcctgggtcaa ggactacttc
cccgaaccgg tgacggtgtc gtggaactca ggcgccctga ccagcggcgt
gcacaccttc ccggtgttc tacagtcctc aggactctac tccctcagca
gcgtggtgac cgtgccctcc agcagcttgg gcacgaagac ctacacctgc
aacgtagatc acaagcccag caacaccaag gtggacaaga gagttggtga
gagggcagca caggaggga ggggtgtctgc tggaagccag gctcagccct
cctgcctgga cgcaccccg gtgtgcagcc ccagcccagg gcagcaaggc
atgccccatc tgtctcctca cccggaggcc tctgaccacc cactcatgc
ccaggagag ggtcttcttg atttttccac caggctccgg gcagccacag
gctggatgcc cctaccccag gccctgcgca tacaggggca ggtgctgcgc
tcagacctgc caagagccat atccgggagg accctgcccc tgacctaaagc
ccaccccaaa ggccaaactc tccactccct cagctcagac accttctctc
ctcccagatc tgagtaactc ccaatcttct ctctgcagag tccaaatatg
gtcccccatg ccacccatgc ccaggtaagc caaccaggc ctgcacctcc
agctcaaggc gggacaggtg ccctagagta gcctgcatcc agggacaggc
cccagccggg tgctgacgca tccacctcca tctcttctctc agcacctgag
ttcctggggg gaccatcagt ctccctgttc cccccaaaac ccaaggacac
tctcatgac tcccggacct ctgaggtcac gtgcgtggtg gtggacgtga
gccaggaaga ccccgaggtc cagttcaact ggtacgtgga tggcgtggag
gtgcataatg ccaagacaaa gccgcgggag gagcagttca acagcacgta
ccgtgtggtc agcgtcctca ccgtcctgca ccaggactgg ctgaacggca
aggagtacaa gtgcaaggtc tccaacaaag gcctcccgtc ctccatcgag
aaaaccatct ccaaagccaa aggtgggacc cacgggggtgc gagggccaca
tggacagagg tcagctcggc ccacctctg ccctgggagt gaccgctgtg
ccaacctctg tccctacagg gcagccccga gagccacagg tgtacacct
gcccccatcc caggaggaga tgaccaagaa ccaggtcagc ctgacctgcc
tggtaaagg cttctacccc agcgacatcg ccgtggagtg ggagagcaat
gggcagccgg agaacaacta caagaccacg cctcccgtgc tggactccga
cggctccttc ttctctaca gcaggctaac cgtggacaag agcaggtggc
aggaggggaa tgtcttctca tgctccgtga tgcattgaggc tctgcacaac
cactacacac agaagagcct ctccctgtct ctgggtaaa

FIGURE 1K

1519gH20 IgG4 heavy chain (V + human gamma-4P constant) with signal sequence underlined and italicised SEQ ID NO: 45

atggaatgga gctgggtcctt tctcttcttc ctgtcagtaa ctacaggagt
ccattctgag gtaccacttg tggaaagcgg aggaggtcct gtgcagcctg
gaggaagtgtt acgtctctct tgtgctgtgt ctggcttcac cttctccaat
tacggaatgg tctgggtcag acaagcacct ggaaagggc ttgaatgggt
ggcctatatt gactctgacg gggacaacac ctactatcgg gattccgtga
aaggacgctt cacaatctcc cgagataacg ccaagagctc actgtacctg
cagatgaata gcctgagagc cgaggatact gccgtgtact attgcacaac
gggaatcggtt aggccttttc tgtactgggg acagggcacc ttggttactg
tctcgagcgc ttctacaaag ggcccatccg tcttccccct ggcgccctgc
tccaggagca cctccgagag cacagccgcc ctgggctgcc tggtaagga
ctacttcccc gaaccggtga cgggtgtcgtg gaactcaggc gccctgacca
gcggcgtgca caccttcccg gctgtcctac agtcctcagg actctactcc
ctcagcagcg tggtgaccgt gccctccagc agcttgggca cgaagacctt
cacctgcaac gtagatcaca agcccagcaa caccaagggtg gacaagagag
ttgggtgagag gccagcacag ggaggagggg tgtctgctgg aagccaggct
cagccctcct gcctggacgc accccggctg tgcagcccca gccagggca
gcaaggcatg ccccatctgt ctctcaccg ggaggcctct gaccaccca
ctcatgcccc gggagagggg cttctggatt tttccaccag gctccgggca
gccacaggct ggatgccct accccaggcc ctgcgcatac aggggcagg
gctgcgtca gacctgcaa gagccatata cgggaggacc ctgcccctga
cctaagcccc ccccaaaggc caaactctcc actccctcag ctacagacc
ttctctctc ccagatctga gtaactcccc atcttctctc tgcagagtcc
aaatatgggt ccccatgccc accatgcccc ggtaagccaa cccaggcctc
gccctccagc tcaaggcggg acagggtgcc tagagtagcc tgcattcagg
gacaggcccc agccgggtgc tgacgcatcc acctccatct cttctcagc
acctgagttc ctggggggac catcagtcct cctgttcccc ccaaaacca
aggacactct catgatctcc cggacccctg aggtcacgtg cgtgggtggg
gacgtgagcc aggaagacct cgagggtccag ttcaactggg acgtggatgg
cgtggagggtg cataatgcca agacaaagcc gcgggaggag cagttcaaca
gcacgtaccg tgtggtcagc gtcctcaccg tctgcacca ggactggctg
aacggcaagg agtacaagt caaggctctc aacaaaggcc tcccgtctc
catcgagaaa accatctcca aagccaaagg tgggacctac ggggtgcgag
ggccacatgg acagaggtca gctcggccca cctctgccc tgggagtga
cgtgtgcca acctctgtcc ctacagggca gccccgagag ccacagggtg
acaccctgcc cccatcccag gaggagatga ccaagaacca ggtcagcctg
acctgcctgg tcaaaggctt ctaccccagc gacatcgccg tggagtggga
gagcaatggg cagccggaga acaactacaa gaccacgcct cccgtgctgg
actccgacgg ctcttcttcc ctctacagca ggctaaccgt ggacaagagc
aggtggcagg aggggaatgt cttctcatgc tccgtgatgc atgaggctct
gcacaaccac tacacacaga agagcctctc cctgtctctg ggtaaa

FIGURE 1L

1519gL20 FabFv light chain SEQ ID NO: 46

DIQMTQSPSS LSASVGDRVT ITCKSSQSLV GASGKTYLYW LFQKPGKAPK
 RLIYLVSTLD SGIPSRFSGS GSGTEFTLTI SSLQPEDFAT YYCLQGTHFP
 HTFGQGTKLE IKRTVAAPSV FIFPPSDEQL KSGTASVVCL LNNFYBREAK
 VQWKVDNALQ SGNSQESVTE QDSKDSTYSL SSTLTLSKAD YEKHKVYACE
 VTHQGLSSPV TKSFNREGCS GGGGSGGGGS GGGGSDIQMT QSPSSVSASV
 GDRVTITCQS SPSVWSNFLS WYQQKPGKAP KLLIYEASKL TSGVPSRFSG
 SGGSTDFTLT ISSLPEDFA TYYCGGGYSS ISDTTFGCGT KVEIKRT

1519gL20 FabFv light chain SEQ ID NO: 47

gatatccaga tgaccagag cccatctagc ttatccgctt ccgttggtga
 tcgcgtgaca attacgtgta agagctccca atctctcgtg ggtgcaagtg
 gcaagaccta tctgtactgg ctctttcaga agcctggcaa ggcacaaaaa
 cggctgatct atctggtgtc tacccttgac tctgggatac cgtcacgatt
 ttccggatct gggagcggaa ctgagttcac actcacgatt tcatcgctgc
 aaccgcagga ctttgctacc tactactgcc tgcaaggcac tcatttcctt
 cacactttcg gccaggggac aaaactcgaa atcaaacgta cggtagcggc
 cccatctgtc ttcactttcc cgccatctga tgagcagttg aaatctggaa
 ctgcctctgt tgtgtgctg ctgaataact tctatcccag agaggccaaa
 gtacagtga aggtggataa cgccctccaa tcgggtaact ccagagagag
 tgtcacagag caggacagca aggacagcac ctacagcctg agcagcacc
 tgacgctgtc taaagcagac tacgagaaac acaaagtgtg cgcctgcgaa
 gtcacccatc agggcctgag ctaccagta acaaaaagtt ttaatagagg
 ggagtgtagc ggtggcgggtg gcagtgggtg gggaggctcc ggagggtggc
 gttcagacat acaaatgacc cagagtcctt catcggtatc cgcgtccgtt
 ggcatagagg tgactattac atgtcaaagc tctcctagcg tctggagcaa
 ttttctatcc tggatcaac agaaaccggg gaaggctcca aaacttctga
 tttatgaagc ctcgaaactc accagtggag ttccgtcaag attcagtggc
 tctggatcag ggacagactt cacgttgaca atcagttcgc tgcaaccaga
 ggactttgcg acctactatt gtggtggagg ttacagtagc ataagtata
 cgacatttggt gtgcggtact aaggtggaaa tcaaacgtac c

1519gL20 FabFv light chain with signal sequence underlined & italicised SEQ ID NO: 48

MSVPTQVLGL LLLWLTDARC DIQMTQSPSS LSASVGDRVT ITCKSSQSLV
 GASGKTYLYW LFQKPGKAPK RLIYLVSTLD SGIPSRFSGS GSGTEFTLTI
 SSLQPEDFAT YYCLQGTHFP HTFGQGTKLE IKRTVAAPSV FIFPPSDEQL
 KSGTASVVCL LNNFYBREAK VQWKVDNALQ SGNSQESVTE QDSKDSTYSL
 SSTLTLSKAD YEKHKVYACE VTHQGLSSPV TKSFNREGCS GGGGSGGGGS
 GGGGSDIQMT QSPSSVSASV GDRVTITCQS SPSVWSNFLS WYQQKPGKAP
 KLLIYEASKL TSGVPSRFSG SGGSTDFTLT ISSLPEDFA TYYCGGGYSS
 ISDTTFGCGT KVEIKRT

FIGURE 1M

1519gL20 FabFv light chain with signal sequence underlined and italicised SEQ ID NO:
49

atgtctgtcc ccaccaagt ctcggactc ctgctactct ggcttacaga
tgccagatgc gatatccaga tgaccagag cccatctagc ttatccgctt
 ccgttggtga tcgctgaca attacgtgta agagctccca atctctctgtg
 ggtgcaagtg gcaagaccta tctgtactgg ctctttcaga agcctggcaa
 ggcacaaaaa cggctgatct atctggtgtc tacccttgac tctgggatac
 cgtcacgatt ttccggatct gggagcggaa ctgagttcac actcacgatt
 tcatcgtctgc aaccgagga ctttgctacc tactactgcc tgcaaggcac
 tcattttccct cacactttcg gccaggggac aaaactcgaa atcaaacgta
 cggtagcggc cccatctgtc ttcattcttc cgccatctga tgagcagttg
 aaatctggaa ctgcctctgt tgtgtgcctg ctgaataact tctatcccag
 agaggccaaa gtacagtgga aggtggataa cgccctccaa tcgggtaact
 cccaggagag tgtcacagag caggacagca aggacagcac ctacagcctg
 agcagcacc tgacgtgtc taaagcagac tacgagaaac acaaagtgtg
 cgcttgcgaa gtcacccatc agggcctgag ctcaccagta acaaaaagtt
 ttaatagagg ggagtgtagc ggtggcgggtg gcagtgggtg gggaggctcc
 ggaggtggcg gttcagacat acaaatgacc cagagtcctt catcggtatc
 cgcgtccggt ggcataggg tgactattac atgtcaaagc tctcctagcg
 tctggagcaa ttttctatcc tggatatcaac agaaaccggg gaaggctcca
 aaactttctga tttatgaagc ctcgaaactc accagtggag ttccgtcaag
 attcagtggc tctggatcag ggacagactt cacgttgaca atcagttcgc
 tgcaaccaga ggactttgcg acctactatt gtggtggagg ttacagtagc
 ataagtgata cgacatttgg gtgcggtact aaggtggaaa tcaaacgtac
 C

1519gH20 FabFv heavy chain SEQ ID NO: 50

EVPLVESGGG LVQPGGSLRL SCAVSGFTFS NYGMVWVRQA PGKGLEWVAY
 IDSDGDNYY RDSVKGRFTI SRDNAKSSLY LQMNSLRAED TAVYYCTTGI
 VRPFLYWQGG TLTVVSSAST KGPSVFPLAP SSKSTSGGTA ALGCLVKDYF
 PEPVTVSWNS GALTSGVHTF PAVLQSSGLY SLSSVVTVPSS SSLGTQTYIC
 NVNHKPSNTK VDKKVEPKSC SGGGSGGGG TGGGGSEVQL LESGGGLVQP
 GGSLRLSCAV SGIDLSNYAI NWVRQAPGKC LEWIGIIWAS GTTFYATWAK
 GRFTISRDNS KNTVYLQMNS LRAEDTAVYY CARTVPGYST APYFDLWGQG TLTVVSS

FIGURE 1N

1519gH20 FabFv heavy chain SEQ ID NO: 51

gaggtaccac ttgtggaaag cggaggaggt cttgtgcagc ctggaggaag
 tttacgtctc tcttgtgctg tgtctggctt caccttctcc aattacggaa
 tggtctgggt cagacaagca cctggaaagg gtcttgaatg ggtggcctat
 attgactctg acggggacaa cacctactat cgggattccg tgaaaggacg
 cttcacaatc tcccagagata acgccaagag ctcactgtac ctgcagatga
 atagcctgag agccgaggat actgccgtgt actattgcac aacgggaatc
 gttaggcctt ttctgtactg gggacagggc accttgggta ctgtctcgag
 cgcgtccaca aagggcccat cgggtcttccc cctggcacc cctccaaga
 gcacctctgg gggcacagcg gccctgggct gcctgggtaa ggactacttc
 cccgaaccag tgacgggtgtc gtggaactca ggtgccctga ccagcggcgt
 tcacaccttc cgggtgttcc tacagtcttc aggactctac tccctgagca
 gcgtgggtgac cgtgccctcc agcagcttgg gcaccagac ctacatctgc
 aacgtgaatc acaagcccag caacaccaag gtcgataaga aagttgagcc
 caaatcttgt agtggaggtg ggggctcagg tggaggcggg accggtggag
 gtggcagcga ggttcaactg cttgagtctg gaggaggcct agtccagcct
 ggaggggagcc tgcgtctctc ttgtgcagta agcggcatcg acctgagcaa
 ttacgccatc aactgggtga gacaagctcc ggggaagtgt ttagaatgga
 tcggtataat atgggccagt gggacgacct tttatgctac atgggcgaaa
 ggaagggtta caattagccg ggacaatagc aaaaacaccg tgtatctcca
 aatgaactcc ttgcgagcag aggacacggc ggtgtactat tgtgctcgca
 ctgtcccagg ttatagcact gcaccctact tcgatctgtg gggacaaggg
 accctgggtga ctgtttcaag t

1519gH20 FabFv heavy chain with signal sequence underlined and italicised SEQ ID NO:
52

MEWSWVFLFF LSVTGTVHSE VPLVESGGGL VQPGGSLRLS CAVSGFTFSN
 YGMVWVRQAP GKLEWVAYI DSDGDNTYYR DSVKGRFTIS RDNAKSSLYL
 QMNSLRAEDT AVYYCTTGIV RPFLYWGQGT LVTVSSASTK GPSVFPLAPS
 SKSTSGGTAA LGCLVKDYFP EPVTVSWNSG ALTSGVHTFP AVLQSSGLYS
 LSSVTVTPSS SLGTQTYICN VNHKPSNTKV DKKVEPKSCS GGGGSGGGGT
 GGGGSEVQLL ESGGLVQPG GSLRLSCAVS GIDLSNYAIN WVRQAPGKCL
 EWIGIIWASG TTFYATWAKG RFTISRDNK NTVYLQMNSL RAEDTAVYYC
 ARTVPGYSTA PYFDLWGQGT LVTVSS

FIGURE 1P

1519gH20 FabFv heavy chain with signal sequence underlined & italicised SEQ ID NO: 53

atggaatgga gctgggtctt tctcttcttc ctgtcagtaa ctacaggagt
ccattctgag gtaccacttg tggaaagcgg aggaggtctt gtgcagcctg
 gaggaagttt acgtctctct tgtgctgtgt ctggcttcac cttctccaat
 tacggaatgg tctgggtcag acaagcacct ggaaagggtc ttgaatgggt
 ggcctatatt gactctgacg gggacaacac ctactatcgg gattccgtga
 aaggacgctt cacaatctcc cgagataacg ccaagagctc actgtacctg
 cagatgaata gcctgagagc cgaggatact gccgtgtact attgcacaac
 gggaatcggt aggccttttc tgtactgggg acagggcacc ttggttactg
 tctcgagcgc gtccacaaag ggcccatcgg tcttccccct ggcaccctcc
 tccaagagca cctctggggg cacagcggcc ctgggctgcc tggtaagga
 ctacttcccc gaaccagtga cgggtgtcgtg gaactcaggt gccctgacca
 gcggcggttca caccttcccg gctgtcctac agtcttcagg actctactcc
 ctgagcagcg tggtgaccgt gccctccagc agcttgggca cccagacctg
 catctgcaac gtgaatcaca agcccagcaa caccaaggtc gataagaaag
 ttgagcccaa atcttgtagt ggaggtgggg gctcaggtgg aggcgggacc
 ggtggaggtg gcagcgaggt tcaactgctt gagtctggag gaggcctagt
 ccagcctgga gggagcctgc gtctctcttg tgcagtaagc ggcacgcacc
 tgagcaatta cgccatcaac tgggtgagac aagctccggg gaagtgttta
 gaatggatcg gtataatatg ggccagtggg acgacctttt atgctacatg
 ggcgaaagga aggtttacaa ttagccggga caatagcaaa aacaccgtgt
 atctccaaat gaactccttg cgagcagagg acacggcggg gtactattgt
 gctcgcaactg tcccaggtta tagcactgca ccctacttcg atctgtgggg
 acaagggacc ctggtgactg tttcaagt

Human VK1 2-1-(1) A30 JK2 acceptor framework SEQ ID NO: 54

DIQMTQSPSS LSASVGDRVT ITCRASQGIR NDLGWYQQKP GKAPKRLIYA
 ASSLQSGVPS RFSGSGSGTE FTLTISSLQP EDFATYYCLQ HNSYPYTFGQ GTKLEIK

Human VK1 2-1-(1) A30 JK2 acceptor framework SEQ ID NO: 55

gacatccaga tgaccagtc tccatcctcc ctgtctgcat ctgtaggaga
 cagagtcacc atcacttgcc gggcaagtca gggcattaga aatgatttag
 gctggtatca gcagaaacca gggaaagccc ctaagcgct gatctatgct
 gcatccagtt tgcaaagtgg ggtcccatca aggttcagcg gcagtggatc
 tgggacagaa ttactctca caatcagcag cctgcagcct gaagattttg
 caacttatta ctgtctacag cataatagtt acccttacac ttttggccag
 gggaccaagc tgagatcaa a

FIGURE 1Q

Human VH3 1-3 3-07 JH4 acceptor framework SEQ ID NO: 56

EVQLVESGGG LVQPGGSLRL SCAASGFTFS SYWMSWVRQA PGKGLEWVAN
IKQDGSEKYY VDSVKGRFTI SRDNAKNSLY LQMNSLRAED TAVYYCARYF
DYWGQGTLVT VS

Human VH3 1-3 3-07 JH4 acceptor framework SEQ ID NO: 57

gaggtgcagc tgggtggagtc tggggggaggc ttggtccagc ctgggggggtc
cctgagactc tcctgtgcag cctctggatt cacctttagt agctattgga
tgagctgggt ccgccaggct ccagggaagg ggctggagtg ggtggccaac
ataaagcaag atggaagtga gaaatactat gtggactctg tgaagggccg
attcaccatc tccagagaca acgccaagaa ctcactgtat ctgcaaatga
acagcctgag agccgaggac acggctgtgt attactgtgc gagatacttt
gactactggg gccagggaac cctggtcacc gtctcc

Rat Ab 1548 VL region SEQ ID NO: 58

DVVMTQTPLS LSVALGQPAS ISCKSSQSLV GASGKTYLYW LFQMSGQSPK
RLIYLVSTLD SGIPDRFSGS GAETDFTLKI RRVEADDLGV YYCLQGTHFP
HTFGAGTKLE IK

Rat Ab 1548 VL region SEQ ID NO: 59

gatgttgtga tgaccagac tccactgtct ttgtcggttg cccttggaaca
accagcctcc atctcttgca agtcaagtca gagcctcgta ggtgctagtg
gaaagacata tttgtattgg ttatttcaga ggtccggcca gtctccaaag
cgactaatct atctgggtgc cacactggac tctggaattc ctgatagggt
cagtggcagt ggagcagaga cagattttac tcttaaaatc cgcagagtgg
aagccgatga tttgggagtt tattactgct tgcaaggtag acattttcct
cacacgtttg gagctgggac caagctggaa ataaaa

Rat Ab 1548 VH region SEQ ID NO: 60

EVPLVESGGG SVQPGRSMKL SCVVSFTFS NYGMVWVRQA PKKGLEWVAY
IDSDGDNTRY RDSVKGRFTI SRNNAKSTLY LQMDSLRSED TATYYCTTGI
VRPFLYWGQG VMVTVS

FIGURE 1R

Rat Ab 1548 VH region SEQ ID NO: 61

gaggtgccgc tgggtggagtc tggggggcggc tcagtgcagc ctgggaggtc
catgaaactc tcctgtgtag tctcaggatt cactttcagt aattatggca
tgggtctgggt ccgccaggct ccaaagaagg gtctggagtg ggtcgcatat
attgattctg atgggtgataa tacttactac cgagattccg tgaagggccg
attcactatc tccagaaata atgcaaaaag caccctatat ttgcaaattg
acagtctgag gtctgaggac acggccactt attactgtac aacagggatt
gtccggccct ttctctattg gggccaagga gtcattggtca cagtctcg

Rat Ab 1644 VL region SEQ ID NO: 62

DVVMTQTPLS LSVAIGQPAS ISCKSSQSLV GASGKTYLYW LFQMSGQSPK
RLIYLVSTLD SGIPDRFSGS GAETDFTLKI RRVEADDLGV YYCLQGTHFP
HTFGAGTKLE LK

Rat Ab 1644 VL region SEQ ID NO: 63

gatgttgtga tgaccagac tccactgtct ttgtcggttg ccattggaca
accagcctcc atctcttgca agtcaagtca gagcctcgta ggtgctagtg
gaaagacata tttgtattgg ttatttcaga ggtccggcca gtctccaaag
cgactaatct atctggtgtc cacactggac tctggaattc ctgatagggt
cagtggcagt ggagcagaga cagattttac tcttaaaatc cgcagagtgg
aagccgatga tttgggagtt tattactgct tgcaagggtac acattttcct
cacacgtttg gagctgggac caagctggaa ctgaaa

Rat Ab 1644 VH region SEQ ID NO: 64

EVPLVESGGG SVQPGRSTKL SCVVSQFTFS NYGMVWVRQA PKKGLEWVAY
IGSDGDNIYY RDSVKGRFTI SRNNAKSTLY LQMDSLRSED TATYYCTTGI
VRPFLYWQGG TTVTVS

Rat Ab 1644 VH region SEQ ID NO: 65

gaggtgccgc tgggtggagtc tggggggcggc tcagtgcagc ctgggaggtc
cacgaaactc tcctgtgtag tctcaggatt cactttcagt aactatggca
tgggtctgggt ccgccaggct ccaaagaagg gtctggagtg ggtcgcatat
attggttctg atgggtgataa tatttactac cgagattccg tgaagggctg
attcactatc tccagaaata atgcaaaaag caccctatat ttgcaaattg
acagtctgag gtctgaggac acggccactt attactgtac aacagggatt
gtccggccct ttctctactg gggccaagga accacggtca ccgtctcg

Figure 1S**Rat Ab 1496 VK region SEQ ID NO: 66**

DVVMTQTPLS LSVALGQPAS ISCKSSQSLV GASGKTYLYW LFQMSGQSPK
 RLIYLVSTLD SGIPDRFSGS GAETDFTLKI RRVEADDLGV YYCLQGTHFP
 HTFGAGTKLE LK

Rat Ab 1496 VK region SEQ ID NO: 67

gatgttgatga tgaccagac tccactgtct ttgtcgggtg cccttgagaca
 accagcctcc atctcttgca agtcaagtca gagcctcgta ggtgctagtg
 gaaagacata tttgtattgg ttatttcaga ggtccggcca gtctccaaag
 cgactaatct atctgggtgc cacactggac tctggaattc ctgatagggt
 cagtggcagt ggagcagaga cagattttac tcttaaaatc cgcagagtgg
 aagccgatga tttgggagtt tattactgct tgcaagggtac acattttcct
 cacacgtttg gagctgggac caagctggaa ctgaaa

Rat Ab 1496 VH region SEQ ID NO: 68

EVLLVESGGG SVQPGRSMKL SCVVSGFTFS NYGMVWVRQA PKKGLEWVAY
 IDSDGDNTYY RDSVKGRFTI SRNNAKSTLY LQMSLRSER TATYYCTTGI
 VRPFLYWQQG TMVTVS

Rat Ab 1496 VH region SEQ ID NO: 69

gaggtgctgc tgggtggagtc tggggggcggc tcagtgcagc ctgggaggtc
 catgaaactc tcctgtgtag tctcaggatt cactttcagt aattatggca
 tgggtctgggt ccgccaggct ccaaagaagg gtctggagtg ggtcgcatat
 attgattctg atgggtgataa tacttactac cgagattccg tgaagggccg
 attcactatc tccagaaata atgcaaaaag caccctatat ttgcaaatgg
 acagtctgag gtctgaggac acggccactt attactgtac aacagggatt
 gtccggccct ttctctattg gggccaagga accatgggtca ccgtctcg

1519gH20 IgG1 heavy chain (V + human gamma-1 constant) SEQ ID NO: 72

EVPLVESGGG LVQPGGSLRL SCAVSGFTFS NYGMVWVRQA PKKGLEWVAY IDSDGDNTYY
 RDSVKGRFTI SRDNAKSSLY LQMNSLRAED TAVYYCTTGI VRPFLYWQQG TLVTVSSAST
 KGPSVFPLAP SSKSTSGGTA ALGCLVKDYF PEPVTVSWNS GALTSGVHTF PAVLQSSGLY
 SLSSVTVPS SSLGTQTYIC NVNHKPSNTK VDKKVEPKSC DKHTCPCP APELLGGPSV
 FLFPPKPKDT LMISRTPEVT CVVVDVSHED PEVKFNWYVD GVEVHNAKTK PREEQYNSTY
 RVSVLTVLH QDWLNGKEYK CKVSNKALPA PIEKTISKAK GQPREPQVYT LPPSRDELTK
 NQVSLTCLVK GFYPSDIAVE WESNGQPENN YKTTTPVLDL DGSFFLYSKL TVDKSRWQQG
 NVFSCSVME ALHNHYTQKS LSLSPGK

Figure 1T

1519gH20 IgG1 heavy chain (V + human gamma-1 constant, exons underlined) SEQ ID NO: 73

gaggtaccac ttgtggaaag cggaggaggt cttgtgcagc ctggaggaag tttacgtctc
tcttgtgctg tgtctggctt caccttctcc aattacgga tggctgggt cagacaagca
cctggaaaag gtcttgaatg ggtggcctat attgactctg acggggacaa cacctactat
cgggattccg tgaaaggacg cttcacaatc tcccagagata acgccaagag ctcaactgtac
ctgcagatga atagcctgag agccgaggat actgccgtgt actattgcac aacgggaatc
gttaggcctt ttctgtactg gggacagggc accttgggtta ctgtctcgag cgcttctaca
aagggcccat cgggtcttccc cctggcaccc tctccaaga gcacctctgg gggcacagcg
gccctgggct gcctgggtcaa ggactacttc cccgaaccgg tgacgggtgtc gtggaactca
ggcgccctga ccagcggcgt gcacaccttc cgggctgtcc tacagtcctc aggactctac
tccctcagca gcgtgggtgac cgtgccctcc agcagcttgg gcacccagac ctacatctgc
aacgtgaatc acaagcccag caacaccaag gtcgacaaga aagttggtga gaggccagca
cagggaggga ggtgtgtgc tggaaagccag gtcagcgtc cctgcctgga cgcattccgg
ctatgcagcc ccagtccagg gcagcaaggc agggcccgtc tgcctcttca cccggaggcc
tctgcccgc cactcatgc tcaggagag ggtcttctgg ctttttccc aggctctggg
caggcacagg ctaggtgccc ctaaccagg cctgcacac aaaggggcag gtgctgggt
cagacctgcc aagagccata tccgggagga cctgcccct gacctaaagg caccocaaag
gccaaactct cactccctc agctcggaca cttctctcc tcccagatct gagtaactcc
caatcttctc tctgcagagc ccaaactctt tgacaaaact cacacatgcc caccgtgccc
aggtaagcca gccaggcct cggcctccag ctcaaggcgg gacaggtgcc ctagagtagc
ctgcatccag ggacaggccc cagccgggtg ctgacacgtc cacctccatc tcttctcag
cacctgaact cctgggggga ccgtcagctc tctcttccc cccaaaaccc aaggacaccc
tcatgatctc ccggaccctc gaggtcacat gcgtgggtgt ggacgtgagc cacgaagacc
ctgaggtcaa gttcaactgg tacgtggacg gcgtggaggt gcataatgcc aagacaaagc
cgcgggagga gcagtacaac agcacgtacc gtgtgggtcag cgtcctcacc gtctgcacc
aggactggct gaatggcaag gagtacaagt gcaaggtctc caacaaagcc ctcccagccc
ccatcgagaa aaccatctcc aaagccaaag gtgggaccg tgggtgtcga gggccacatg
gacagaggcc ggctcggccc accctctgcc ctgagagtga ccgctgtacc aacctctgtc
cctacagggc agccccgaga accacagggtg tacaccctgc cccatccccg ggatgagctg
accaagaacc aggtcagcct gacctgcctg gtcaaaggct tctatcccag cgacatcgcc
gtggagtggg agagcaatgg gcagccggag acaactaca agaccacgcc tccgtgtgtg
gactccgacg gctccttctt cctctacagc aagctcaccg tggacaagag caggtggcag
caggggaacg tcttctcatg ctccgtgatg catgaggctc tgcacaacca ctacacgcag
aagagcctct cctgtctcc gggtaaa

Figure 1U

1519gH20 IgG1 heavy chain (V + human gamma-1 constant) with signal sequence
underlined and italicized SEQ ID NO: 74

atggaatgga gctgggtcctt tctcttcttc ctgtcagtaa ctacaggagt ccattctgag
gtaccacttg tggaaagcgg aggaggtcctt gtgcagcctg gaggaagttt acgtctctct
tgtgctgtgt ctggcttcac cttctccaat tacggaatgg tctgggtcag acaagcacct
ggaaagggtc ttgaatgggt ggcctatatt gactctgacg gggacaacac ctactatcgg
gattccgtga aaggacgctt cacaatctcc cgagataacg ccaagagctc actgtacctg
cagatgaata gcctgagagc cgaggataact gccgtgtact attgcacaac gggaaatcgtt
aggccttttc tgtactgggg acagggcacc ttggttactg tctcgagcgc ttctacaaag
ggcccatcgg tcttccccct ggcaccctcc tccaagagca cctctggggg cacagcggcc
ctgggctgcc tgggtcaagga ctacttcccc gaaccggtga cgggtgctgtg gaactcaggc
gccctgacca gcggcgtgca caccttcccc gctgtcctac agtcctcagg actctactcc
ctcagcagcg tggtgaccgt gccctccagc agcttgggca ccagaccta catctgcaac
gtgaatcaca agcccagcaa caccaaggctc gacaagaaag ttggtgagag gccagcacag
ggagggaggg tgtctgctgg aagccaggct cagcgtcctt gcctggacgc atcccggcta
tgcagcccca gtccagggca gcaaggcagg ccccgctctgc ctcttcaccc ggaggcctct
gcccgcccc ctcatgctca gggagaggggt cttctggctt tttccccagg ctctgggcag
gcacaggcta ggtgccccta acccaggccc tgcacacaaa ggggcagggtg ctgggctcag
acctgccaa agccatatcc gggaggacc tgcccctgac ctaagcccac cccaaaggcc
aaactctcca ctcccctcagc tcggacacct tctctcctcc cagatctgag taactcccaa
tcttctctct gcagagccca aatcttgtga caaaactcac acatgccac cgtgcccagg
taagccagcc caggcctcgc cctccagctc aaggcgggac aggtgcccta gagtagcctg
catccaggga caggccccag cggggtgctg acacgtccac ctccatctct tcctcagcac
ctgaactcct ggggggaccg tcagtcttcc tcttcccccc aaaaccaag gacacctca
tgatctcccg gaccctgag gtcacatgcg tgggtggtgga cgtgagccac gaagacctg
aggtcaagtt caactggtac gtggacggcg tggaggtgca taatgccaag acaaagccgc
gggaggagca gtacaacagc acgtaccgtg tggtcagcgt cctcaccgtc ctgcaccagg
actggctgaa tggcaaggag tacaagtgca aggtctccaa caaagccctc ccagcccca
tcgagaaaac catctccaaa gccaaagggtg ggaccctggg ggtgcgaggg ccacatggac
agaggccggc tcggcccacc ctctgccctg agagtgaccg ctgtaccaac ctctgtccct
acagggcagc cccgagaacc acaggtgtac accctgcccc catcccggga tgagctgacc
aagaaccagg tcagcctgac ctgcctgggtc aaaggcttct atcccagcga catcgccgtg
gagtgggaga gcaatgggca gccggagaac aactacaaga ccacgcctcc cgtgctggac
tccgacggct ccttcttccct ctacagcaag ctcaccgtgg acaagagcag gtggcagcag
gggaacgtct tctcatgctc cgtgatgcat gaggctctgc acaaccacta cacgcagaag
agcctctccc tgtctccgggtaaa

Figure 1V

1519 gL20 light chain (V + constant, mammalian expression alternative) SEQ ID NO: 75

```

gatatccaga tgacccagag cccatctagc ttatccgctt ccgttggtga
tcgcgtgaca attacgtgta agagctccca atctctcgtg ggtgcaagtg
gcaagaccta tctgtactgg ctctttcaga agcctggcaa ggcacaaaaa
cggctgatct atctgggtgc tacccttgac tctgggatac cgtcacgatt
ttccggatct gggagcggaa ctgagttcac actcacgatt tcatcgctgc
aacccgagga ctttgctacc tactactgcc tgcaaggcac tcatttccct
cacactttcg gccaggggac aaaactcgaa atcaaacgta cggtagcggc
cccattctgtc ttcatcttcc cgccattctga tgagcagttg aaatctggaa
ctgcctctgt tgtgtgcctg ctgaataact tctatcccag agaggccaaa
gtacagtggg aggtggataa cgccctccaa tcgggtaact ccaggagag
tgtcacagag caggacagca aggacagcac ctacagcctc agcagcacc
tgacgctgag caaagcagac tacgagaaac acaaagtcta cgctgcgaa
gtcaccatc agggcctgag ctgcgccgtc acaaagagct tcaacagggg agagtgt

```

1519gH20 Fab' heavy chain (V + human gamma-1 CH1 + hinge, mammalian expression one base change from SEQ ID NO: 38) SEQ ID NO: 76

```

gaggtaccac ttgtggaaaag cggaggaggt cttgtgcagc ctggagggaag
tttacgtctc tcttgtgctg tgtctggctt caccttctcc aattacggaa
tggtctgggt cagacaagca cctggaaaagg gtcttgaatg ggtggcctat
attgactctg acggggacaa cacctactat cgggattccg tgaaaggacg
cttcacaate tcccagagata acgccaagag ctactgtac ctgcagatga
atagcctgag agccgaggat actgccgtgt actattgcac aacgggaatc
gttaggcctt ttctgtactg gggacagggc accttggtta ctgtctcgag
cgcttctaca aaggggccat cgggtcttccc cctggcacc cctccaaga
gcacctctgg gggcacagcg gccctgggct gcctgggtcaa ggactacttc
cccgaaccgg tgacgggtgc gtggaactca ggcgccctga ccagcggcgt
gcacaccttc ccggctgtcc tacagtcttc aggactctac tccctcagca
gcgtgggtgac cgtgccctcc agcagcttgg gcaccagac ctacatctgc
aacgtgaatc acaagcccag caacaccaag gtggacaaga aagttgagcc
caaatcttgt gacaaaactc acacatgcgc cgcg

```

1519 gH20 Fab' heavy chain with signal sequence underlined and italicized (mammalian expression one base changed from SEQ ID NO: 42) SEQ ID NO: 77

```

atggaatgga gctgggtctt tctcttcttc ctgtcagtaa ctacaggagt
ccattctgag gtaccacttg tggaaagcgg aggaggtctt gtgcagcctg
gaggaagtgt acgtctctct tgtgctgtgt ctggcttcac cttctccaat
tacggaatgg tctgggtcag acaagcacct ggaaagggtc ttgaatgggt
ggcctatatt gactctgacg gggacaacac ctactatcgg gattccgtga
aaggacgctt cacaatctcc cgagataacg ccaagagctc actgtacctg
cagatgaata gcctgagagc cgaggatact gccgtgtact attgcacaac
gggaatcggt aggccttttc tgtactgggg acagggcacc ttggttactg
tctcgagcgc ttctacaaag ggcccatcgg tcttccccct ggcaccctcc
tccaagagca cctctggggg cacagcggcc ctgggctgcc tggtaagga
ctacttcccc gaaccggtga cgggtgtcgtg gaactcaggc gccctgacca
gcggcgtgca caccttcccg gctgtcctac agtcctcagg actctactcc
ctcagcagcg tggtgaccgt gccctccagc agcttgggca ccagaccta
catctgcaac gtgaatcaca agcccagcaa caccaagggtg gacaagaaag
ttgagcccaa atcttgtgac aaaactcaca catgcgccgc g

```

Figure 1W

1519gL20 FabFv light chain (alternative sequence to SEQ ID NO: 46) SEQ ID NO: 78

```

DIQMTQSPSS LSASVGDRVT ITCKSSQSLV GASGKTYLYW LFQKPGKAPK
RLIYLVSTLD SGIPSRFSGS GSGTEFTLTI SSLQPEDFAT YYCLQGTHFP
HTFGQGTKLE IKRTVAAPSV FIFPPSDEQL KSGTASVVCL LNNFYPREAK
VQWKVDNALQ SGNSQESVTE QDSKDSTYSL SSTLTLSKAD YEKHKVYACE
VTHQGLSSPV TKSFNRGECG GGGSGGGGSG GGGSDIQMTQ SPSSVSASVG
DRVITITCQSS PSVWSNFLSW YQOKPGKAPK LLIYEASKLT SGVPSRFSGS
GGGTDFTLTI SSLQPEDFAT YYCGGGYSSI SDTTFGCGTK VEIKRT

```

1519gL20 FabFv light chain (alternative sequence to SEQ ID NO: 47) SEQ ID NO: 79

```

gacatccaga tgacccagtc cccctccagc ctgtccgcct ccgtggggcga
cagagtgacc atcacatgca agtcctccca gtccctggtc ggagcctccg
gcaagaccta cctgtactgg ctggtccaga agccccgcaa ggcccccaag
cggctgatct acctggtgtc taccctggac tccggcatcc cctcccgggtt
ctccggctct ggctctggca ccgagttcac cctgaccatc tccagcctgc
agcccagagg cttcgccacc tactactgtc tgcaaggcac ccacttcccc
cacaccttcg gccagggcac caagctggaa atcaagcgga ccgtagcggc
cccattctgtc ttcattcttc cgccatctga tgagcagttg aaatctggaa
ctgcctctgt tgtgtgcctg ctgaataact tctatcccag agaggccaaa
gtacagtggg aggtggataa cgccctccaa tcgggtaact ccagggagag
tgtcacagag caggacagca aggacagcac ctacagcctc agcagcacc
tgacgctgag caaagcagac tacgagaaac acaaagtcta cgcctgcgaa
gtcacccatc agggcctgag ctgcgccgtc acaaagagct tcaacagggg
agagtgtggt ggaggtggct ctggcggtgg tggctccgga ggcgaggaa
gacagatcca gatgaccag agcccttcct ctgtaagcgc cagtgtcggg
gacagagtga ctattacctg ccaaagctcc ctttcagtct ggtccaattt
tctatcctgg tatcagcaaa agccccgaaa ggctcctaaa ttgctgatct
acgaagcaag caaactcacc agcggcgtgc ccagcaggtt cagcggcagt
gggtctggaa ctgactttac cctgacaatc tcctcactcc agccccagga
cttcgccacc tattactgcg gtggagggtta cagtagcata agtgatacga
catttggatg cggcactaaa gtggaaatca agcgtacc

```

FIGURE 1X

1519gH20 FabFv heavy chain (alternative sequence to SEQ ID NO: 51) SEQ ID NO: 80

```

gaggtgcccc tgggtggaatc tggcggcgga ctggtgcagc ctggcggctc
cctgagactg tcttgcgccg tgtccggctt caccttctcc aactacggca
tgggtctgggt ccgacaggct cctggcaagg gactggaatg ggtggcctac
atcgactccg acggcgacaa cacctactac cgggactccg tgaagggccg
gttcaccatc tcccgggaca acgccaagtc ctccctgtac ctgcagatga
actccctgcg ggccgaggac accgccgtgt actactgcac caccggcatc
gtgcggccct ttctgtactg gggccagggc accctgggtca ccgtgtcctc
tgcttctaca aagggcccat cgggtcttccc cctggcaccc tcctccaaga
gcacctctgg gggcacagcg gccctgggct gcctgggtcaa ggactacttc
cccgaaccgg tgacgggtgtc gtggaactca ggcgcctga ccagcggcgt
gcacaccttc ccggctgtcc tacagtcttc tggactctac tccctcagca
gcgtggtgac cgtgccctcc agcagcttgg gcacccagac ctacatctgc
aacgtgaatc acaagcccag caacaccaag gtggacaaga aagttgagcc
caaatcttgt tccggagggtg gcggttccgg aggtggcggg acaggtggcg
gtgggtccga agtccagctg cttgaatccg gaggcggact cgtgcagccc
ggaggcagtc ttcgcttgtc ctgcgctgta tctggaatcg acctgagcaa
ttacgccatc aactgggtga gacaggcacc tgggaaatgc ctggaatgga
tcggcattat atgggctagt gggacgacct tttatgtac atgggcgaag
ggtagattca caatctcacg ggataatagt aagaacacag tgtacctgca
gatgaactcc ctgcgagcag aggataccgc cgtttactat tgtgctcgca
ctgtcccagg ttatagcact gcaccctact ttgatctgtg ggggcagggc
actctggtca ccgtctcgtc c

```

Figure 1Y (signal sequences underlined and italicised)

Rat Ab 1548 VL region (alternative sequence to SEQ ID NO: 58) SEQ ID NO: 81

DVVMTQTPLS LSVAIGQPAS ISSKSSQSLV GAGGKTYLYW LLQRSGQSPK
 RLIYLVSTLD SGIPDRFSGS GAETDFTLKI RRVEADDLGV YYCLQGTHFP
 HTFGAGTNLE IK

Rat Ab 1548 VL region (alternative sequence to SEQ ID NO: 59) SEQ ID NO: 82

gatgttggtga tgacccagac tccactgtct ttgtcgggtg ccattggaca
 accagcctcc atctcttcta agtcaagtca gagcctcgta ggtgctggtg
 gaaagacata tttgtattgg ttattacaga ggtccggcca gtctccaaag
 cgactaatct atctggtgtc cacactggac tctggaattc ctgatagggt
 cagtggcagt ggagcagaga cagattttac tcttaaaatc cgcagagtgg
 aagccgatga tttgggagtt tattactgct tgcaagggtac acattttcct
 cacacgtttg gagctgggac caacctggaa ataaaa

Rat Ab 1548 VH region (alternative sequence to SEQ ID NO: 60) SEQ ID NO: 83

EVPLVESGGG SVQPGRSMKL SCVVSGFTFS NYGMVWVRQA PKKGLEWVAY
 IGSDGDNTYY RDSVKGRFTI SRNNAKSTLY LQMDSLRSED TATYYCTTGI
 VRPFLYWGGG VMVTVS

Rat Ab 1548 VH region (alternative sequence to SEQ IS NO: 61) SEQ ID NO: 84

gaggtgccgc tggtggagtc tgggggaggc tcagtgcagc ctgggaggtc
 catgaaactc tcctgtgtag tctcaggatt cactttcagt aactatggca
 tggtctgggt ccgccaggct ccaaagaagg gtctggagtg ggtcgcatat
 attggttctg atggtgataa tacttactac cgagattccg tgaagggccg
 attcactatc tccagaaata atgcaaaaag caccctatat ttgcaaatgg
 acagtctgag gtctgaggac acggccactt attactgtac aacagggatt
 gtccggccct ttctctactg gggccaagga gtcatgggtca cagtctcg

Figure 1Z

1519gH20 IgG1 heavy chain (V + human gamma-1 constant, exons underlined one base change to SEQ ID NO: 71) SEQ ID NO: 85

gaggtaccac ttgtggaaag cggaggaggt cttgtgcagc ctggaggaag tttacgtctc
tcttgtgctg tgtctggcctt caccttctcc aattacgga tggctctgggt cagacaagca
cctggaaagg gtcttgaatg ggtggcctat attgactctg acggggacaa cacctactat
cgggattccg tgaaaggacg cttcacaatc tcccagata acgccaagag ctactgtac
ctgcagatga atagcctgag agccgaggat actgccgtgt actattgcac aacgggaatc
gttaggcctt ttctgtactg gggacagggc accttgggta ctgtctcgag cgcttctaca
aagggcccat cggctctccc cctggcacc cctccaaga gcacctctgg gggcacagcg
gccctgggct gcctgggtcaa ggactacttc cccgaaccgg tgacgggtgtc gtggaaactc
ggcgccctga ccagcggcgt gcacaccttc cgggctgtcc tacagtccctc aggactctac
tccctcagca gcgtgggtgac cgtgccctcc agcagcttgg gcaccagac ctacatctgc
aacgtgaatc acaagcccag caacaccaag gtggacaaga aagtgggtga gaggccagca
cagggaggga ggggtgtctgc tggagccag gctcagcgt cctgcctgga cgcattccgg
ctatgcagcc ccagtccagg gcagcaaggc agggcccgtc tgcctcttca cccggaggcc
tctgcccgcc ccaactcatgc tcaggagag ggtcttctgg ctttttcccc aggcctctggg
caggcacagg ctaggtgcc ctaaccagg cctgcacac aaaggggcag gtgctgggct
cagacctgcc aagagccata tccgggagga cctgcccct gacctaaagg caccctaaag
gccaaactct ccaactccctc agctcggaca cttctctcc tcccagatct gagtaactcc
caatcttctc tctgcagagc ccaaactctg tgacaaaact cacacatgcc caccgtgcc
aggtaagcca gcccaggcct cgcctccag ctcaaggcgg gacaggtgcc ctagagtagc
ctgcatccag ggacaggccc cagccgggtg ctgacacgtc caccctccatc tcttccctcag
cacctgaact cctgggggga ccgtcagctc tctcttctcc cccaaaaccc aaggacaccc
tcatgatctc ccggaccct gaggtcacat gcgtgggtgt ggacgtgagc cacgaagacc
ctgaggtcaa gttcaactgg tacgtggacg gcgtggaggt gcataatgcc aagacaaagc
cgcgaggaga gcagtacaac agcacgtacc gtgtgggtcag cgtcctcacc gtctgcacc
aggactggct gaatggcaag gactacaagt gcaaggtctc caacaaagcc ctcccagccc
ccatcgagaa aaccatctcc aaagccaaag gtgggaccgg tggggtgcga gggccacatg
gacagaggcc ggctcggccc accctctgcc ctgagagtga ccgctgtacc aacctctgtc
cctacagggc agccccgaga accacagggtg tacaccctgc ccccatcccc ggatgagctg
accaagaacc aggtcagcct gacctgctg gtcaaaggct tctatcccag cgacatcgcc
gtggagtggg agagcaatgg gcagccggag aacaactaca agaccacgcc tcccgtgctg
gactccgacg gctccttctt cctctacagc aagctcaccg tggacaagag caggtggcag
caggggaacg tcttctcatg ctccgtgatg catgaggctc tgacacaacca ctacacgcag
aagagcctct ccctgtctcc gggtaaa

Figure 1AA

1519gH20 IgG1 heavy chain (V + human gamma-1 constant) with signal sequence
underlined and italicized (one base change from SEQ ID NO:72) SEQ ID NO: 86

atggaatgga gctgggtctt tctcttcttc ctgtcagtaa ctacaggagt ccattctgag
gtaccacttg tggaaagcgg aggaggtctt gtgcagcctg gaggaagttt acgtctctct
tgtgctgtgt ctggcttcac cttctccaat tacggaatgg tctgggtcag acaagcacct
ggaaagggtc ttgaatgggt ggcctatatt gactctgacg gggacaacac ctactatcgg
gattccgtga aaggacgctt cacaatctcc cgagataacg ccaagagctc actgtacctg
cagatgaata gcctgagagc cgaggatact gccgtgtact attgcacaac gggaatcggt
aggccttttc tgtactgggg acagggcacc ttggttactg tctcgagcgc ttctacaaag
ggcccatcgg tcttccccct ggcaccctcc tccaagagca cctctggggg cacagcggcc
ctgggctgcc tgggtcaagga ctacttcccc gaaccggtga cgggtgcgtg gaactcaggc
gccctgacca gcggcggtga caccttcccc gctgtcctac agtcctcagg actctactcc
ctcagcagcg tggtgaccgt gccctccagc agcttgggca ccagaccta catctgcaac
gtgaatcaca agcccagcaa caccaagggtg gacaagaaag ttggtgagag gccagcacag
ggagggaggg tgtctgctgg aagccaggct cagcgtcctt gcctggacgc atcccggcta
tgacgcccc gtccagggca gcaaggcagg ccccgctctgc ctcttcaccc ggaggcctct
gcccgcccc ctcatgctca gggagagggg cttctggctt tttccccagg ctctgggcag
gcacaggcta ggtgccccta acccaggccc tgcacacaaa ggggcagggtg ctgggctcag
acctgccaa agccatatcc gggaggaccc tgcccctgac ctaagccac cccaaaggcc
aaactctcca ctccctcagc tcggacacct tctctcctcc cagatctgag taactcccaa
tcttctctct gcagagccca aatcttgtga caaaactcac acatgcccac cgtgcccagg
taagccagcc caggcctcgc cctccagctc aaggcgggac aggtgcccta gagtagcctg
catccaggga caggccccag cggggtgctg acacgtccac ctccatctct tccctcagac
ctgaactcct ggggggaccg tcagtcttcc tcttcccccc aaaacccaag gacaccctca
tgatctccc gaccctgag gtcacatgcg tgggtggtga cgtgagccac gaagacctg
aggtcaagtt caactggtac gtggacggcg tggaggtgca taatgccaa acaaagccgc
gggaggagca gtacaacagc acgtaccgtg tggtcagcgt cctcaccgtc ctgcaccagg
actggctgaa tggcaaggag tacaagtga aggtctccaa caaagccctc ccagccccca
tcgagaaaac catctccaaa gccaaagggtg ggaccctggg ggtgagagg ccacatggac
agaggccggc tcggcccacc ctctgcctg agagtgaccg ctgtaccaac ctctgtccct
acagggcagc cccgagaacc acaggtgtac accctgcccc catcccgga tgagctgacc
aagaaccagg tcagcctgac ctgcctggtc aaaggcttct atcccagcga catcgccgtg
gagtgggaga gcaatgggca gccggagaac aactacaaga ccacgcctcc cgtgctggac
tccgacggct ccttcttctt ctacagcaag ctaccgtgg acaagagcag gtggcagcag
gggaacgtct tctcatgctc cgtgatgcat gaggctctgc acaaccacta cagcagaag
agcctctccc tgtctccgggtaaa

1519gH20 IgG4 heavy chain (V + human gamma-4 constant no P mutations) SEQ ID NO: 87

EVPLVESGGG LVQPGGSLRL SCAVSGFTFS NYGMVWVRQA PGKGLEWVAY
IDSDGDNTRY RDSVKGRFTI SRDNAKSSLY LQMNSLRAED TAVYYCTTGI
VRPFLYWQGG TLVTVSSAST KGPSVFPLAP CSRSTSESTA ALGCLVKDYF
PEPVTVSWNS GALTSGVHTF PAVLQSSGLY SLSSVTVPS SSLGKTYTC
NVDHKPSNTK VDKRVESKYG PPCPSCPAPF FLGGPSVFLF PPKPKDTLMI
SRTPEVTCVV VDVSQEDPEV QFNWYVDGVE VHNAKTKPRE EQFNSTYRVV
SVLTVLHQDW LNGKEYKCKV SNKGLPSSIE KTISKAKGQP REPQVYTLPP
SQEEMTKNQV SLTCLVKGFY PSDIAVEWES NGQPENNYKT TPPVLDSDGS
FFLYSRLTVD KSRWQEGNVF SCSVMHEALH NHYTKQSLSL SLGK

Figure 1BB

1519gH20 IgG4 heavy chain (V + human gamma-4 constant, exons underlined no P mutations) SEQ ID NO: 88

gaggtaccac ttgtggaaag cggaggaggt cttgtgcagc ctggaggaag
tttacgtctc tcttgtgctg tgtctggctt caccttctcc aattacggaa
tggctctgggt cagacaagca cctggaaagg gtcttgaatg ggtggcctat
attgactctg acggggacaa cacctactat cgggattccg tgaaaggacg
cttcacaatc tcccagagata acgccaagag ctactgtac ctgcagatga
atagcctgag agccgaggat actgccgtgt actattgcac aacgggaatc
gttaggcctt ttctgtactg gggacagggc accttgggta ctgtctcgag
cgcttctaca aagggcccat cegtcttccc cctggcgccc tgctccagga
gcacctccga gagcacagcc gccctgggct gcctgggtaa ggactacttc
cccgaaccgg tgacgggtgtc gtggaactca ggcgcctga ccagcggcgt
gcacaccttc ccggtgttcc tacagtcttc aggactctac tccctcagca
gcgtgggtgac cgtgccctcc agcagcttgg gcacgaagac ctacacctgc
aacgtagatc acaagcccag caacaccaag gtggacaaga gaggttgggta
gaggccagca cagggagggg ggggtgtctgc tggaagccag gctcagccct
cctgcctgga cgcaccccggt ctgtgcagcc ccagcccagg gcagcaaggc
atgccccatc tgtctcttca cccggaggcc tctgaccacc ccaactcatgc
ccagggagag ggtcttcttg atttttccac caggctccgg gcagccacag
gctggatgcc cctaccccag gccctgcgca tacaggggca ggtgctgcgc
tcagacctgc caagagccat atccgggagg accctgcccc tgacctaaag
ccaccccaaa ggccaaactc tccactccct cagctcagac acctctctc
ctcccagatc tgagtaactc ccaatcttct ctctgcagag tccaaatatg
gtcccccatg cccatcatgc ccaggtaagc caaccacagg ctcgcccctc
agctcaaggc gggacaggtg ccctagagta gcctgcatcc agggacaggc
cccagccggg tgctgacgca tccacctcca tctcttctc agcacctgag
ttcctggggg gaccatcagt ctctctgttc cccccaaaac ccaaggacac
tctcatgac tcccggaccc ctgaggtcac gtgcgtgggtg gtggacgtga
gccaggaaga ccccgaggtc cagttcaact ggtacgtgga tggcgtggag
gtgcataatg ccaagacaaa gccgcgggag gagcagttca acagcacgta
ccgtgtgggtc agcgtcctca ccgtcctgca ccaggactgg ctgaacggca
aggagtacaa gtgcaaggtc tccaacaaag gcctcccgtc ctccatcgag
aaaaccatct ccaaagccaa aggtgggacc cacgggggtgc gagggccaca
tggacagagg tcagctcggc ccacctctg ccctgggagt gaccgctgtg
ccaacctctg tccctacagg gcagccccga gagccacagg tgtacacctt
cccccatcc caggaggaga tgaccaagaa ccaggtcagc ctgacctgcc
tgggtcaaagg ctctacccc agcgacatcg ccgtggagtg ggagagcaat
gggcagccgg agaacaacta caagaccacg cctcccgtgc tggactccga
cggctccttc ttctcttaca gcaggctaac cgtggacaag agcaggtggc
aggaggggaa tgtcttctca tgctccgtga tgcattgagg tctgcacaac
cactacacac agaagagcct ctccctgtct ctgggtaaa

Figure 1CC

1519gH20 IgG4 heavy chain (V + human gamma-4 constant) with signal sequence
underlined and italicised– no P mutation SEQ ID NO: 89

atggaatgga gctgggtctt tctcttcttc ctgtcagtaa ctacaggagt
ccattctgag gtaccacttg tggaaagcgg aggaggtctt gtgcagcctg
gaggaagttt acgtctctct tgtgctgtgt ctggcttcac cttctccaat
tacggaatgg tctgggtcag acaagcacct ggaaagggtc ttgaatgggt
ggcctatatt gactctgacg gggacaacac ctactatcgg gattccgtga
aaggacgctt cacaatctcc cgagataacg ccaagagctc actgtacctg
cagatgaata gcctgagagc cgaggatact gccgtgtact attgcacaac
gggaatcgtt aggccttttc tgtactgggg acagggcacc ttggttactg
tctcgagcgc ttctacaaag ggcccatccg tcttccccct ggcgccctgc
tccaggagca cctccgagag cacagccgcc ctgggctgcc tggatcaagga
ctacttcccc gaaccgggtga cgggtgtcgtg gaactcaggc gccctgacca
gcggcgtgca caccttcccg gctgtcctac agtcctcagg actctactcc
ctcagcagcg tggtgaccgt gccctccagc agcttgggca cgaagacctt
cacctgcaac gtagatcaca agcccagcaa caccaagggtg gacaagagag
ttgggtgagag gccagcacag ggaggagggt tgtctgctgg aagccaggct
cagccctcct gcctggacgc accccggctg tgcagcccca gccaggggca
gcaaggcatg ccccatctgt ctctcaccg ggaggcctct gaccaccca
ctcatgcccc gggagagggt cttctggatt tttccaccag gctccgggca
gccacaggct ggatgcccct accccaggcc ctgcgcatatc aggggcagggt
gctgcgctca gacctgcaa gagccatctc cgaggaggacc ctgcccctga
cctaagcccc ccccaaaggc caaactctcc actccctcag ctcacacacc
ttctctcctc ccagatctga gtaactcca atcttctctc tgcagagtcc
aaatatgggtc ccccatgccc atcatgccc ggtaagccaa cccaggcctc
gccctccagc tcaaggcggg acagggtgcc tagagtagcc tgcattccagg
gacaggcccc agccgggtgc tgacgcatcc acctccatct cttctcagc
acctgagttc ctggggggac catcagtctt cctgttcccc caaaaccca
aggacactct catgatctcc cggacccttg aggtcacgtg cgtgggtggtg
gacgtgagcc aggaagacct cgagggtccag ttcaactggg acgtggatgg
cgtggagggtg cataatgcca agacaaagcc gcgggaggag cagttcaaca
gcacgtaccg tgtggtcagc gtcctcaccg tctgcacca ggactggctg
aacggcaagg agtacaagtg caagggtctcc aacaaaggcc tcccgtctc
catcgagaaa accatctcca aagccaaagg tgggaccac ggggtgcgag
ggccacatgg acagaggcca gctcggccca cctctgccc tgggagtgc
cgctgtgcca acctctgtcc ctacagggca gcccagagag ccacagggtg
acaccctgcc cccatcccag gaggagatga ccaagaacca ggtcagcctg
acctgacctg tcaaaggctt ctacccagc gacatcgccg tggagtggga
gagcaatggg cagccggaga acaactaca gaccacgcct cccgtgctgg
actccgacgg ctcttctctc ctctacagca ggctaaccgt ggacaagagc
aggtggcagg aggggaatgt cttctcatgc tccgtgatgc atgaggctct
gcacaaccac tacacacaga agagcctctc cctgtctctg ggtaaa

Figure 1DD

1519 gL20 V-region (mammalian expression alternative to SEQ ID NO: 17) SEQ ID NO: 90

```
gacatccaga tgaccagtc cccctccagc ctgtccgcct ccgtgggaga
cagagtgacc atcacatgca agtcctccca gtccctggtc ggagcctccg
gcaagaccta cctgtactgg ctgttccaga agcccggcaa ggcccccaag
cggctgatct acctgggtgtc taccctggac tccggcatcc cctcccgggtt
ctccggctct ggctctggca ccgagttcac cctgaccatc tccagcctgc
agcccagaga cttcgccacc tactactgtc tgcaaggcac ccacttcccc
cacaccttcg gccagggcac caagctggaa atcaag
```

1519 gL20 light chain (V + constant, mammalian expression alternative to SEQ ID NO: 24) SEQ ID NO: 91

```
gacatccaga tgaccagtc cccctccagc ctgtccgcct ccgtgggaga
cagagtgacc atcacatgca agtcctccca gtccctggtc ggagcctccg
gcaagaccta cctgtactgg ctgttccaga agcccggcaa ggcccccaag
cggctgatct acctgggtgtc taccctggac tccggcatcc cctcccgggtt
ctccggctct ggctctggca ccgagttcac cctgaccatc tccagcctgc
agcccagaga cttcgccacc tactactgtc tgcaaggcac ccacttcccc
cacaccttcg gccagggcac caagctggaa atcaagcgga ccgtggccgc
tccctccgtg ttcattctcc caccctccga cgagcagctg aagtccggca
ccgcctccgt cgtgtgcctg ctgaacaact tctacccccg cgaggccaag
gtgcagtggg aggtggacaa cgccctgcag tccggcaact ccaggaatc
cgtcaccgag caggactcca aggacagcac ctactccctg tcctccaccc
tgaccctgtc caaggccgac tacgagaagc acaagggtgta cgctgcgaa
gtgaccaccc agggcctgtc cagccccgtg accaagtcct tcaaccgggg
cgagtgc
```

Figure 1EE

1519 gH20 V-region (mammalian expression alternative to SEQ ID NO: 31) SEQ ID NO: 92

```
gaggtgcccc tgggtggaatc tggcggcgga ctggtgcagc ctggcggctc
cctgagactg tcttgcgccg tgtccggctt caccttctcc aactacggca
tggctctgggt ccgacaggct cctggcaagg gactggaatg ggtggcctac
atcgactccg acggcgacaa cacctactac cgggactccg tgaagggccg
gttcaccatc tcccgggaca acgccaagtc ctccctgtac ctgcagatga
actccctgcg ggccgaggac accgccgtgt actactgcac caccggcatc
gtgcggccct ttctgtactg gggccagggc accctgggtca ccgtgtcc
```

Figure 1FF

1519gH20 IgG4 heavy chain (V + human gamma-4P constant alternative to
SEQ ID NO: 44) SEQ ID NO: 93

```

gaggtgcccc tgggtggaate tggcgggcggga ctggtgcagc ctggcggetc
cctgagactg tcttgccgccc tgtccggcctt caccttctcc aactacggca
tgggtctgggt cgcacaggct cctggcaagg gactggaatg ggtggcctac
atcgactccg acggcgacaa cacctactac cgggactccg tgaagggccg
gttcaccatc tcccgggaca acgccaagtc ctccctgtac ctgcagatga
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gtgcggccct ttctgtactg gggccagggc accctgggtca ccgtgtcctc
tgccctccacc aagggccccc cctgtgtccc tctggccccc tgctcccggg
ccacctccga gtctaccgcc gctctgggct gcctgggtcaa ggactacttc
cccagagccc tgacagtgtc ctggaactct ggccgcccga cctccggcgt
gcacaccttc cctgccgtgc tgcagtcttc cggcctgtac tcctgtcct
ccgtcgtgac cgtgccctcc tccagcctgg gcaccaagac ctacacctgt
aacgtggacc acaagccctc caacaccaag gtggacaagc ggggtggaatc
taagtaaggc cctccctgcc ccccccgtccc tgcccccgtgaa tttctggggc
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tcccggaccc ccgaagtgc ctgctgtgtg gtggacgtgt cccaggaaga
tcccagagtc cagttcaatt ggtacgtgga cggcgtggaa gtgcacaatg
ccaagaccaa gccagagag gaacagttca actccacctc ccgggtgggtg
tccgtgctga ccgtgctgca ccaggactgg ctgaacggca aagagtacaa
gtgcaagggtg tccaacaagg gcctgccctc cagcatcgaa aagaccatct
ccaaggccaa gggccagccc cgcgagcccc aggtgtacac cctgccccct
agccaggaag agatgaccaa gaaccagggtg tcctgacct gtctggtcaa
gggcttctac ccctccgaca ttgccgtgga atgggagtcc aacggccagc
ccgagaacaa ctacaagacc accccccctg tgctggacag cgacggctcc
ttcttctctgt actctcggct gaccgtggac aagtcccggg ggcaggaagg
caacgtcttc tcctgctccg tgatgcacga ggccctgcac aaccactaca
cccagaagtc cctgtccctg agcctgggca ag

```

Human β 2M (SEQ ID NO: 95)

IQKTPQIQVYSRHPENGKPNFLNCYVSQFHPPQIEILLKNGKKIPNIEMSDLSFSKDWSFYILAHTFTPTETDVYA
CRVKHVTLEPKVTWDRDM

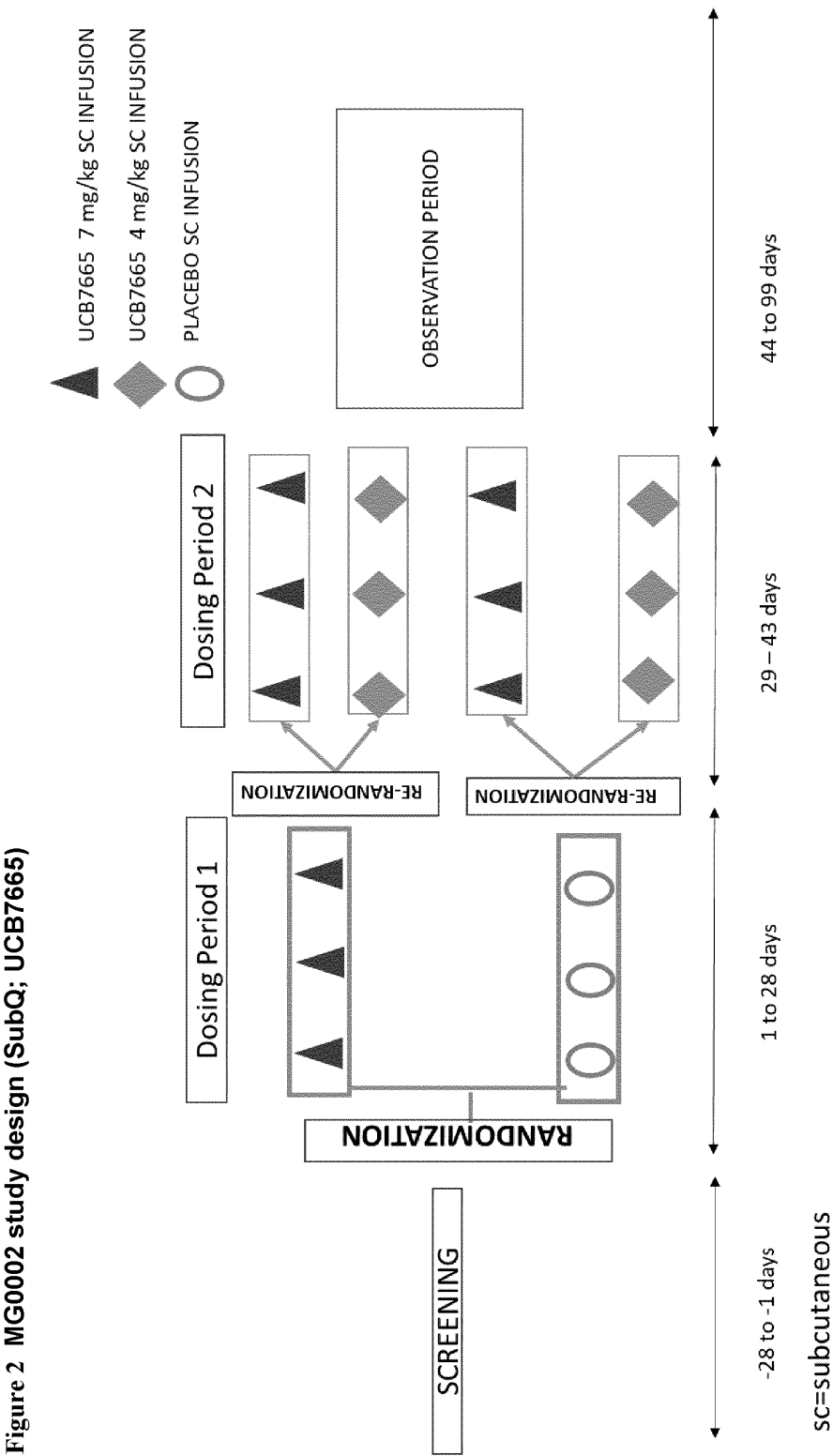


Figure 3

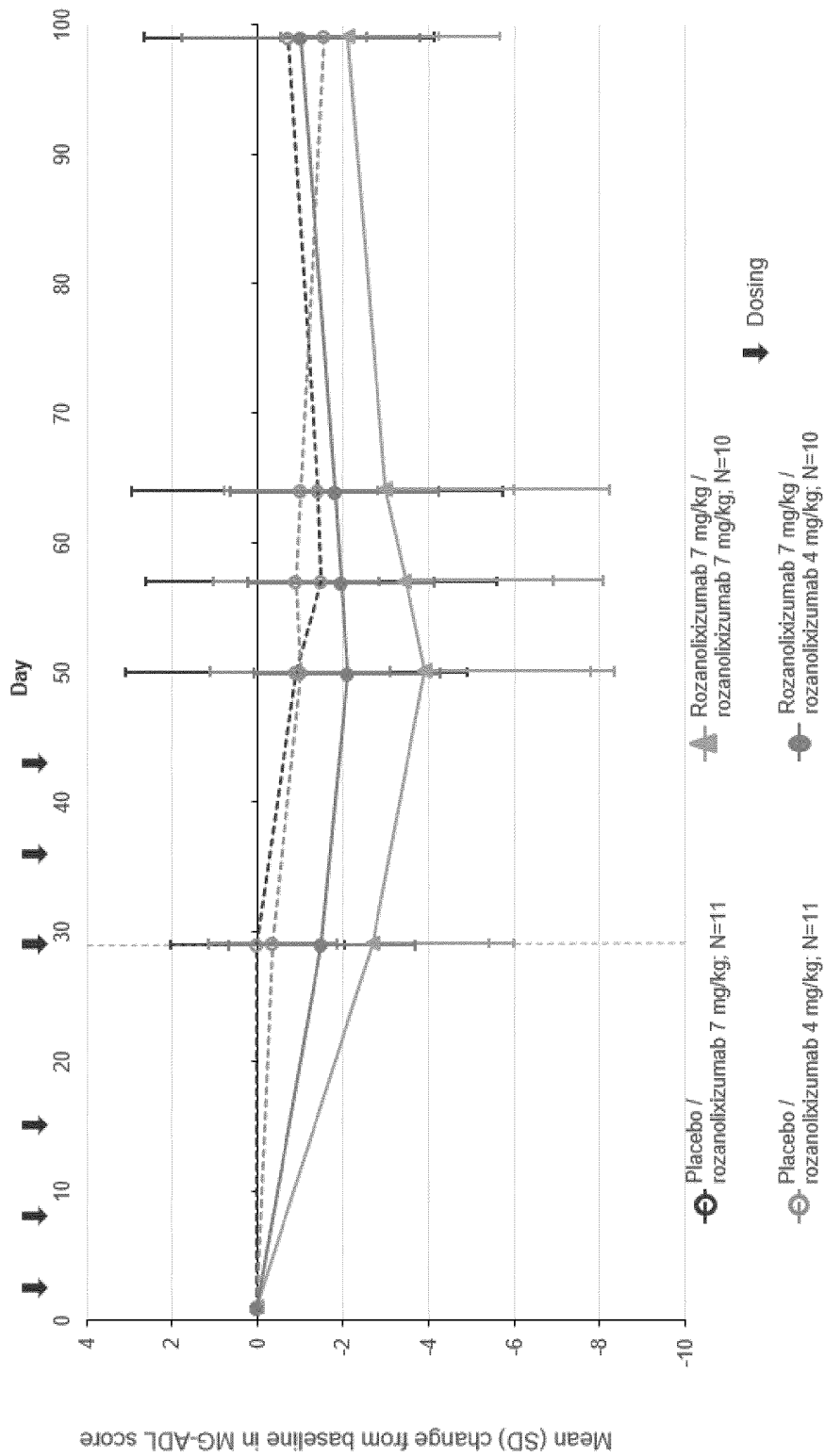


Figure 4

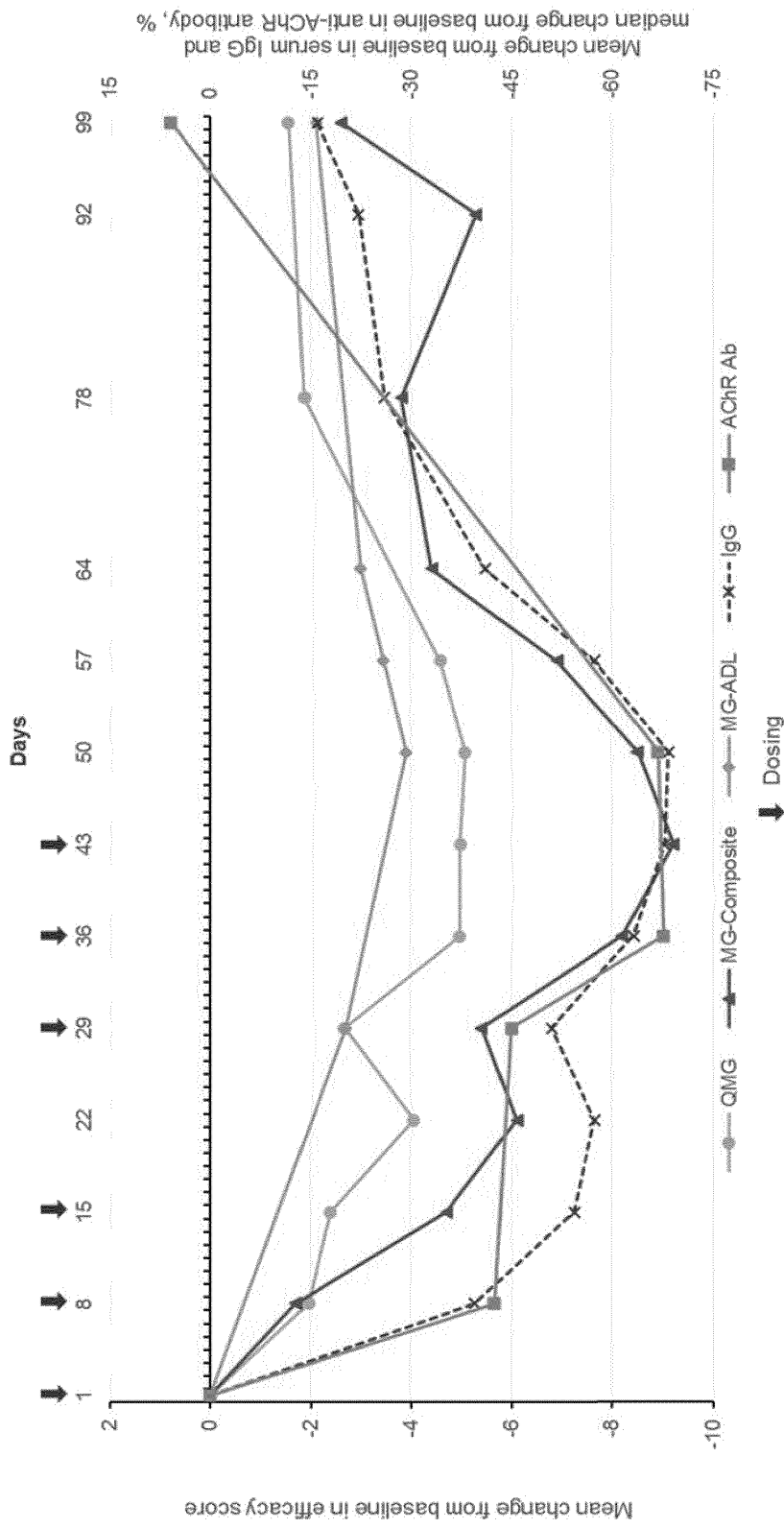


Figure 5

QUANTITATIVE MYASTHENIA GRAVIS TESTING FORM

Patient Name: _____ Patient #: _____ Date: _____

MR#: _____ DOB: _____ Sex: _____ Ht. (in): _____ Wt. (kg): _____

Evaluator: _____ Handedness: _____ Leggedness: _____ Time of Exam: _____

Anticholinesterase Medication: _____

Comments: _____

TEST ITEMS WEAKNESS	NONE	MILD	MODERATE	SEVERE	SCORE
GRADE	0	1	2	3	
Double vision (lateral gaze) Sec.	60	11-59	1-10	Spontaneous	
Ptosis (upward gaze) Sec.	60	11-59	1-10	Spontaneous	
Facial Muscles	Normal lid closure	Complete, weak some resistance	Complete, without resistance	Incomplete	
Swallowing 4 oz. Water (1/2 cup)	Normal	Minimal coughing or throat clearing	Severe coughing Choking or nasal regurgitation	Cannot swallow (test not attempted)	
Speech following counting aloud from 1- 50 (onset of dysarthria)	None at #50	Dysarthria at #30-49	Dysarthria at #10-29	Dysarthria at #9	
Right arm outstretched (90°, sitting) Sec.	240	90-239	10-89	0-9	
Left arm outstretched (90°, sitting) Sec.	240	90-239	10-89	0-9	
Forced vital capacity	≥80%	65-79%	50-64%	<50%	
Rt. Hand grip: male (Kg) :female	≥45 ≥30	15-44 10-29	5-14 5-9	0-4 0-4	
Left Hand grip: male (Kg) :female	≥35 ≥25	15-34 10-24	5-14 5-9	0-4 0-4	
Head, lifted (45%, supine) Sec.	120	30-119	1-29	0	
Right leg outstretched (45-50% supine) Sec.	100	31-99	1-30	0	
Left leg outstretched (45-50% supine) Sec.	100	31-99	1-30	0	

Figure 6 MG Composite Score**MG composite scale**

Ptosis, upward ease (physician examination)	>45 seconds =0	11-45 seconds = 1	1-10 seconds =2	Immediate = 3
Double vision on lateral Gaze, left or right (physician examination)	>45 seconds =0	11-45 seconds = 1	1-10 seconds =3	Immediate = 4
Eye Closure (physician examination)	Normal = 0	Mild weakness (can be forced open with effort) = 0	Moderate weakness (can be forced open easily) = 1	Sever weakness (unable to keep eye closed) = 2
Talking (patient history)	Normal = 0	Intermittent slurring or nasal speech = 2	Constant slurring or nasal but can be understood = 4	Difficult to understand speech = 6
Chewing (patient history)	Normal = 0	Fatigue with solid food = 2	Fatigue with soft food = 4	Gastric tube = 6
Swallowing (patient history)	Normal = 0	Rare episode of choking or trouble swallowing =2	Frequent trouble swallowing for example necessitating change in diet = 5	Gastric tube = 6
Breathing (thought to be caused by MG)	Normal = 0	Shortness of breath with exertion = 2	Shortness of breath at rest = 4	Ventilator dependence = 9
Neck flexion or extension (weakest) (physician examination)	Normal = 0	Mild weakness = 1	Moderate weakness (i.e., -50% weak, $\pm 15\%$) =3	Severe weakness =4
Shoulder abduction (physician examination)	Normal = 0	Mild weakness = 2	Moderate weakness (i.e., -50% weak, $\pm 15\%$) =4	Severe weakness =5
Hip flexion (physician examination)	Normal = 0	Mild weakness = 2	Moderate weakness (i.e., -50% weak, $\pm 15\%$) =4	Severe weakness =5
<i>Total</i>				-----

Note: Please note that “moderate weakness” for neck and limb items should be construed as weakness that equals roughly 50% $\pm 15\%$ of expected normal strength. Any weakness milder than that would be “mild” and any weakness more severe than that would be classified as “severe.”

Figure 7 MG – Activities of Daily Living (MG – ADL) Scoring

Grade	0	1	2	3	Score
Talking	Normal	Intermittent slurring or nasal speech	Constant slurring or nasal, but can be understood	Difficult to understand speech	
Chewing	Normal	Fatigue with solid food	Fatigue with soft food	Gastric tube	
Swallowing	Normal	Rare episode of choking	Frequent choking necessitating changes in diet	Gastric tube	
Breathing	Normal	Shortness of breath with exertion	Shortness of breath at rest	Ventilator dependence	
Impairment of ability to brush teeth or comb hair	None	Extra effort, but no rest periods needed	Rest periods needed	Cannot do one of these functions	
Impairment of ability to arise from a chair	None	Mild, sometimes uses arms	Moderate, always uses arms	Severe, requires assistance	
Double vision	None	Occurs, but not daily	Daily, but not constant	Constant	
Eyelid droop	None	Occurs, but not daily	Daily, but not constant	Constant	

Total Score