ANTIBODY-A Family VH

```
1   5    10   15   20   25   30    a    40   45   50 a  55   60   65   70   75   80 abc  85   90   95    abcdefghi    105     113  Kabat pos #
1   5  9     15   20   25 29   38     45   50   55      65   70   75   80   85   90   95   100  105  110     130  135  140  145 149  AHo pos #
-1   5    10   15   20   25   30   35   40   45   50   55   60   65   70  -74    80   85   90   95   100  105  110  115  120  125  sequential pos #, rabAB-A_VH
-QSLEESGGGLVQPGASLTLTCKASGIDFSSSGYMCWVRQAPGKGLEWIGCIYTYSSNTYYASWAKGRFTISKT-SSTTVTLQMTSLTAADTATYFCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    rabAB-A_VH  (SEQ ID NO:4)
EVQLVESGGGLVQPGGSLRLSCAASGIDFSSSGYMAWVRQAPGKGLEWVGAIYTYSSNTYYAASVKGRFTISRDDSKNSLYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGQGTLVTVSS    ANTIBODY-A_H0  (SEQ ID NO:5)
-QSLVESGGGLVQPGGSLRLSCAASGIDFSSSGYMAWVRQAPGKGLEWVGAIYTYSSNTYYAASVKGRFTISRDDSKNSLYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGQGTLVTVSS    ANTIBODY-A_H1  (SEQ ID NO:6)
-QSLVESGGGLVQPGGSLRLSCAASGIDFSSSGYMAWVRQAPGKGLEWVGAIYTYSSNTYYAASVKGRFTISKT-SSTTVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGQGTLVTVSS    ANTIBODY-A_H2  (SEQ ID NO:7)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMAWVRQAPGKGLEWVGAIYTYSSNTYYASWAKGRFTISKD-SKNSVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H3  (SEQ ID NO:8)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMSWVRQAPGKGLEWVGVIYTYSSNTYYASWAKGRFTISKD-SKNSVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H3(SV) (SEQ ID NO:9)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMSWVRQAPGKGLEWVGRIYTYSSNTYYASWAKGRFTISKD-SKNSVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H3(SR)(SEQ ID NO:10)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMSWVRQAPGKGLEWVGYIYTYSSNTYYASWAKGRFTISKD-SKNSVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H3(SY)(SEQ ID NO:11)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMHWVRQAPGKGLEWVGAIYTYSSNTYYASWAKGRFTISKD-SKNSVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H3(HA)(SEQ ID NO:12)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMAWVRQAPGKGLEWVGAIYTYSSNTYYASWAKGRFTISKT-SSTTVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H4  (SEQ ID NO:13)
EVQLVESGGGLVQPGGSLRLSCAASGIDFSSSGYMCWVRQAPGKGLEWVGCIYTYSSNTYYAASVKGRFTISRDDSKNSLYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGQGTLVTVSS    ANTIBODY-A_H0C (SEQ ID NO:14)
-QSLVESGGGLVQPGGSLRLSCAASGIDFSSSGYMCWVRQAPGKGLEWVGCIYTYSSNTYYAASVKGRFTISRDDSKNSLYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGQGTLVTVSS    ANTIBODY-A_H1C (SEQ ID NO:15)
-QSLVESGGGLVQPGGSLRLSCAASGIDFSSSGYMCWVRQAPGKGLEWVGCIYTYSSNTYYAASVKGRFTISKT-SSTTVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGQGTLVTVSS    ANTIBODY-A_H2C (SEQ ID NO:16)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMCWVRQAPGKGLEWVGCIYTYSSNTYYASWAKGRFTISKD-SKNSVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H3C (SEQ ID NO:17)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMCWVRQAPGKGLEWVGCIYTYSSNTYYASWAKGRFTISKT-SSTTVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H4C (SEQ ID NO:18)
   L ESGGGLVQPG SL L C ASGIDFSSSGYM WVRQAPGKGLEW G IYTYSSNTYYA  KGRFTIS  S    LQM SL  DTA Y CARGTYGYTGYTYTMGYFSLWG GTLVTVSS    conserved
```

Fig. 1A

ANTIBODY-B Family VH

```
1   5    10   15   20   25   30    a    40   45   50 a  55   60   65   70   75   80 abc  85   90   95    abc    105     113  Kabat pos #
1   5  9     15   20   25 29   38     45   50   55      65   70   75   80   85   90   95   100  105  110 133    140  145 149  AHo pos #
-1   5    10   15   20   25   30   35   40   45   50   55   60   65   70  -74    80   85   90   95   100  105  110  115 119  sequential pos #, rabAB-B_VH
-QSLEESGGGLVQPEGSLTLTCKASGFSFSNSYWICWVRQAPGKGLEWIGCINTDADSTNYASWARGRFTISKT-SSTTVTLQMTSLTAADTASYFCARQNNVFDPGYNLWGPGTLVTVSS    rabAB-B_VH  (SEQ ID NO:19)
QVQLVESGGGVVQPGRSLRLSCAASGFSFSNSYWIAWVRQAPGKGLEWVAAINTDADSTNYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H0  (SEQ ID NO:20)
-QSLVESGGGVVQPGRSLRLSCAASGFSFSNSYWIAWVRQAPGKGLEWVAAINTDADSTNYADSVKGRFTISKDNSKNTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H1  (SEQ ID NO:21)
-QSLVESGGGVVQPGRSLRLSCAASGFSFSNSYWISWVRQAPGKGLEWVAVINTDADSTNYADSVKGRFTISKDNSKNTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H1(SV) (SEQ ID NO:22)
-QSLVESGGGVVQPGRSLRLSCAASGFSFSNSYWISWVRQAPGKGLEWVARINTDADSTNYADSVKGRFTISKDNSKNTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H1(SR) (SEQ ID NO:23)
-QSLVESGGGVVQPGRSLRLSCAASGFSFSNSYWISWVRQAPGKGLEWVAYINTDADSTNYADSVKGRFTISKDNSKNTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H1(SY) (SEQ ID NO:24)
-QSLVESGGGVVQPGRSLRLSCAASGFSFSNSYWIHWVRQAPGKGLEWVAAINTDADSTNYADSVKGRFTISKDNSKNTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H1(HA) (SEQ ID NO:25)
-QSLVESGGGVVQPGRSLRLSCKASGFSFSNSYWIAWVRQAPGKGLEWVAAINTDADSTNYADSVKGRFTISKD-SSTTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H2  (SEQ ID NO:26)
-QSLVESGGGVVQPGRSLRLSCAASGFSFSNSYWIAWVRQAPGKGLEWVAAINTDADSTNYASWARGRFTISKDNSKNTLYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H3  (SEQ ID NO:27)
-QSLVESGGGVVQPGRSLRLSCKASGFSFSNSYWIAWVRQAPGKGLEWVAAINTDADSTNYASWARGRFTISKT-SSTTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGPGTLVTVSS    ANTIBODY-B_H4  (SEQ ID NO:28)
QVQLVESGGGVVQPGRSLRLSCAASGFSFSNSYWICWVRQAPGKGLEWVGCINTDADSTNYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H0C  (SEQ ID NO:29)
-QSLVESGGGVVQPGRSLRLSCAASGFSFSNSYWICWVRQAPGKGLEWVGCINTDADSTNYADSVKGRFTISKDNSKNTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H1C  (SEQ ID NO:30)
-QSLVESGGGVVQPGRSLRLSCKASGFSFSNSYWICWVRQAPGKGLEWVGCINTDADSTNYADSVKGRFTISKD-SSTTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H2C  (SEQ ID NO:31)
-QSLVESGGGVVQPGRSLRLSCAASGFSFSNSYWICWVRQAPGKGLEWVGCINTDADSTNYASWARGRFTISKDNSKNTLYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H3C  (SEQ ID NO:32)
-QSLVESGGGVVQPGRSLRLSCKASGFSFSNSYWICWVRQAPGKGLEWVGCINTDADSTNYASWARGRFTISKT-SSTTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGPGTLVTVSS    ANTIBODY-B_H4C  (SEQ ID NO:33)
   L ESGGG VQP  SL L C ASGFSFSNSYWI WVRQAPGKGLEW  INTDADSTNYA  GRFTIS  S  T  LQM SL A DTA Y CARQNNVFDPGYNLWG GTLVTVSS    conserved
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Fig. 1B

ANTIBODY-A Family VL

```
1   5    10   15   20   25   30  35   40   45   50   55   60   65   70   75   80   85   90    abcd   100    107  Kabat pos #
1   5    10   15   20    29  39   45   50   55  67 70   75   80   87 90   95   100  105  110 133   140     148  AHo pos #
1   5    10   15   20   25   30  35   40   45   50   55   60   65   70   75   80   85   90   95   100  105   111  sequential pos #, rabAB-A_VL
ELDMTQTPASVEAAVGGTVTIKCQASQNINSYLAWYQQKPGQPPKLLIYRASTLASGVPSRFKGSGSGTEFTLTISDLECADAATYYCQSYYYSGSSNYNAFGGGTELEIL    rabAB-A_VL  (SEQ ID NO:34)
DIQMTQSPSTLSASVGDRVTITCQASQNINSYLAWYQQKPGKAPKLLIYRASSLESGVPSRFSGSGSGTEFTLTISSLQPDDFATYYCQSYYYSGSSNYNAFGGGTKVEIK    ANTIBODY-A_L0  (SEQ ID NO:35)
DIQMTQSPSTLSASVGDRVTITCQASQNINSYLAWYQQKPGKAPKLLIYRASTLASGVPSRFSGSGSGTEFTLTISSLQPDDFATYYCQSYYYSGSSNYNAFGGGTKVEIK    ANTIBODY-A_L1  (SEQ ID NO:36)
ELDMTQSPSTLSASVGDRVTITCQASQNINSYLAWYQQKPGKAPKLLIYRASTLASGVPSRFSGSGSGTEFTLTISSLQPDDFATYYCQSYYYSGSSNYNAFGGGTKVEIK    ANTIBODY-A_L2  (SEQ ID NO:37)
   MTQ P    A VG  VTI CQASQNINSYLAWYQQKPG  PKLLIYRAS L SGVPSRF GSGSGTEFTLTIS L   D ATYYCQSYYYSGSSNYNAFGGGT  EI     conserved
```

Fig. 1C

ANTIBODY-B Family VL

```
1   5    10   15   20   25   30  35   40   45   50   55   60   65   70   75   80   85   90    abc    100    107  Kabat pos #
1   5    10   15   20    29  39   45   50   55  67 70   75   80   87 90   95   100  105  110 134   140     148  AHo pos #
1   5    10   15   20   25   30  35   40   45   50   55   60   65   70   75   80   85   90   96   100  105  110  sequential pos #, rabAB-B_VL
ELVLTQTPASVSEAVGGTVTIKCQASQNIGSNLAWYQQKPGQPPKLLIYDASKLASGVPSRFSGSGSGTEFTLTISDLECADAATYYCQCTVRGGAYGNAFGGGTEVVVK    rabAB-B_VL  (SEQ ID NO:38)
DIQMTQSPSTLSASVGDRVTITCRASQNIGSNLAWYQQKPGKAPKLLIYDASKLESGVPSRFSGSGSGTEFTLTISSLQPDDFATYYCQQTVRGGAYGLAFGGGTKVEIK    ANTIBODY-B_L0  (SEQ ID NO:39)
ELVLTQSPSTLSASVGDRVTITCRASQNIGSNLAWYQQKPGKAPKLLIYDASKLESGVPSRFSGSGSGTEFTLTISSLQPDDFATYYCQATVRGGAYGLAFGGGTKVEIK    ANTIBODY-B_L1  (SEQ ID NO:40)
ELVLTQSPSTLSASVGDRVTITCRASQNIGSNLAWYQQKPGKAPKLLIYDASKLESGVPSRFSGSGSGTEFTLTISSLQPDDFATYYCQCTVRGGAYGNAFGGGTKVEIK    ANTIBODY-B_L2  (SEQ ID NO:41)
ELVLTQSPSTLSASVGDRVTITCRASQNIGSNLAWYQQKPGKAPKLLIYDASKLESGVPSRFSGSGSGTEFTLTISSLQPDDFATYYCQSTVRGGAYGNAFGGGTKVEIK    ANTIBODY-B_L2(C90S)  (SEQ ID NO:42)
ELVLTQSPSTLSASVGDRVTITCRASQNIGSNLAWYQQKPGKAPKLLIYDASKLESGVPSRFSGSGSGTEFTLTISSLQPDDFATYYCQTTVRGGAYGNAFGGGTKVEIK    ANTIBODY-B_L2(C90T)  (SEQ ID NO:43)
ELVLTQSPSTLSASVGDRVTITCRASQNIGSNLAWYQQKPGKAPKLLIYDASKLESGVPSRFSGSGSGTEFTLTISSLQPDDFATYYCQVTVRGGAYGNAFGGGTKVEIK    ANTIBODY-B_L2(C90V)  (SEQ ID NO:44)
    TQ P   S  VG  VTI C ASQNIGSNLAWYQQKPG  PKLLIYDASKL SGVPSRFSGSGSGTEFTLTIS L   D ATYYCQ TVRGGAYG AFGGGT V  K    conserved
```

Fig. 1D

ANTIBODY-A Family VH

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1   5    10   15   20   25   30   a    40   45   50 a  55   60   65   70   75   80 abc  85   90   95   abcdefghi   105     113  Kabat pos #
1   5  9     15   20   25 29   38     45   50   55    65   70   75   80   85   90   95   100  105  110    130  135  140  145 149  AHo pos #
-1   5    10   15   20   25   30   35   40   45   50   55   60   65   70  -74    80   85   90   95   100  105  110  115  120  125  sequential pos #, rabAB-A_VH
-QSLEESGGGLVQPGASLTLTCKASGIDFSSSGYMCWVRQAPGKGLEWIGCIYTYSSNTYYASWAKGRFTISKT-SSTTVTLQMTSLTAADTATYFCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    rabAB-A_VH  (SEQ ID NO:4)
EVQLVESGGGLVQPGGSLRLSCAASGIDFSSSGYMAWVRQAPGKGLEWVGAIYTYSSNTYYAASVKGRFTISRDDSKNSLYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGQGTLVTVSS    ANTIBODY-A_H0 (SEQ ID NO:5)
-QSLVESGGGLVQPGGSLRLSCAASGIDFSSSGYMAWVRQAPGKGLEWVGAIYTYSSNTYYAASVKGRFTISRDDSKNSLYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGQGTLVTVSS    ANTIBODY-A_H1  (SEQ ID NO:6)
-QSLVESGGGLVQPGGSLRLSCAASGIDFSSSGYMAWVRQAPGKGLEWVGAIYTYSSNTYYAASVKGRFTISKT-SSTTVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGQGTLVTVSS    ANTIBODY-A_H2  (SEQ ID NO:7)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMAWVRQAPGKGLEWVGAIYTYSSNTYYASWAKGRFTISKD-SKNSVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H3  (SEQ ID NO:8)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMSWVRQAPGKGLEWVGVIYTYSSNTYYASWAKGRFTISKD-SKNSVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H3(SV) (SEQ ID NO:9)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMSWVRQAPGKGLEWVGRIYTYSSNTYYASWAKGRFTISKD-SKNSVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H3(SR)(SEQ ID NO:10)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMSWVRQAPGKGLEWVGYIYTYSSNTYYASWAKGRFTISKD-SKNSVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H3(SY)(SEQ ID NO:11)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMHWVRQAPGKGLEWVGAIYTYSSNTYYASWAKGRFTISKD-SKNSVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H3(HA)(SEQ ID NO:12)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMAWVRQAPGKGLEWVGAIYTYSSNTYYASWAKGRFTISKT-SSTTVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H4  (SEQ ID NO:13)
EVQLVESGGGLVQPGGSLRLSCAASGIDFSSSGYMCWVRQAPGKGLEWVGCIYTYSSNTYYAASVKGRFTISRDDSKNSLYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGQGTLVTVSS    ANTIBODY-A_H0C (SEQ ID NO:14)
-QSLVESGGGLVQPGGSLRLSCAASGIDFSSSGYMCWVRQAPGKGLEWVGCIYTYSSNTYYAASVKGRFTISRDDSKNSLYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGQGTLVTVSS    ANTIBODY-A_H1C (SEQ ID NO:15)
-QSLVESGGGLVQPGGSLRLSCAASGIDFSSSGYMCWVRQAPGKGLEWVGCIYTYSSNTYYAASVKGRFTISKT-SSTTVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGQGTLVTVSS    ANTIBODY-A_H2C (SEQ ID NO:16)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMCWVRQAPGKGLEWVGCIYTYSSNTYYASWAKGRFTISKD-SKNSVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H3C (SEQ ID NO:17)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMCWVRQAPGKGLEWVGCIYTYSSNTYYASWAKGRFTISKT-SSTTVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H4C (SEQ ID NO:18)
   L ESGGGLVQPG SL L C ASGIDFSSSGYM WVRQAPGKGLEW G IYTYSSNTYYA   KGRFTIS   S     LQM SL   DTA Y CARGTYGYTGYTYTMGYFSLWG GTLVTVSS    conserved
```

Fig. 2A

ANTIBODY-B Family VH

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1   5    10   15   20   25   30   a    40   45   50 a  55   60   65   70   75   80 abc  85   90   95    abc    105     113  Kabat pos #
1   5  9     15   20   25 29   38     45   50   55    65   70   75   80   85   90   95   100  105  110 133    140  145 149  AHo pos #
-1   5    10   15   20   25   30   35   40   45   50   55   60   65   70  -74    80   85   90   95   100  105  110  115 119  sequential pos #, rab AB-B _VH
-QSLEESGGGLVQPEGSLTLTCKASGFSFSNSYWICWVRQAPGKGLEWIGCINTDADSTNYASWARGRFTISKT-SSTTVTLQMTSLTAADTASYFCARQNNVFDPGYNLWGPGTLVTVSS    rabAB-B_VH (SEQ ID NO:19)
QVQLVESGGGVVQPGRSLRLSCAASGFSFSNSYWIAWVRQAPGKGLEWVAAINTDADSTNYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H0  (SEQ ID NO:20)
-QSLVESGGGVVQPGRSLRLSCAASGFSFSNSYWIAWVRQAPGKGLEWVAAINTDADSTNYADSVKGRFTISKDNSKNTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H1  (SEQ ID NO:21)
-QSLVESGGGVVQPGRSLRLSCAASGFSFSNSYWISWVRQAPGKGLEWVAVINTDADSTNYADSVKGRFTISKDNSKNTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H1(SV) (SEQ ID NO:22)
-QSLVESGGGVVQPGRSLRLSCAASGFSFSNSYWISWVRQAPGKGLEWVARINTDADSTNYADSVKGRFTISKDNSKNTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H1(SR) (SEQ ID NO:23)
-QSLVESGGGVVQPGRSLRLSCAASGFSFSNSYWISWVRQAPGKGLEWVAYINTDADSTNYADSVKGRFTISKDNSKNTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H1(SY) (SEQ ID NO:24)
-QSLVESGGGVVQPGRSLRLSCAASGFSFSNSYWIHWVRQAPGKGLEWVAAINTDADSTNYADSVKGRFTISKDNSKNTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H1(HA) (SEQ ID NO:25)
-QSLVESGGGVVQPGRSLRLSCKASGFSFSNSYWIAWVRQAPGKGLEWVAAINTDADSTNYADSVKGRFTISKD-SSTTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H2  (SEQ ID NO:26)
-QSLVESGGGVVQPGRSLRLSCAASGFSFSNSYWIAWVRQAPGKGLEWVAAINTDADSTNYASWARGRFTISKDNSKNTLYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H3  (SEQ ID NO:27)
-QSLVESGGGVVQPGRSLRLSCKASGFSFSNSYWIAWVRQAPGKGLEWVAAINTDADSTNYASWARGRFTISKT-SSTTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGPGTLVTVSS    ANTIBODY-B_H4  (SEQ ID NO:28)
QVQLVESGGGVVQPGRSLRLSCAASGFSFSNSYWICWVRQAPGKGLEWVGCINTDADSTNYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H0C  (SEQ ID NO:29)
-QSLVESGGGVVQPGRSLRLSCAASGFSFSNSYWICWVRQAPGKGLEWVGCINTDADSTNYADSVKGRFTISKDNSKNTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H1C  (SEQ ID NO:30)
-QSLVESGGGVVQPGRSLRLSCKASGFSFSNSYWICWVRQAPGKGLEWVGCINTDADSTNYADSVKGRFTISKD-SSTTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H2C  (SEQ ID NO:31)
-QSLVESGGGVVQPGRSLRLSCAASGFSFSNSYWICWVRQAPGKGLEWVGCINTDADSTNYASWARGRFTISKDNSKNTLYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGQGTLVTVSS    ANTIBODY-B_H3C  (SEQ ID NO:32)
-QSLVESGGGVVQPGRSLRLSCKASGFSFSNSYWICWVRQAPGKGLEWVGCINTDADSTNYASWARGRFTISKT-SSTTVYLQMNSLRAEDTAVYYCARQNNVFDPGYNLWGPGTLVTVSS    ANTIBODY-B_H4C  (SEQ ID NO:33)
   L ESGGG VQP  SL L C ASGFSFSNSYWI WVRQAPGKGLEW   INTDADSTNYA    GRFTIS   S  T  LQM SL A DTA Y CARQNNVFDPGYNLWG GTLVTVSS    conserved
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Fig. 2B

ANTIBODY-A Family VL

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1   5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   abcd   100   107  Kabat pos #
1   5    10   15   20    29   39    45   50   55  67 70   75   80   87 90   95   100  105  110 133   140   148  AHo pos #
1   5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   95   100  105   111  sequential pos #, rabAB-A_VL
ELDMTQTPASVEAAVGGTVTIKCQASQNINSYLAWYQQKPGQPPKLLIYRASTLASGVPSRFKGSGSGTEFTLTISDLECADAATYYCQSYYYSGSSNYNAFGGGTELEIL    rabAB-A_VL  (SEQ ID NO:34)
DIQMTQSPSTLSASVGDRVTITCQASQNINSYLAWYQQKPGKAPKLLIYRASSLESGVPSRFSGSGSGTEFTLTISSLQPDDFATYYCQSYYYSGSSNYNAFGGGTKVEIK    ANTIBODY-A_L0  (SEQ ID NO:35)
DIQMTQSPSTLSASVGDRVTITCQASQNINSYLAWYQQKPGKAPKLLIYRASTLASGVPSRFSGSGSGTEFTLTISSLQPDDFATYYCQSYYYSGSSNYNAFGGGTKVEIK    ANTIBODY-A_L1  (SEQ ID NO:36)
ELDMTQSPSTLSASVGDRVTITCQASQNINSYLAWYQQKPGKAPKLLIYRASTLASGVPSRFSGSGSGTEFTLTISSLQPDDFATYYCQSYYYSGSSNYNAFGGGTKVEIK    ANTIBODY-A_L2  (SEQ ID NO:37)
   MTQ P    A VG  VTI CQASQNINSYLAWYQQKPG  PKLLIYRAS L SGVPSRF GSGSGTEFTLTIS L   D ATYYCQSYYYSGSSNYNAFGGGT  EI     conserved
```

Fig. 2C

ANTIBODY-B Family VL

```
1   5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   abc   100   107  Kabat pos #
1   5    10   15   20    29   39    45   50   55  67 70   75   80   87 90   95   100  105  110 134   140   148  AHo pos #
1   5    10   15   20   25   30   35   40   45   50   55   60   65   70   75   80   85   90   96  100  105  110  sequential pos #, rabAB-B_VL
ELVLTQTPASVSEAVGGTVTIKCQASQNIGSNLAWYQQKPGQPPKLLIYDASKLASGVPSRFSGSGSGTEFTLTISDLECADAATYYCQCTVRGGAYGNAFGGGTEVVVK    rabAB-B_VL  (SEQ ID NO:38)
DIQMTQSPSTLSASVGDRVTITCRASQNIGSNLAWYQQKPGKAPKLLIYDASKLESGVPSRFSGSGSGTEFTLTISSLQPDDFATYYCQQTVRGGAYGLAFGGGTKVEIK    ANTIBODY-B_L0  (SEQ ID NO:39)
ELVLTQSPSTLSASVGDRVTITCRASQNIGSNLAWYQQKPGKAPKLLIYDASKLESGVPSRFSGSGSGTEFTLTISSLQPDDFATYYCQATVRGGAYGLAFGGGTKVEIK    ANTIBODY-B_L1  (SEQ ID NO:40)
ELVLTQSPSTLSASVGDRVTITCRASQNIGSNLAWYQQKPGKAPKLLIYDASKLESGVPSRFSGSGSGTEFTLTISSLQPDDFATYYCQCTVRGGAYGNAFGGGTKVEIK    ANTIBODY-B_L2  (SEQ ID NO:41)
ELVLTQSPSTLSASVGDRVTITCRASQNIGSNLAWYQQKPGKAPKLLIYDASKLESGVPSRFSGSGSGTEFTLTISSLQPDDFATYYCQSTVRGGAYGNAFGGGTKVEIK    ANTIBODY-B_L2(C90S)  (SEQ ID NO:42)
ELVLTQSPSTLSASVGDRVTITCRASQNIGSNLAWYQQKPGKAPKLLIYDASKLESGVPSRFSGSGSGTEFTLTISSLQPDDFATYYCQTTVRGGAYGNAFGGGTKVEIK    ANTIBODY-B_L2(C90T)  (SEQ ID NO:43)
ELVLTQSPSTLSASVGDRVTITCRASQNIGSNLAWYQQKPGKAPKLLIYDASKLESGVPSRFSGSGSGTEFTLTISSLQPDDFATYYCQVTVRGGAYGNAFGGGTKVEIK    ANTIBODY-B_L2(C90V)  (SEQ ID NO:44)
    TQ P   S  VG  VTI C ASQNIGSNLAWYQQKPG  PKLLIYDASKL SGVPSRFSGSGSGTEFTLTIS L   D ATYYCQ TVRGGAYG AFGGGT V  K    conserved
```

Fig. 2D

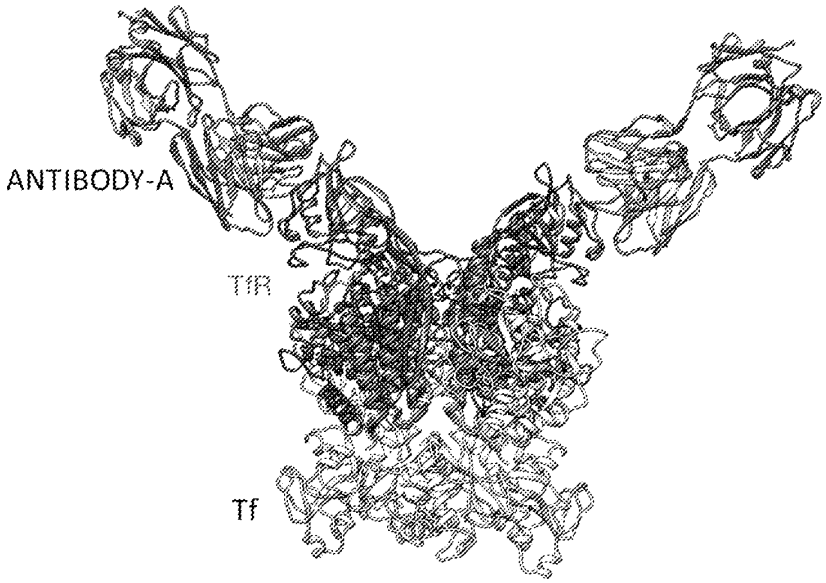


Fig. 3

```
Human    SKVWRDQHFVKIQVKDSAQNSVIIVDKNGRLVYLVENPGGYVAYSKAATVTGKLVHANFG      238
Cyno     SKVWRDQHFVKIQVKDSAQNSVIIVDKNGGLVYLVENPGGYVAYSKAATVTGKLVHANFG      238
Mouse    SKVWRDEHYVKIQVKSSIGQNMVTIVQSNGNLDPVESPEGYVAFSKPTEVSGKLVHANFG      240
         ******:*:******.*  :.:: : :..  :  **.* ****:** : *:*********

Human    TKKDFEDLYTPVNGSIVIVRAGKITFAEKVANAESLNAIGVLIYMDQTKFPIVNAELSFF      298
Cyno     TKKDFEDLDSPVNGSIVIVRAGKITFAEKVANAESLNAIGVLIYMDQTKFPIVKADLSFF      298
Mouse    TKKDFEELSYSVNGSLVIVRAGEITFAEKVANAQSFNAIGVLIYMDKNKFPVVEADLALF      300
         ******:*   ****:******:**********:*:**********:.***:*:*:*::*

Human    GHAHLGTGDPYTPGFPSFNHTQFPPSRSSGLPNIPVQTISRAAAEKLFGNMEGDCPSDWK      358
Cyno     GHAHLGTGDPYTPGFPSFNHTQFPPSQSSGLPNIPVQTISRAAAEKLFGNMEGDCPSDWK      358
Mouse    GHAHLGTGDPYTPGFPSFNHTQFPPSQSSGLPNIPVQTISRAAAEKLFGKMEGSCPARWN      360
         *************************:**********************:***.**: *:

Human    TDSTCRMVTSESKNVKLTVSNVLKEIKILNIFGVIKGFVEPDHYVVVGAQRDAWGPGA-A      417  (SEQ ID NO: 165)
Cyno     TDSTCKMVTSENKSVKLTVSNVLKETKILNIFGVIKGFVEPDHYVVVGAQRDAWGPGA-A      417  (SEQ ID NO: 166)
Mouse    IDSSCKLELSQNQNVKLIVKNVLKERRILNIFGVIKGYEEPDRYVVVGAQRDALGAGVAA      420  (SEQ ID NO: 167)
          **:*::  *:.:.*** *.***** :**********: ***:********** * *. *
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Fig. 4

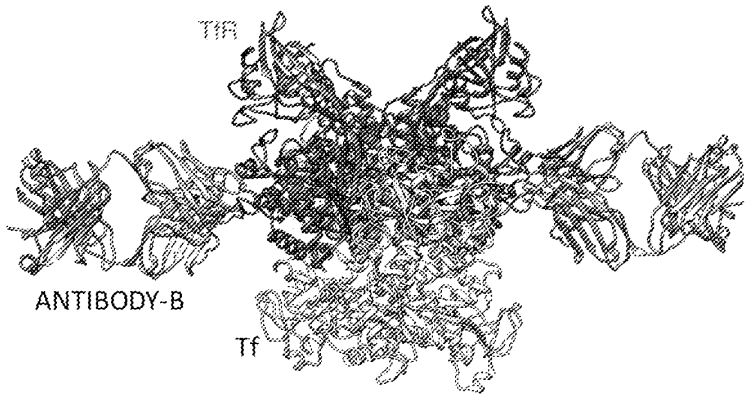


Fig. 5

```
Human    ARRLYWDDLKRKLSEKLDSTDFTGTIKLLNENSYVPREAGSQKDENLALYVENQFREFKL      178  (SEQ ID NO: 168)
Cyno     APRLYWDDLKRKLSEKLDTTDFTSTIKLLNENLYVPREAGSQKDENLALYIENQFREFKL      178  (SEQ ID NO: 169)
Mouse    SSRLYWADLKTLLSEKLNSIEFADTIKQLSQNTYTPREAGSQKDESLAYYIENQFHEFKF      180  (SEQ ID NO: 170)
         : **** ***  *****:: :*:.*** *.:* *.**********.** *:****:***:

------------------------------------------------------------------------------

Human    AFTYINLDKAVLGTSNFKVSASPLLYTLIEKTMQNVKHPVTGQFLYQDSNWASKVEKLTL      537
Cyno     AFTYINLDKAVLGTSNFKVSASPLLYTLIEKTMQDVKHPVTGRSLYQDSNWASKVEKLTL      537
Mouse    AFTYINLDKVVLGTSNFKVSASPLLYTLMGKIMQDVKHPVDGKSLYRDSNWISKVEKLSF      540
         *********.******************: * **:***** *: **:**** ******::

Human    DNAAFPFLAYSGIPAVSFCFCEDTDYPYLGTTMDTYKELIERIPELNKVARAAAEVAGQF      597  (SEQ ID NO: 171)
Cyno     DNAAFPFLAYSGIPAVSFCFCEDTDYPYLGTTMDTYKELVERIPELNKVARAAAEVAGQF      597  (SEQ ID NO: 172)
Mouse    DNAAYPFLAYSGIPAVSFCFCEDADYPYLGTRLDTYEALTQKVPQLNQMVRTAAEVAGQL      600  (SEQ ID NO: 173)
         ****:*******************:******* :***: * :::*:**::.*:*******:
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Fig. 6

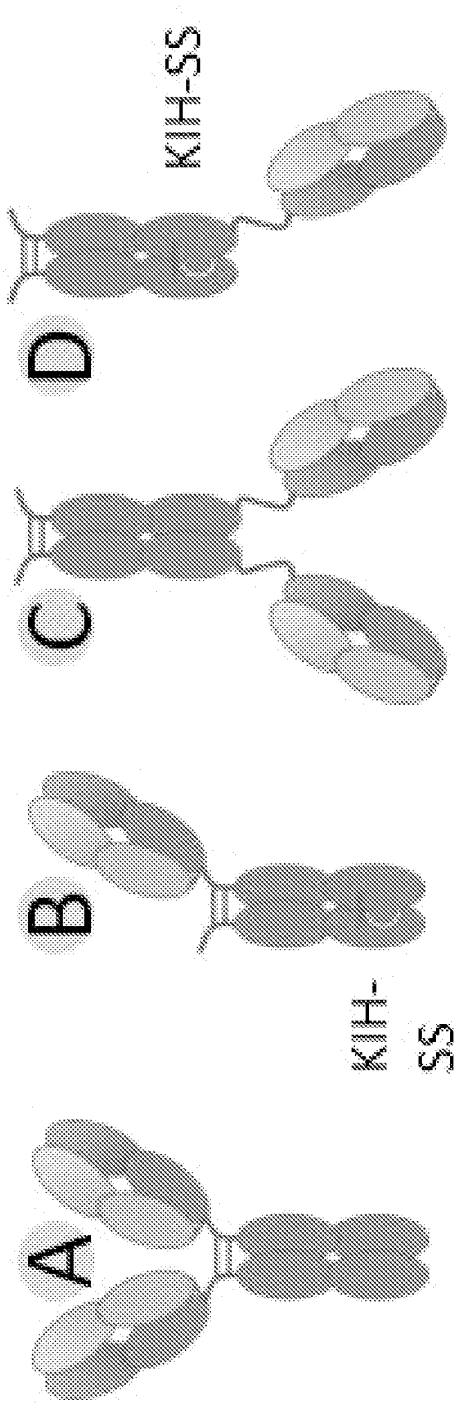


Fig. 7A

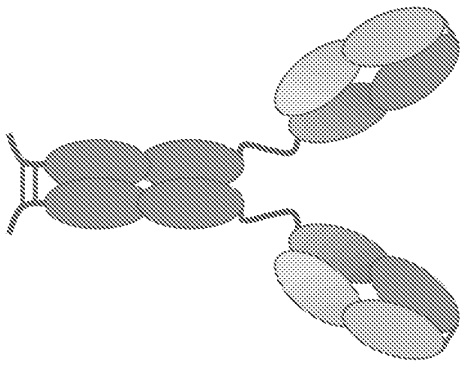


Fig. 7B

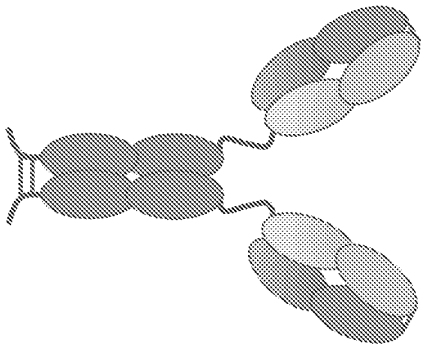


Fig. 7C

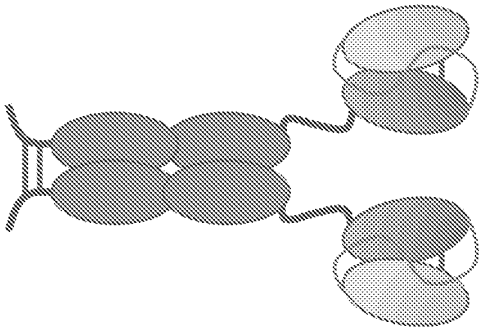


Fig. 7D

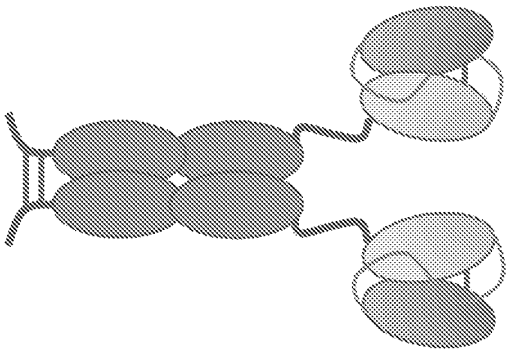


Fig. 7E

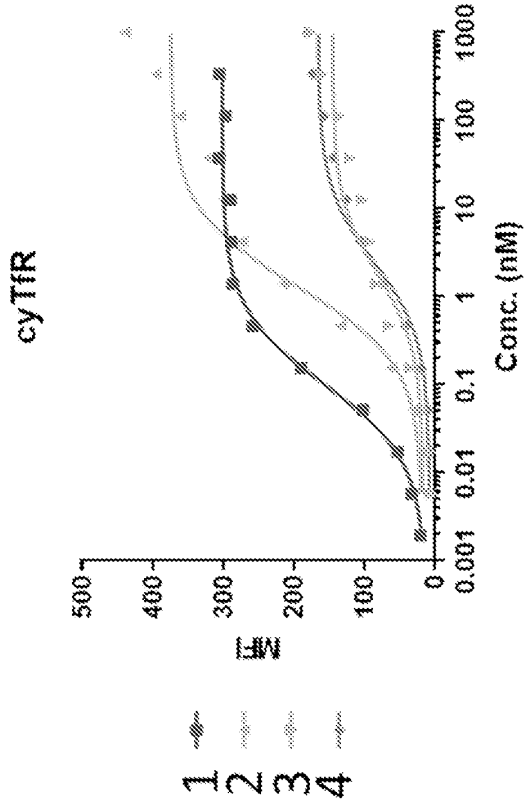

cyTfR
MFI
500
400
300
200
100
0
0.001
0.01
0.1
1
10
100
1000
Conc. (nM)
1
2
3
4

Fig. 8A

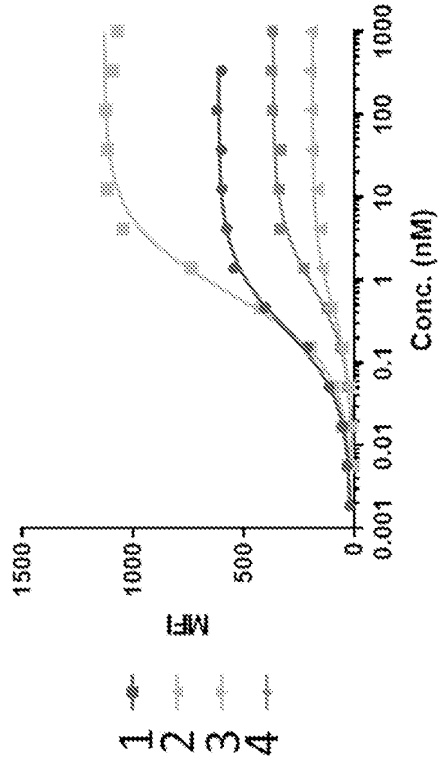

huTfR
MFI
1500
1000
500
0
0.001
0.01
0.1
1
10
100
1000
Conc. (nM)
1
2
3
4

Fig. 8B

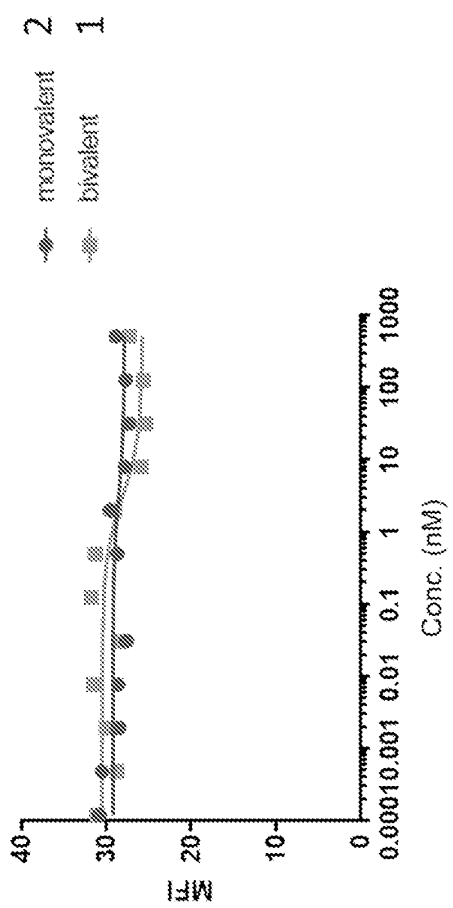

2
1
monovalent
bivalent
MFI
40
30
20
10
0
0.00010.001 0.01 0.1 1 10 100 1000
Conc. (nM)

Fig. 9A

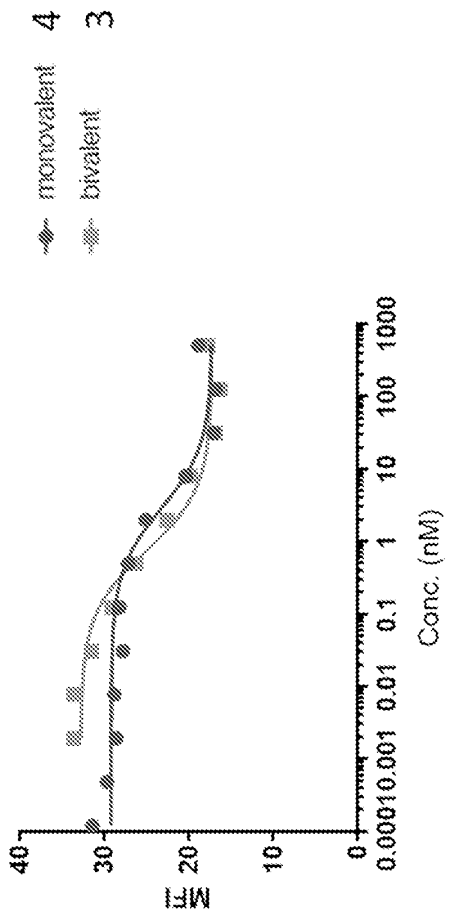

4
3
monovalent
bivalent
MFI
40
30
20
10
0
0.00010.001 0.01 0.1 1 10 100 1000
Conc. (nM)

Fig. 9B

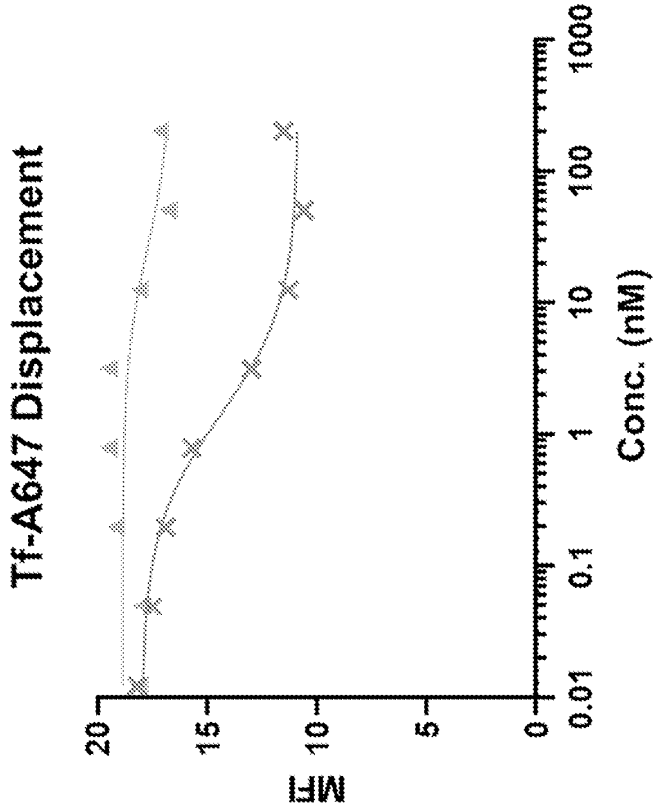

Tf-A647 Displacement
MFI
20
15
10
5
0
0.01
0.1
1
10
100
1000
Conc. (nM)

Fig. 10