

FIG. 1A

SEQ ID NO: 1 > 1923Ab2 VH

QVQLVESGGGVVQPGRSLRLSCAASGFTFRNYGMHWVRQAPGKGLEWVAVIWFDGIN
KYYADSVKGRFTISRDNSENTLYLQMNSLRAEDTAVYYCARDRSSSPDFWQGGLVT
VSS

NYGMH	VIWFDGINKYYADSVKG	DRSSSPDF
SEQ: 5	SEQ: 6	SEQ: 7

SEQ ID NO: 2 > 1923Ab2 VL

EIVMTQSPATLSLSPGERATLSCRASQNFNNYLSWYQQTPGQAPRLLIYGASTRATGIP
ARFSGSGSGTDFTLTISLQPEDFAVYYCQQDYNLFTFGPGTKVDIK

RASQNFNNYLS	GASTRAT	QQDYNLFT
SEQ: 8	SEQ: 9	SEQ: 10

SEQ ID NO: 3 > 1923Ab3 VH

QVQLVQSGAEVKKPGASVKVSKASGYTFTSYDINWVRQATGQGLEWMGWMNPNSG
ITGYAQRFGQGRVTMTRDTSISTAYMELSSLRSEDTAVYYCARHRWGKGYLDLWGRGTL
VTVSS

SYDIN	WMNPNSGITGYAQRFGQ	HRWGKGYLDL
SEQ: 11	SEQ: 12	SEQ: 13

SEQ ID NO: 4 > 1923Ab3 VL

EIVMAQSPATLSLSPGERATLSCRASQSVSSSYLSWFQQKPGQAPRLLIYGASTRATGIPA
RFGGSGSGTDFTLTISLQPEDFAVYYCQQDYNLPYTFGQGTKLEIK

RASQSVSSSYLS	GASTRAT	QQDYNLPYT
SEQ: 14	SEQ: 9	SEQ: 15

FIG. 1B

SEQ ID NO: 16 > 1923Ab4 VH

QVQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKGLEWVAIIWYDGIN
KYYADSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYFD
FWGQGLTVTVSS

NYGMH	IIWYDGINKYYADSVKG	DQDYDILTGYKEDYFDF
SEQ: 5	SEQ: 22	SEQ: 23

SEQ ID NO: 17 > 1923Ab4 VL

SYELTQPPSVSVSPGQTARITCSGDALPKKYAYWYQOKSGQAPVLVIYEDSKRPSGIPER
FSGSSSGTMTALTISGAQVEDEADYYCYSTDSSGNRVFGGGTKLTVL

SGDALPKKYAY	EDSKRPS	YSTDSSGNRV
SEQ: 24	SEQ: 25	SEQ: 26

SEQ ID NO: 18 > 1923Ab5 VH

QVQLVESGGGVVQPGRSLRLSCAASGFTFSSYGMHWVRQAPGKGLEWVAVIWYDGSN
EYYADSVKGRFTISRDN SKNTLYLQMNSLRAEDTAVYYCARERWQWLVLFDYWGQGT
LTVTVSS

SYGMH	VIWYDGSNEYADSVKG	ERWQWLVLFDY
SEQ: 27	SEQ: 28	SEQ: 29

SEQ ID NO: 19 > 1923Ab5 VL

EIVLTQSPATLSLSPGERATLSCRASQTITSSYLSWYQQKPGQAPRLLIYGASTRATGIPA
RFGSGSGTDFTLTISSLQPEDFALYFCQQDFNLPYTFGQGTKLEIK

RASQTITSSYLS	GASTRAT	QQDFNLPYT
SEQ: 30	SEQ: 9	SEQ:31

FIG. 1C

SEQ ID NO: 20 > 1923Ab6 VH

EVHLL~~ESGGGLVQPGGSLRLSCAASGFTFSSYAMGWVRQAPGKGLEWVSI~~IIGGGGGST
YYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVYYCAKVGYSGTYGGWFDPWGQG
TLVTVSS

SYAMG	IIGGGGGSTYYADSVKG	VGYSGTYGGWFDP
SEQ: 32	SEQ: 33	SEQ: 34

SEQ ID NO: 21 > 1923Ab6 VL

DIQMTQSPSSLSASIGDRVAITCRASQGISNYLAWFQQKPGKAPKSLIYAAASSLQSGVPSK
FSGSGSGTDFTLTISSLPEDFATYYCQQYNSYPLTFGGGTKVEIK

RASQGISNYLA	AASSLQS	QQYNSYPLT
SEQ: 35	SEQ: 36	SEQ: 37

SEQ ID NO: 38 > 1923Ab7 and 1923Ab8 Heavy Chain

QVQLVQSGAEVKKPGASVKVSCKASGYTFTSYDINWVRQATGQGLEWMGWMNPNSG
ITGYAQRFFQGRVTMTRDTSISTAYMELSSLRSEDTAVYYCARHRWGKGYLDLWGRGTL
VTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPA
VLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAP
EAAGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTK
PREEQYNSTYRVVSVLTVLHQDWLNGKEYCKVSNKALPAPIEKTISKAKGQPREPQV
YTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPVLDSDGSFFLYS
KLTVDKSRWQQGNVVFSCVMHEALHNHYTQKSLSLSPGGGGSGGGGSGGGGSSQVQLV
ESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKGLEWVAIIWYDGINKYYAD
SVKGRFTISRDNKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYDFDFWGQG
TLVTVSSGGGGSGGGGSGGGGSSYELTPPSVSVSPGQTARITCSGDALPKKYAYWYQ
QKSGQAPVLVIYEDSKRPSGIPERFSGSSSGTMTLTISGAQVEDEADYYCYSTDSSGNR
VFGGGTKLTVL

SEQ ID NO 39: > 1923Ab7 and 1923Ab9, 1923Ab10, 1923Ab17 Light Chain

EIVMAQSPATLSLSPGERATLSCRASQSVSSSYLSWFQQKPGQAPRLLIYGASTRATGIPA
RFGGSGSGTDFTLTISSLPEDFAVYYCQQDYNLPYTFGQGTKLEIKRTVAAPSVFIFPPS
DEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNSQESVTEQDSKDSTYLSSTL
TLISKADYEKKHKVYACEVTHQGLSPVTKSFNRGECGGGGSGGGGSGGGGSTIPPHVQK
SVNNDMIVTDNNGAVKFPQLCKFCDFRSTCDNQKSCMSNCSITSICEKPQEVCAVW
RKNDENITLETVCHDPKLPYHDFILEDAAAPKCMKEKKKPGETFFMCSSSDECNDNIIF
SEEYNTSNPD

FIG. 1D

SEQ ID NO 40: > 1923Ab8 and 1923Ab11, 1923Ab13, 1923Ab18, 1923Ab20 Light Chain

EIVMAQSPATLSLSPGERATLSCRASQSVSSSYLSWFOQKPGQAPRLLIYGASTRATGIPA
RFGGSGSGTDFTLTISSLQPEDFAVYYCQQDYNLPYTFGQGTKLEIKRTVAAPSVFIFPPS
DEQLKSGTASVCLLNFPYFPAKRVQWQVDNALQSGNSQESVTEQDSKDSSTLSSTL
TLKADYEEKHKVYACEVTHQGLSSPVTKSFNRGEC

SEQ ID NO:41 > 1923Ab9 Heavy Chain 1

QVQLVQSGAEVKKPGASVKVSCKASGYTFTSYDINWVRQATGQGLEWMGWMNPNSG
ITGYAQRFFQGRVTMTRDTSISTAYMELSSLRSEDTAVYYCARHRWGKGYLDLWGRGTL
VTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPA
VLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAP
EAAGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTK
PREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQV
YTLPPCRDELTKNQVSLWCLVKGFYPSDIAVEWESNGQPENNYKTTTPVLDSDGSFFLY
SKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSPGSGGGSGGGSGGGSGQVQL
VESGGGVVQPGSRSLRLSCAASGFTFSNYGMHWVRQAPGKGLEWVAIIWYDGINKYYA
DSVKGRFTISRDNSKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYFDLFWGQ
GTLVTVSSGGGGSGGGSGGGSSYELTQPPSVSVSPGQTARITCSGDALPKKYAYWY
QQKSGQAPVLVIYEDSKRPSGIPERFSGSSSGTMTLTISGAQVEDEADYYCYSTDSSGN
RVFGGGGTKLTVL

SEQ ID NO: 42 > 1923Ab9 and 1923Ab10 Heavy Chain 2

QVQLVQSGAEVKKPGASVKVSCKASGYTFTSYDINWVRQATGQGLEWMGWMNPNSG
ITGYAQRFFQGRVTMTRDTSISTAYMELSSLRSEDTAVYYCARHRWGKGYLDLWGRGTL
VTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPA
VLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAP
EAAGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTK
PREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVC
TLPPSRDELTKNQVSLSCAVKGFYPSDIAVEWESNGQPENNYKTTTPVLDSDGSFFLVSK
LTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSPGK

FIG. 1E

SEQ ID NO: 43 > 1923Ab10 Heavy Chain 1

QVQLVQSGAEVKKPGASVKVSCKASGYTFTSYDINWVRQATGQGLEWMGWMNPNSG
ITGYAQRFFQGRVTMTRDTSISTAYMELSSLRSEDTAVYYCARHRWGKGYLDLWGRGTL
VTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPA
VLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAP
EAAGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTK
PREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQV
YTLPPCRDELTKNQVSLWCLVKGFYPSDIAVEWESNGQPENNYKTTTPVLDSGSSFFLY
SKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSPGGGGSGGGGSGGGGSSYELT
QPPSVSVSPGQTARITCSGDALPKKYAYWYQQKSGQAPVLVIYEDSKRPSGIPERFSGSS
SGTMTATLTISGAQVEDEADYYCYSTDSSGNRVFGGGTKLTVLGGGGSGGGGSGGGGSQ
VQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKGLEWVAIIWYDGINK
YYADSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYDFD
WGQGTLVTVSS

SEQ ID NO: 44 > 1923Ab11 Heavy Chain

QVQLVQSGAEVKKPGASVKVSCKASGYTFTSYDINWVRQATGQGLEWMGWMNPNSG
ITGYAQRFFQGRVTMTRDTSISTAYMELSSLRSEDTAVYYCARHRWGKGYLDLWGRGTL
VTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPA
VLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAP
EAAGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTK
PREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQV
YTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPVLDSGSSFFLYS
KLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSPGGGGSGGGGSGGGGSSYELT
QPPSVSVSPGQTARITCSGDALPKKYAYWYQQKSGQAPVLVIYEDSKRPSGIPERFSGSS
SGTMTATLTISGAQVEDEADYYCYSTDSSGNRVFGGGTKLTVLGGGGSGGGGSGGGGSQ
VQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKGLEWVAIIWYDGINK
YYADSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYDFD
WGQGTLVTVSS

FIG. 1F

SEQ ID NO: 45 > 1923Ab12 Heavy Chain

QVQLVQSGAEVKKPGASVKVSCKASGYTFTSYDINWVRQATGQGLEWMGWMNPNSG
ITGYAQRFFQGRVTMTRDTSISTAYMELSSLRSEDNAVYYCARHRWGKGYLDLWGRGTL
VTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPA
VLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAP
EAAGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTK
PREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQV
YTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPVLDSDGSFFLYS
KLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSPGK

SEQ ID NO: 46 > 1923Ab12 Light Chain

QVQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKCLEWVAIIWYDGIN
KYYADSVKGRFTISRDN SKNTLYLQMNSLKAEDNAVYYCARDQDYDILTGYKEDYFD
FWGQGTILVTVSSGGGSGGGGSGGGGSSYELTQPPSVSVSPGQTARITCSGDALPKKYA
YWYQQKSGQAPVLVIYEDSKRPSGIPERFSGSSSGTMTLTISGAQVEDEADYYCYSTDS
SGNRVFGCGTKLTVLGGGSGGGGSGGGGSGGGGSEIVMAQSPATLSLSPGERATLSCR
ASQSVSSSYLSWFFQQKPGQAPRLLIYGASTRATGIPARFGGSGSGTDFTLTISLQPEDFA
VYYCQQDYNLPYTFGGQGTKLEIKRTVAAPSVFIFPPSDEQLKSGTASVVCLLNNFYPREA
KVQWKVDNALQSGNSQESVTEQDSKDYSLSTLTLSKADYEKHKVYACEVTHQGLS
SPVTKSFNRGEC

SEQ ID NO: 47 > 1923Ab13 Heavy Chain

QVQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKCLEWVAIIWYDGIN
KYYADSVKGRFTISRDN SKNTLYLQMNSLKAEDNAVYYCARDQDYDILTGYKEDYFD
FWGQGTILVTVSSGGGSGGGGSGGGGSSYELTQPPSVSVSPGQTARITCSGDALPKKYA
YWYQQKSGQAPVLVIYEDSKRPSGIPERFSGSSSGTMTLTISGAQVEDEADYYCYSTDS
SGNRVFGCGTKLTVLGGGSGGGGSGGGGSGGGGSGVQLVQSGAEVKKPGASVKVSC
KASGYTFTSYDINWVRQATGQGLEWMGWMNPNSGITGYAQRFFQGRVTMTRDTSISTA
YMELSSLRSEDNAVYYCARHRWGKGYLDLWGRGTLVTVSSASTKGPSVFPLAPSSKST
SGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPAVLQSSGLYSLSSVVTVPSSSLGT
QTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAPEAAGGPSVFLFPPKPKDTLMISR
TPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQD
WLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKG
FYPSDIAVEWESNGQPENNYKTTTPVLDSDGSFFLYSKLTVDKSRWQQGNVFCFSVMHE
ALHNHYTQKSLSLSPGK

FIG. 1G

SEQ ID NO: 48 > 1923Ab16 Heavy Chain

QVQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKGLEWVAIIWYDGIN
KYYADSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYFD
FWGQGT LVT VSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVT VSWNSGALT
SGVHTFPAVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTH
TCPPCPAPEAAGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVE
VHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKG
QPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLD S
DGSFFLYSKLTVDKSRWQQGNV FSCSVMHEALHNHYTQKSLSLSPGGGGSGGGGSGGG
GSEIVMAQSPATLSLSPGERATLSCRASQSVSSSYLSWFQKPGQAPRLLIYGASTRATGI
PARFGGSGSGTDFTLTISSLPEDFAVYYCQQDYNLPTFGQGTKLEIKGGGGSGGGGS
GGGGSQVQLVQSGAEVKKPGASVKVSCKASGYFTSYDINWVRQATGQGLEWMGWM
NPNSGITGYAQR FQGRVTMTRDTSISTAYMELSSLRSEDTAVYYCARHRWGKG YLDLW
GRGTLTVTVSS

SEQ ID NO: 49 > 1923Ab16 Light Chain

SYELTQPPSVSVSPGQTARITCSGDALPKKYAYWYQQKSGQAPVLVIYEDSKRPSGIPER
FSGSSSGT MATLTISGAQVEDEADYYCYSTDSSGNRVFGGGTKLTVLGOPKANPTVTLF
PPSSEELQANKATLVCLISDFYPGAVTVAWKADGSPVKAGVETTKPSKQSNKYAASSY
LSLTPEQWKSHRSYSCQVTHEGSTVEKTVAPTECSGGGGSGGGGSGGGGSTIPPHVQKS
VNNDMIVTDNNGAVKFPQLCKFCDVRFSTCDNQKSCMSNCSITSICEKPQEVCAVWR
KNDENITLETVCHDPKLPYHDFILED AASPKCIMKEKKKPGETFFMCSCSSDECNDNIIFS
EEYNTSNPD

SEQ ID NO: 50 > 1923Ab17 and 1923Ab18 Heavy Chain

QVQLVQSGAEVKKPGASVKVSCKASGYFTSYDINWVRQATGQGLEWMGWMNPNSG
ITGYAQR FQGRVTMTRDTSISTAYMELSSLRSEDTAVYYCARHRWGKG YLDLWGRGTL
VT VSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVT VSWNSGALTSGVHTFPA
VLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAP
EAAGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTK
PREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQV
YTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYS
KLTVDKSRWQQGNV FSCSVMHEALHNHYTQKSLSLSPGGGGSGGGGSGGGGSQVQLV
ESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKCLEWVAIIWYDGIN KYYADS
VKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYFD FFWGQG
TLVT VSSGGGGSGGGGSGGGGSGGGGSSYELTQPPSVSVSPGQTARITCSGDALPKKYA
YWYQQKSGQAPVLVIYEDSKRPSGIPERFSGSSSGT MATLTISGAQVEDEADYYCYSTD S
SGNRVFGCGTKLTVL

FIG. 1H

SEQ ID NO: 51 > 1923Ab19 and 1923Ab20 Heavy Chain

QVQLVQSGAEVKKPGASVKVSCKASGYTFTSYDINWVRQATGQGLEWMGWMNPNSG
ITGYAQRFGQGRVTMTRDTSISTAYMELSSLRSEDTAVYYCARHRWGKGYLDLWGRGTL
VTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPA
VLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAP
EAAGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTK
PREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQV
YTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPVLDSDGSFFLYS
KLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSPGSGGGSGGGSGGGSGSTIPPHV
QKSVNNDMIVTDNNGAVKFPQLCKFCDFRSTCDNQKSCMSNCSITSICEKPQEVCAV
WRKNDENITLETVCHDPKLPYHDFILEDAAAPKCIMKEKKKPGETFFMCSSSDECNDNI
IFSEYNTSNPD

SEQ ID NO: 52 > 1923Ab19 Light Chain

EIVMAQSPATLSLSPGERATLSCRASQSVSSSYLSWFOQKPGQAPRLLIYGASTRATGIPA
RFGGSGSGTDFTLTISSLQPEDFAVYYCQQDYNLPYTFGQGTKLEIKRTVAAPSVFIFPPS
DEQLKSGTASVVCLLNFPYAPREKAVQWKVDNALQSGNSQESVTEQDSKDSTYLSSTL
TLKADYEKHKVYACEVTHQGLSSPVTKSFNRGECGGGGSGGGSGGGSGQVQLVESG
GGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKCLEWVAIIWYDGINKYYADSVK
GRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYDFDFWGQGLTV
TVSSGGGGSGGGSGGGSGGGSGGGSSYELTQPPSVSVSPGQTARITCSGDALPKKYAYW
YQKSGQAPVLVIYEDSKRPSGIPERFSGSSSGTMTLTISGAQVEDEADYYCYSTDSSG
NRVFGCGTKLTVL

SEQ ID NO: 53 > scFv that binds CD137

QVQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKGLEWVAIIWYDGIN
KYYADSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYDF
FWGQGLTVTVSSGGGGSGGGSGGGSGGGSSYELTQPPSVSVSPGQTARITCSGDALPKKYA
YWYQKSGQAPVLVIYEDSKRPSGIPERFSGSSSGTMTLTISGAQVEDEADYYCYSTD
SGNRVFGGGTKLTVL

SEQ ID NO: 54 > scFv (LH) that binds CD137

YELTQPPSVSVSPGQTARITCSGDALPKKYAYWYQKSGQAPVLVIYEDSKRPSGIPERF
SGSSSGTMTLTISGAQVEDEADYYCYSTDSSGNRVFGGGTKLTVLGGGGSGGGSGG
GGQVQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKGLEWVAIIWYD
GINKYYADSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKED
YDFDFWGQGLTVTVSS

FIG. 11

SEQ ID NO: 55 > scFv* with 4x (G4S) linker that binds CD137

QVQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKCLEWVAIIWYDGIN
KYYADSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYFD
FWGQGT LVT VSSGGGGSGGGGSGGGGSSYELTQPPSVSVSPGQTARITCSGDAL
PKKYAYWYQQKSGQAPVLVIYEDSKRPSGIPERFSGSSSGTMTLTISGAQVEDEADYY
CYSTDSSGNRVFGCGTKLTVL

SEQ ID NO: 56 > scFv* with 3x (G4S) linker that binds CD137

QVQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKCLEWVAIIWYDGIN
KYYADSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYFD
FWGQGT LVT VSSGGGGSGGGGSGGGGSSYELTQPPSVSVSPGQTARITCSGDALPKKYA
YWYQQKSGQAPVLVIYEDSKRPSGIPERFSGSSSGTMTLTISGAQVEDEADYYCYSTD
SGNRVFGCGTKLTVL

SEQ ID NO: 57 > scFv (LH) that binds PD-L1

EIVMAQSPATLSLSPGERATLSCRASQSVSSSYLSWFQQKPGQAPRLLIYGASTRATGIPA
RFGGSGSGTDFTLTISSLQPEDFAVYYCQQDYNLPYTFGQGTKLEIKGGGGSGGGSGG
GGSQVQLVQSGAEVKKPGASVKVSKASGYTFTSYDINWVRQATGGGLEWMGWMNP
NSGITGYAQRFGQGRVTMTRDTSISTAYMELSSLRSEDTAVYYCARHRWGKG YLDLWGR
GTLVTVSS

SEQ ID NO: 58 > 3x (G4S) linker

GGGGSGGGGSGGGGS

SEQ ID NO: 59 > 4x (G4S) linker

GGGGSGGGGSGGGGSGGGGS

SEQ ID NO: 60 > Human IgG1 constant region

ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPAVLQSS
GLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAPELLGG
PSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQY
NSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSR
DELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPVLDSDGSFFLYSKLTVDK
SRWQQGNVFSCSVMHEALHNHYTQKSLSLSPK

FIG. 1J

SEQ ID NO: 61 > Human IgG1 constant region LALA

ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPAVLQSS
GLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAPEAAG
GPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQ
YNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPS
RDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVD
KSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPK

SEQ ID NO: 62 > Human IgG1 constant region with LALA and “Knob”

ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPAVLQSS
GLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAPEAAG
GPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQ
YNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPC
RDELTKNQVSLWCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVD
KSRWQQGNVFSCSVMHEALHNHYTQKSLSLSP

SEQ ID NO: 63 > Human IgG1 constant region with LALA and “Hole”

ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPAVLQSS
GLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAPEAAG
GPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQ
YNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVCTLPPS
RDELTKNQVSLSCAVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLVSKLTVD
KSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

SEQ ID NO: 64 > Human IgG4 constant region S228P

ASTKGPSVFPLAPCSRSTSESTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPAVLQSS
GLYSLSSVVTVPSSSLGTQTYTCNVNHDHPSNTKVDKRVESKYGPPCPPCPAPEFLGGPSV
FLFPPKPKDTLMISRTPEVTCVVVDVSQEDPEVQFNWYVDGVEVHNAKTKPREEQFNST
YRVVSVLTVLHQDWLNGKEYKCKVSNKGLPSSIEKTISKAKGQPREPQVYTLPPSQEEM
TKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSRLTVDKSRW
QEGNVFSCSVMHEALHNHYTQKSLSLSPGK

SEQ ID NO: 65 > Human Kappa constant region

RTVAAPSVFIFPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNSQESVTEQ
DSKDSTYLSSTLTLSKADYEKHKVYACEVTHQGLSPVTKSFNRGEC

FIG. 1K**SEQ ID NO: 66** > Human Lambda constant region

GQPKANPTVTLFPPSSEELQANKATLVCLISDFYPGAVTVAWKADGSPVKAGVETTKPS
KQSNNKYAASSYLSLTPEQWKSHRSYSCQVTHEGSTVEKTVAPTECS

SEQ ID NO: 67 > Human TGF-beta receptor type-2 ECD

TIPPHVQKSVNNDMIVTDNNGAVKFPQLCKFCDFRFSTCDNQKSCMSNCSITSICEKPQE
VCVAVWRKNDENITLETVCHDPKLPYHDFILEDAAAPKCIMKEKKKPGETFFMCSCSSD
ECNDNIIFSEEYNTSNPD

SEQ ID NO: 75 > Heavy Chain that binds CD137 (Ab4 VH-hlgG1 LALA)

QVQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKGLEWVAIIWYDGIN
KYYADSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYFD
FWGQGTLLTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALT
SGVHTFPAVLQSSGLYSLSSVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTH
TCPPCPAPEAAGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVE
VHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKG
QPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPVLDS
DGSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSP

SEQ ID NO: 76 > Light Chain that binds CD137 (Ab4 VL-Lambda)

SYELTQPPSVSVSPGQTARITCSGDALPKKYAYWYQOKSGQAPVLVIYEDSKRPSGIPER
FSGSSSGTMTALTISGAQVEDEADYYCYSTDSSGNRVFGGGTKLTVLGQPKANPTVTLF
PPSSEELQANKATLVCLISDFYPGAVTVAWKADGSPVKAGVETTKPSKQSNNKYAASSY
LSLTPEQWKSHRSYSCQVTHEGSTVEKTVAPTECS

FIG. 2A

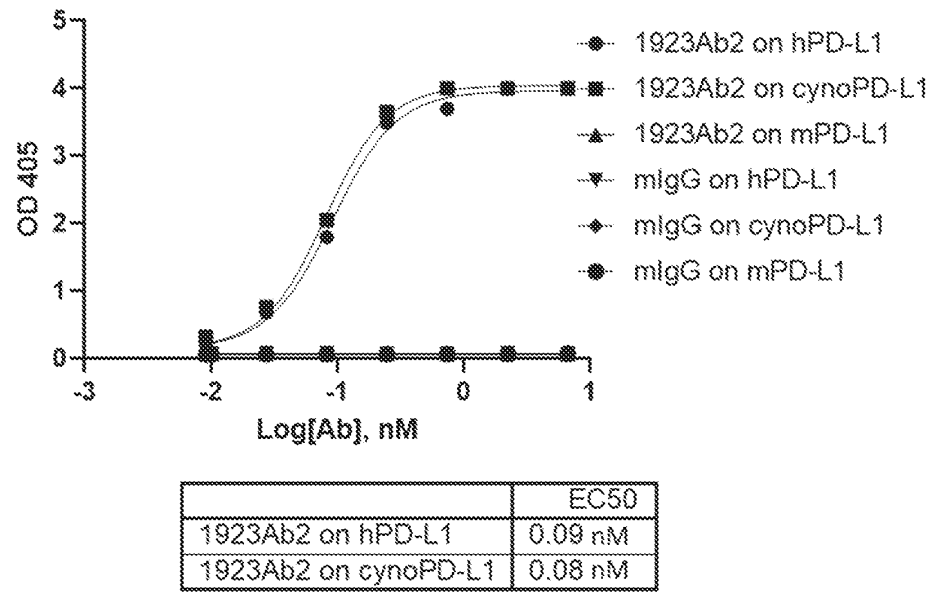


FIG. 2B

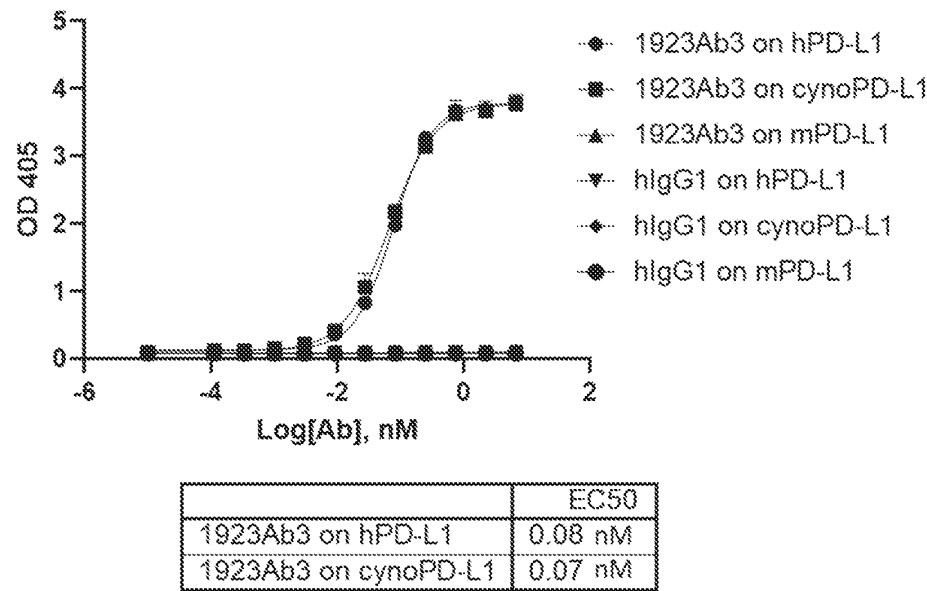
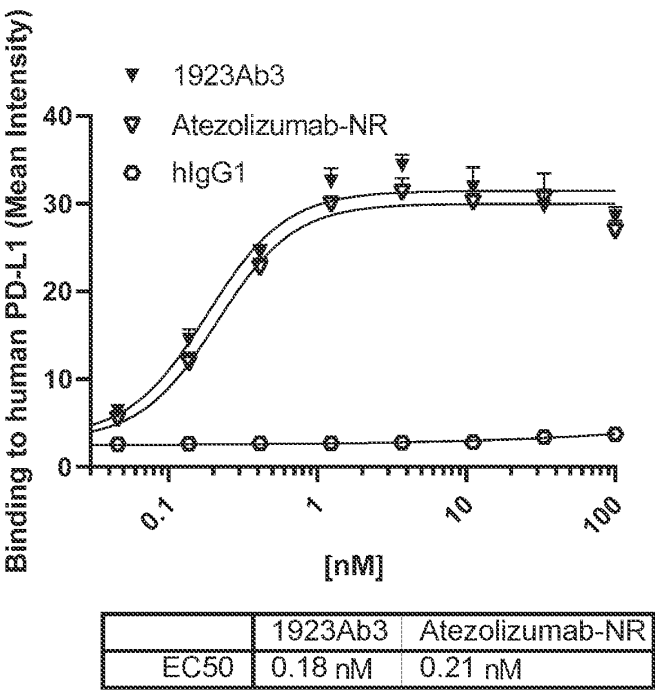


FIG. 3



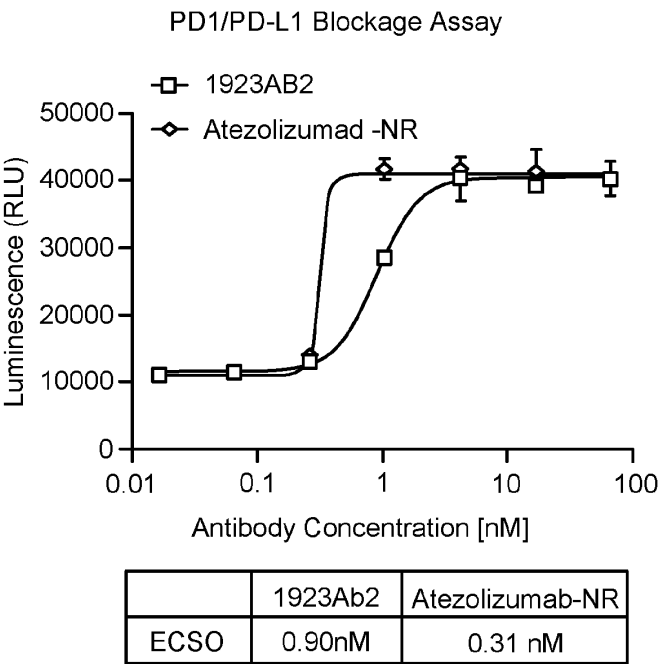


FIG. 4A

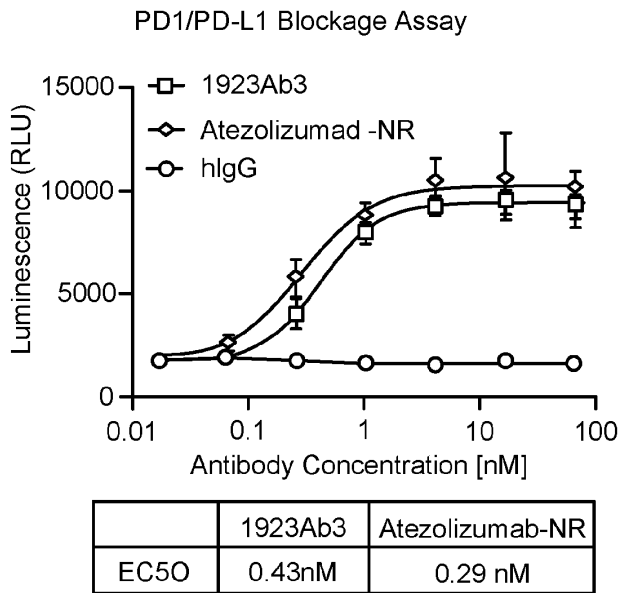


FIG. 4B

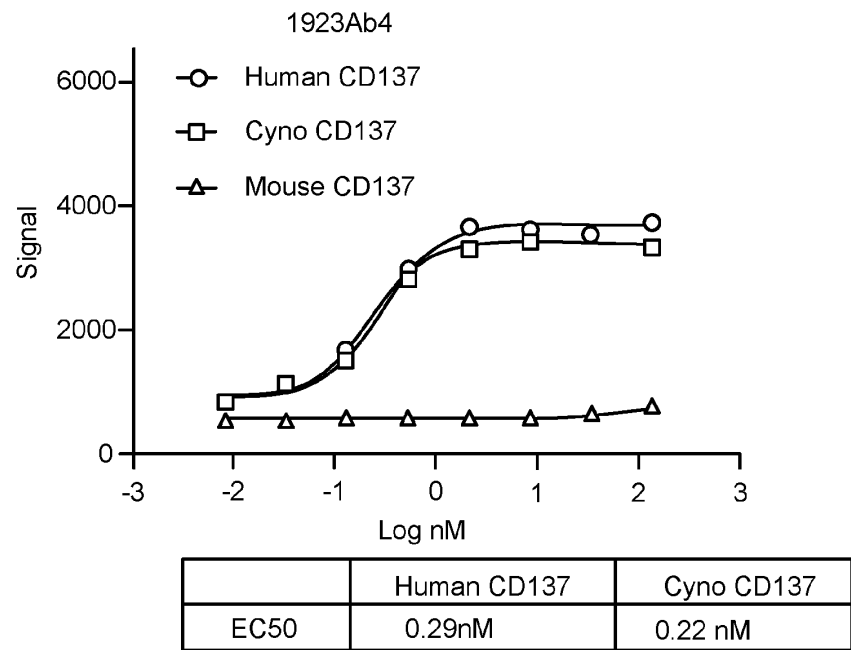


FIG. 5A

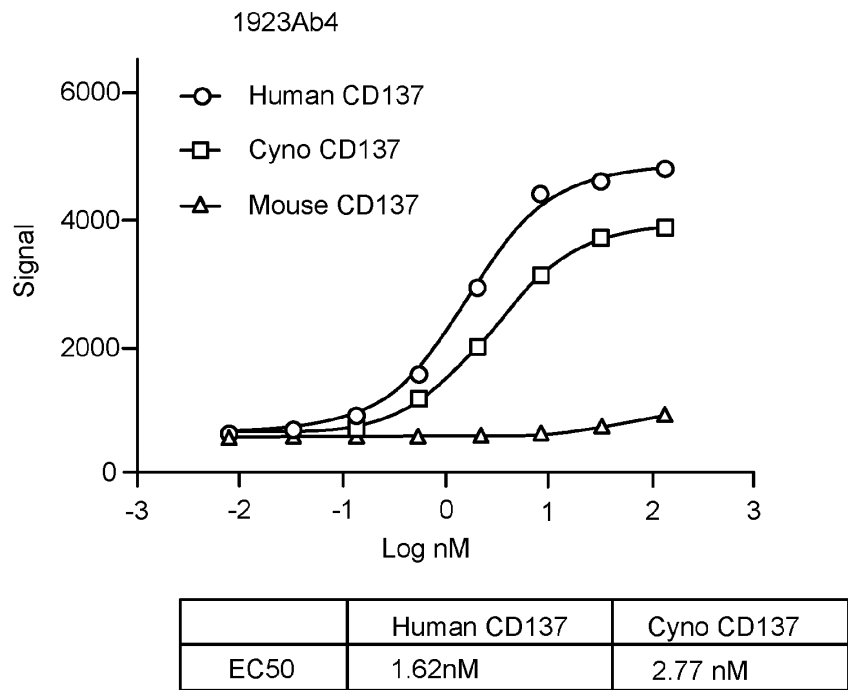
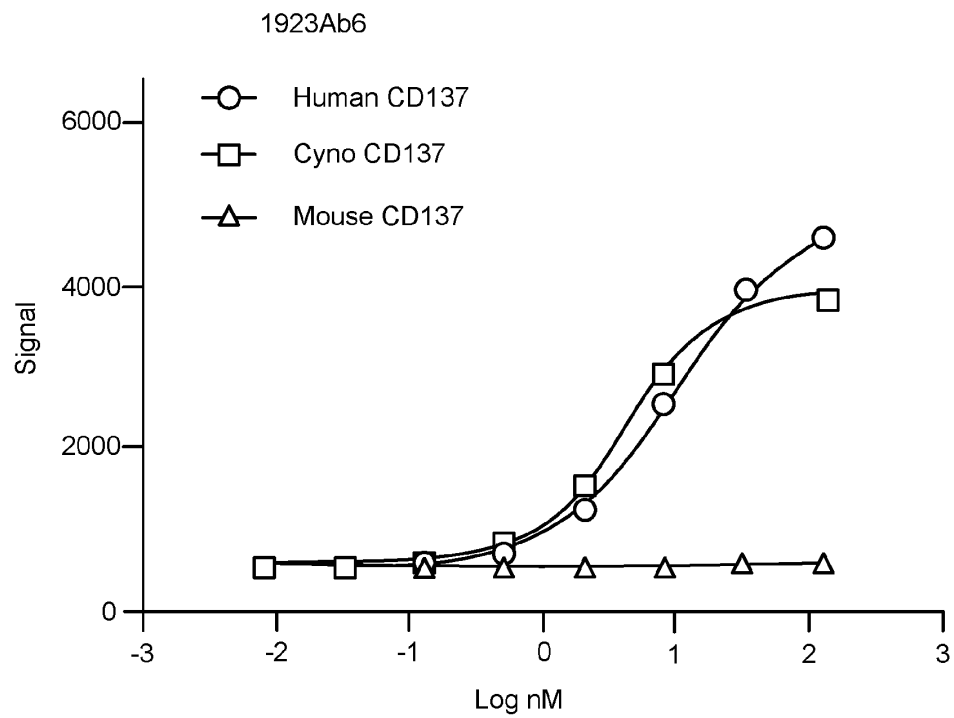


FIG. 5B



	Human CD137	Cyno CD137
EC50	10.5 nM	4.23 nM

FIG. 5C

FIG. 6

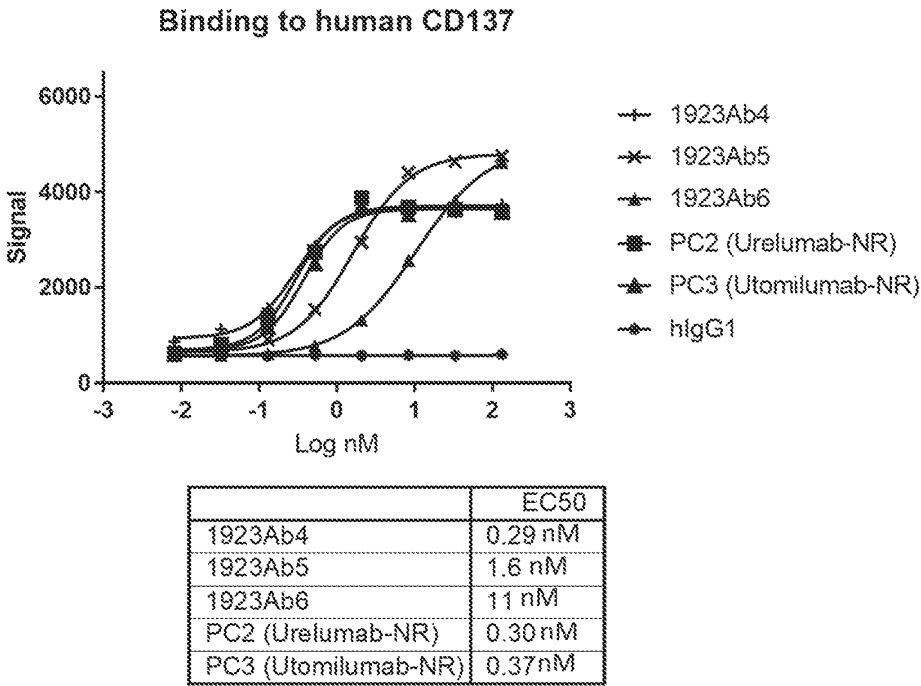


FIG. 7

Clones	Ligand blocking
1923Ab4	Yes
1923Ab5	No
1923Ab6	No
PC2 Urelumab-NR	No
PC3 Utomilumab-NR	Yes

FIG. 8

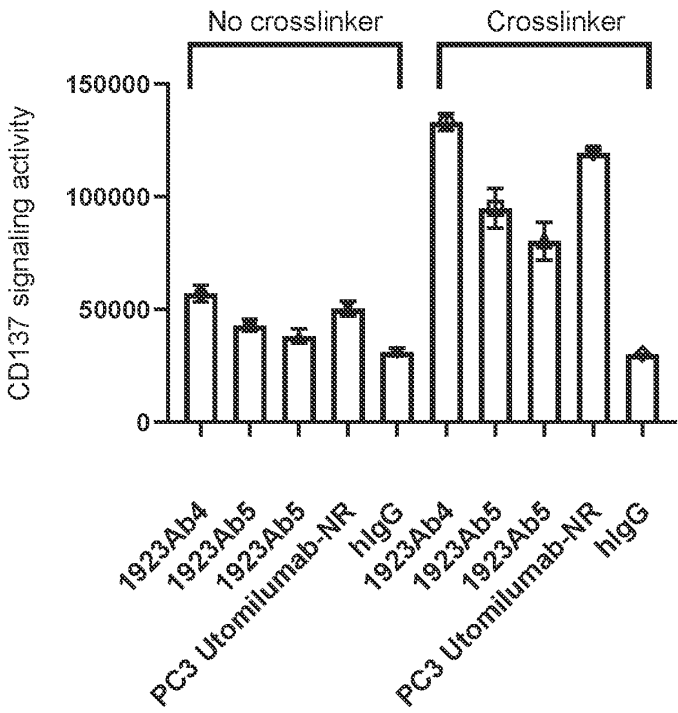
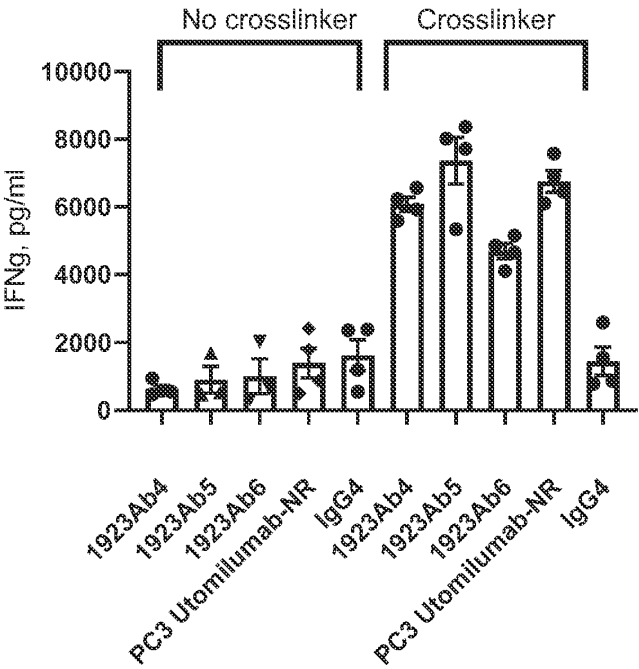


FIG. 9



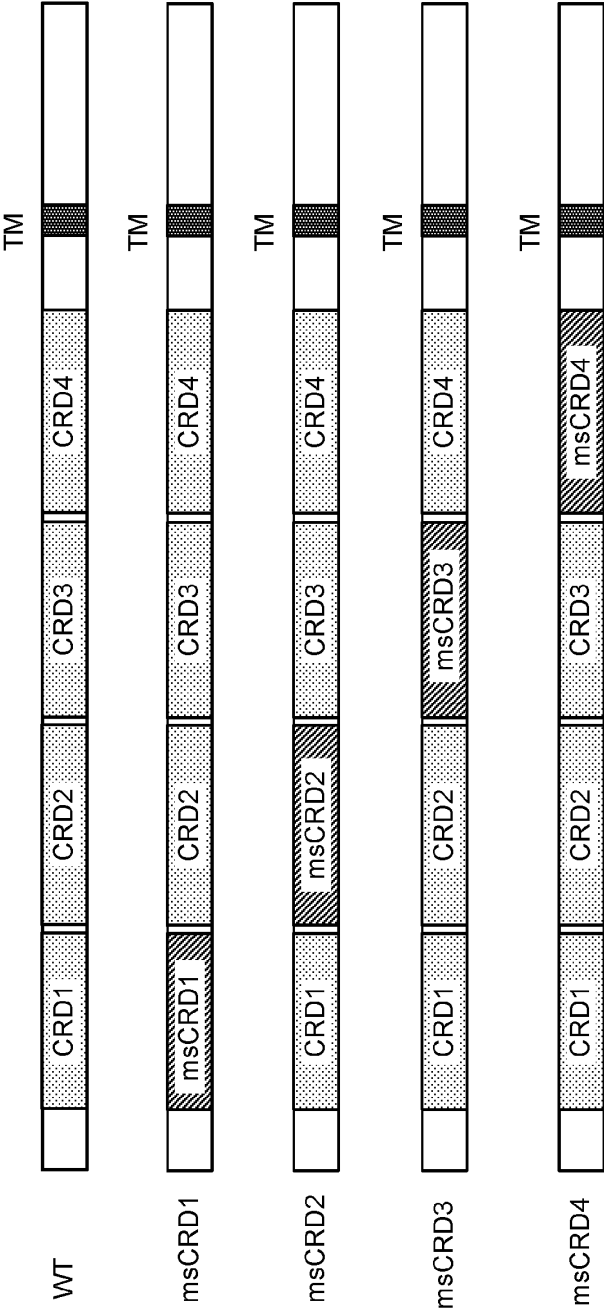


FIG. 10A

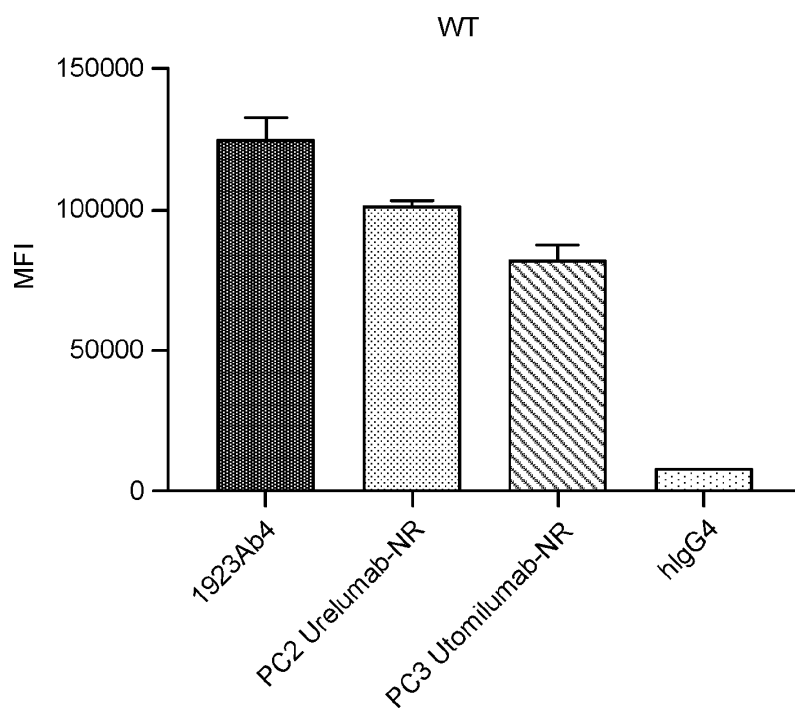


FIG. 10B

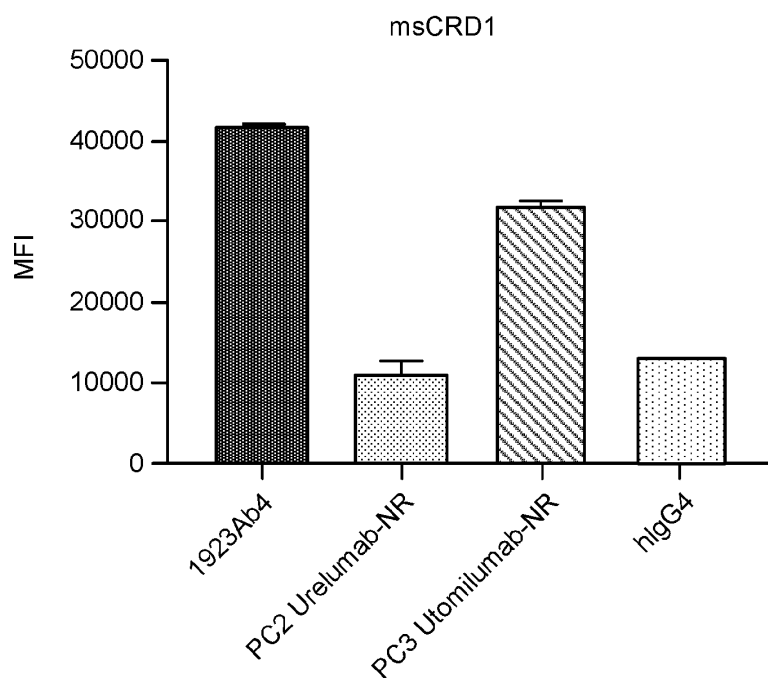


FIG. 10C

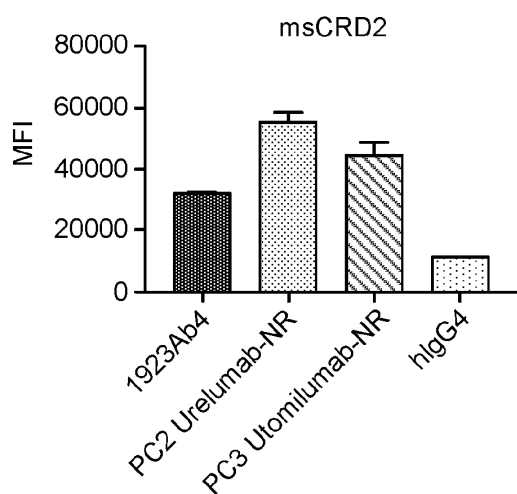


FIG. 10D

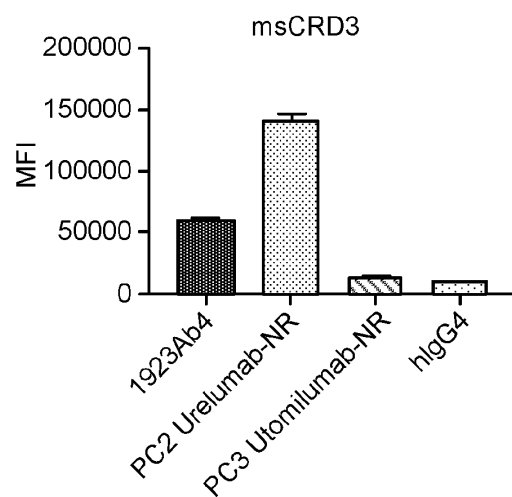


FIG. 10E

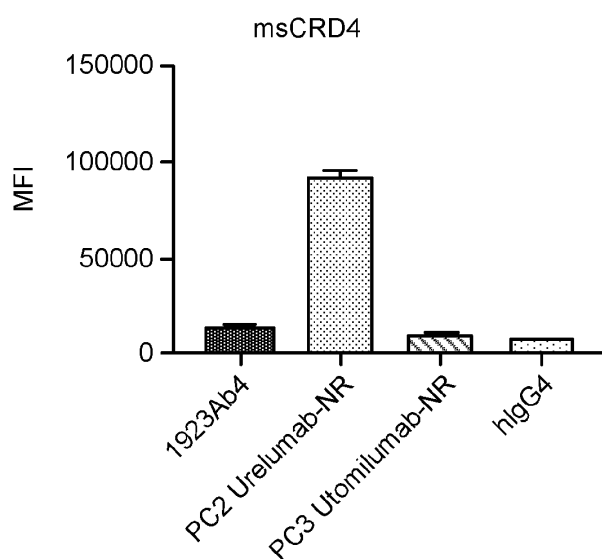


FIG. 10F

CRD4 of CD137									
	M1	M2	M3	M4	M5				
Hu	CCFGTFNDQK-RGI	CRPWTNCSLDGKSVLV	NGTKERD	VVCG					
C	GT	FNDQ	G+	CRPWTNCSLDG+SVL	GT	E+	DV	VCG	
Ms	CSL	GT	FNDQ	NGTGV	CRPWTNCSLDGRSVL	KTGT	TEK	DV	VCG

FIG. 11A

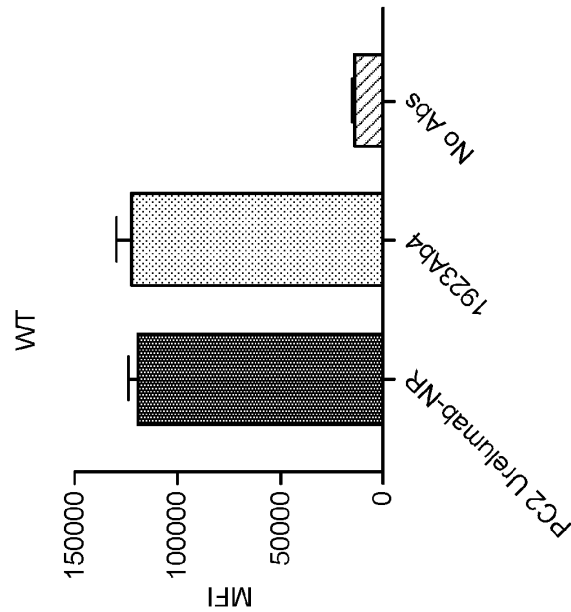


FIG. 11B

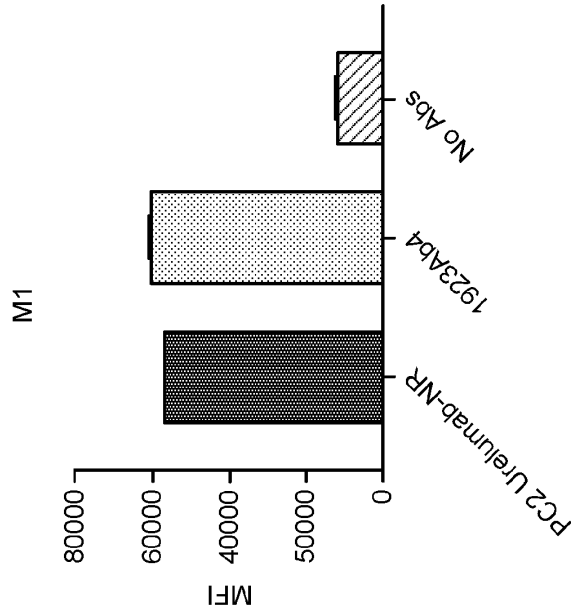


FIG. 11C

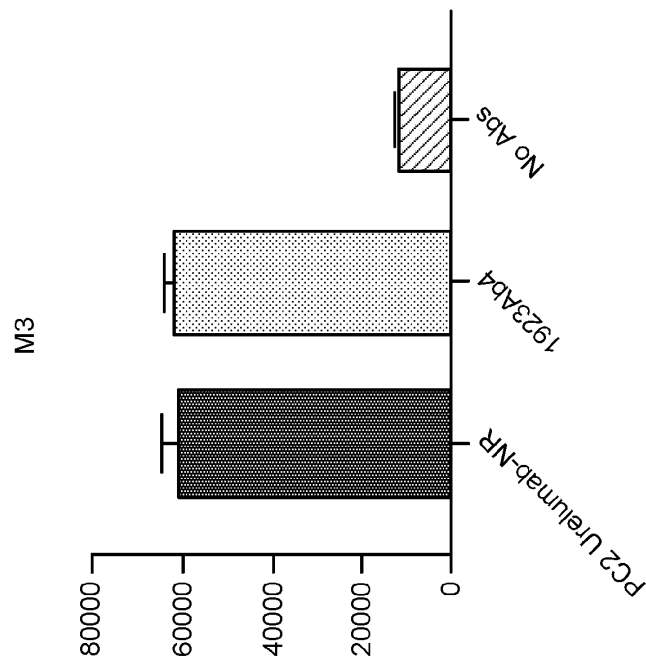


FIG. 11E

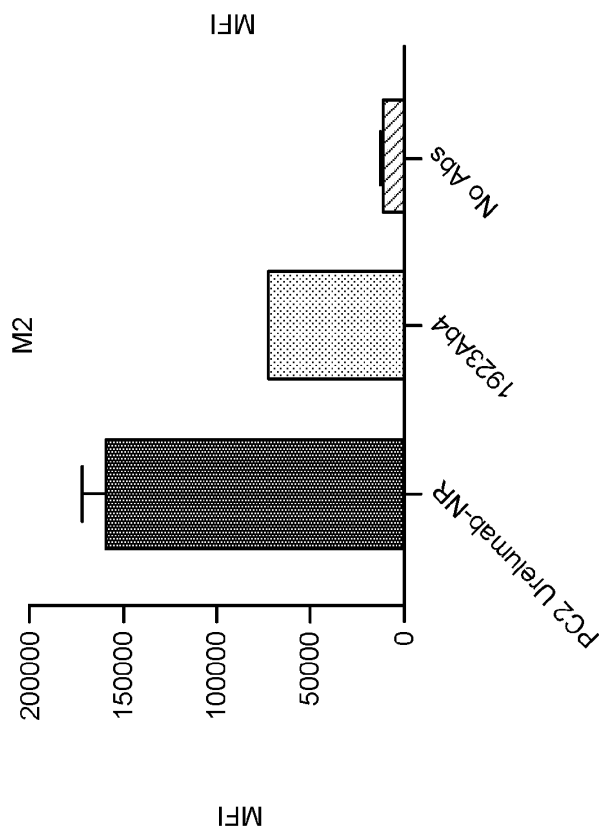


FIG. 11D

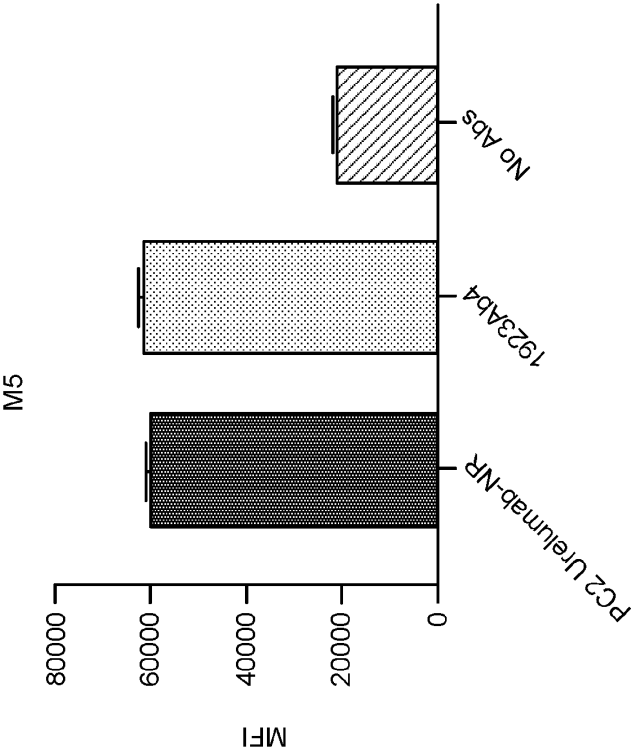


FIG. 11G

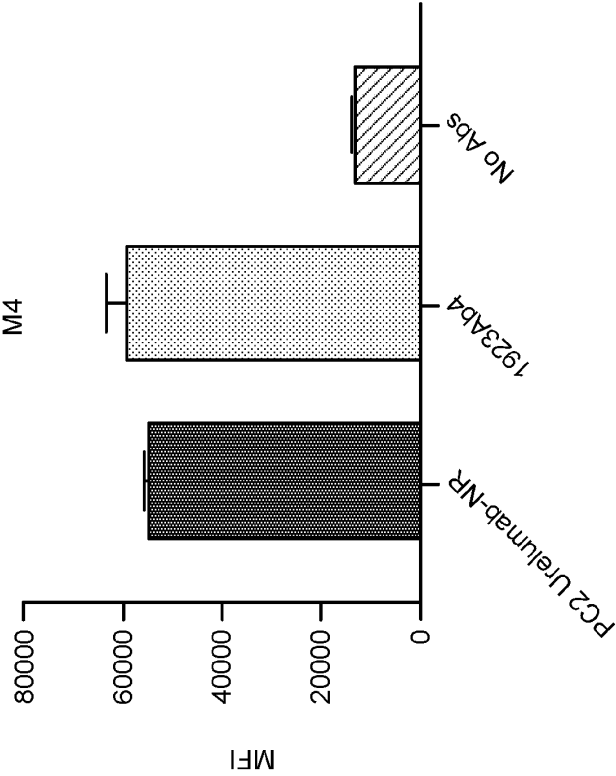


FIG. 11F

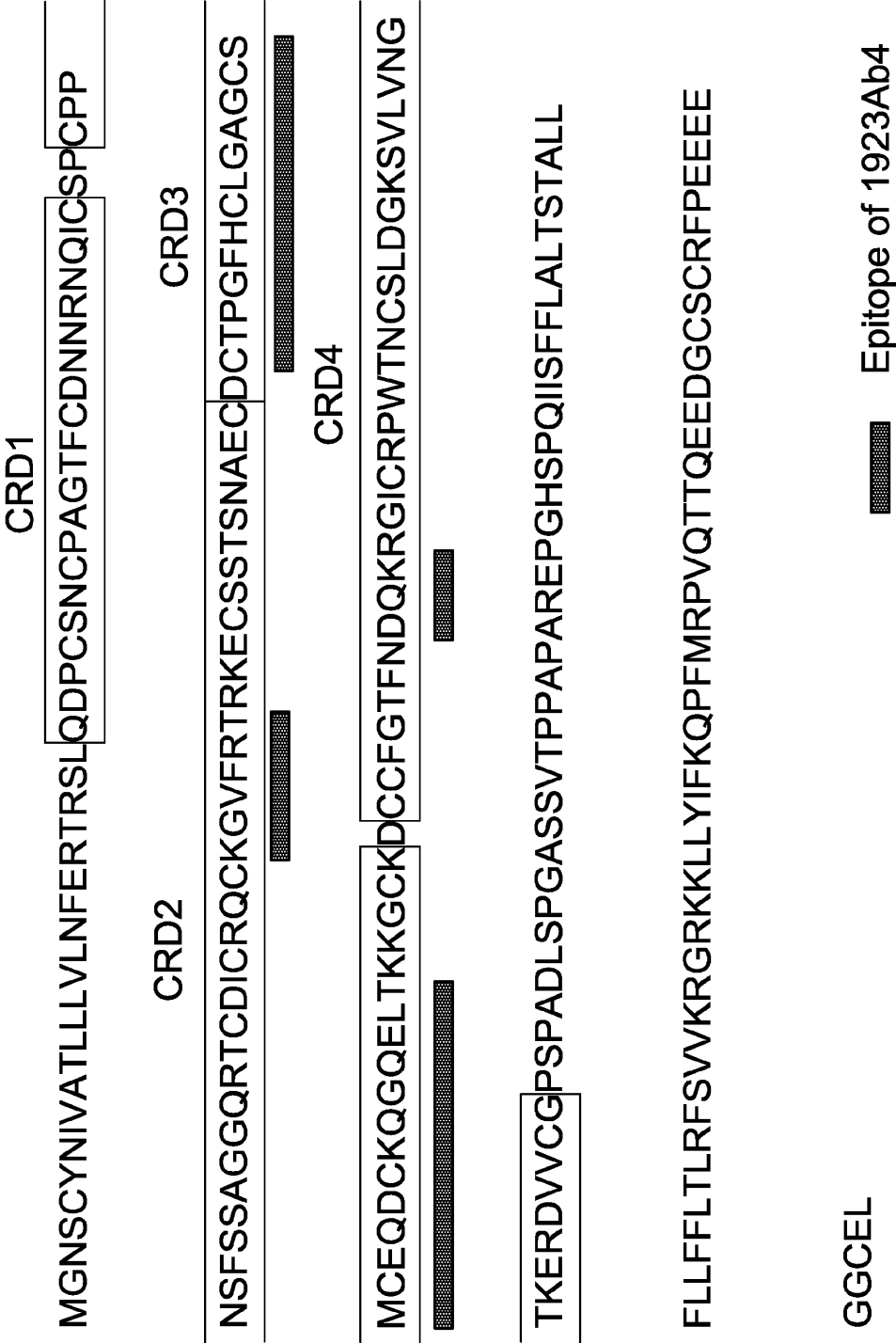


FIG. 12

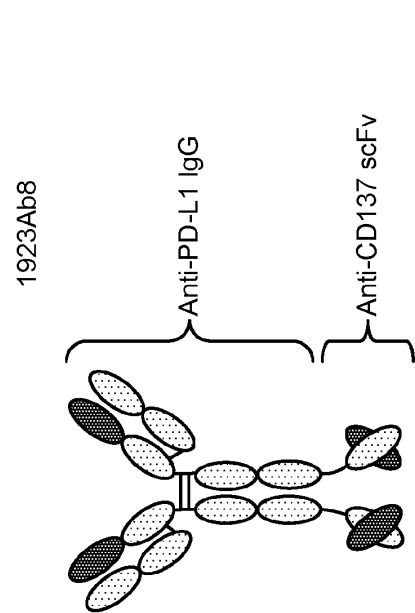


FIG. 13B

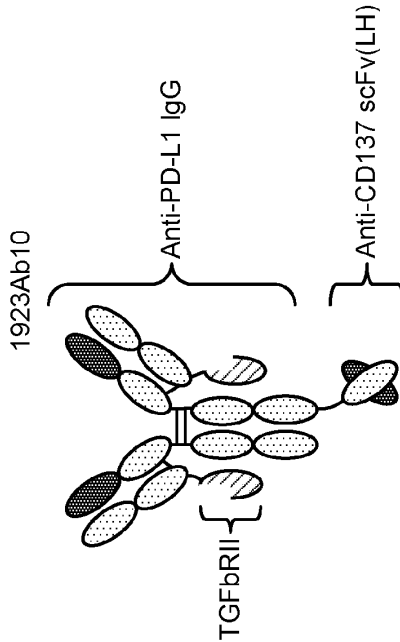


FIG. 13D

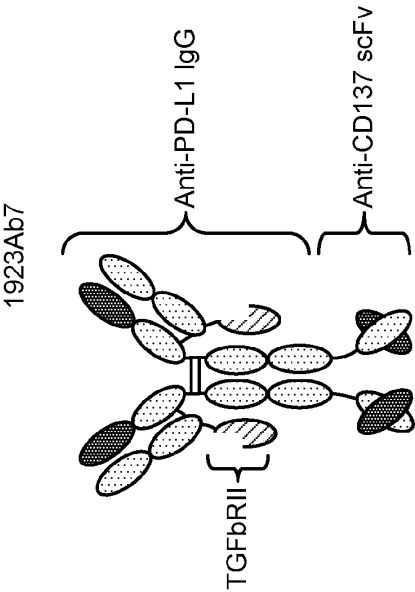


FIG. 13A

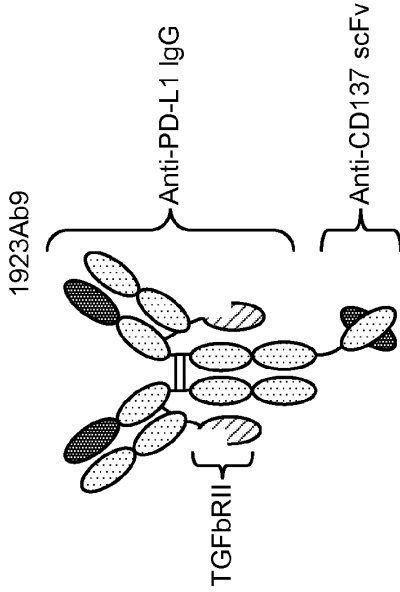


FIG. 13C

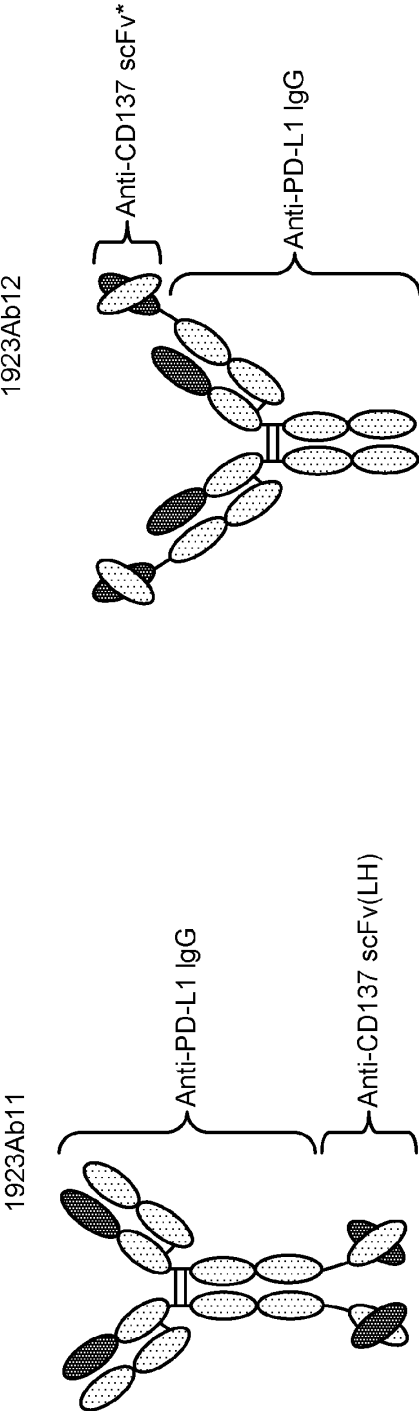


FIG. 13E

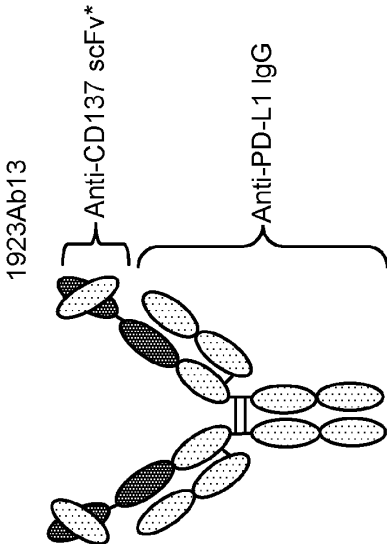


FIG. 13G

1923Ab12

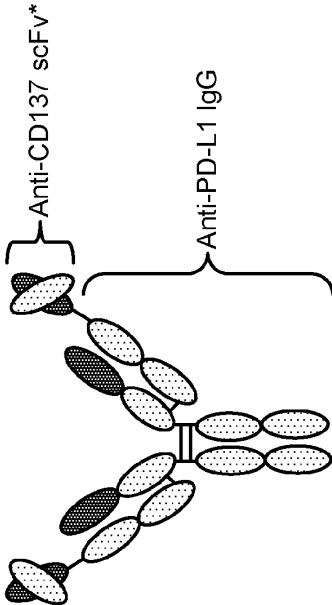


FIG. 13F

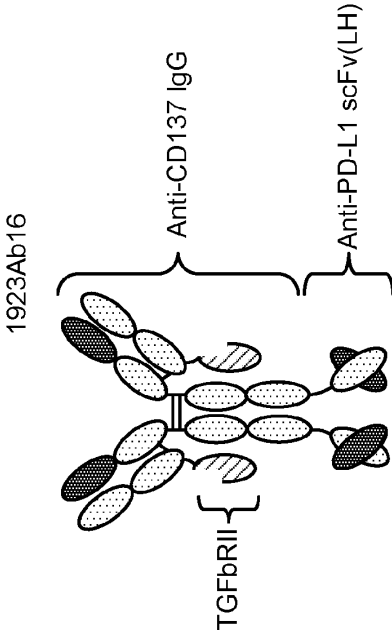


FIG. 13H

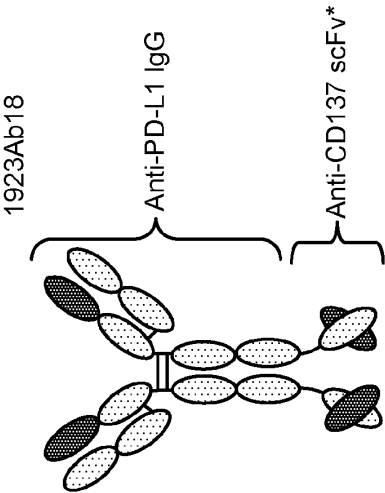


FIG. 13J

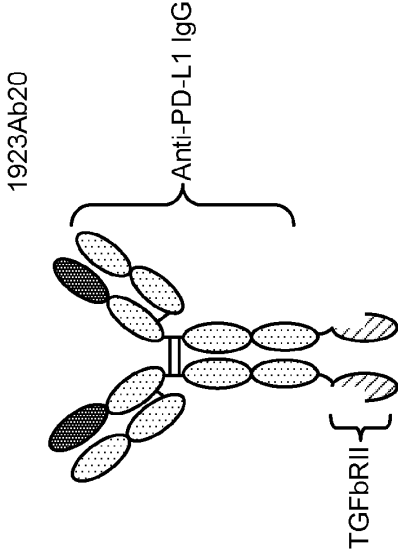


FIG. 13L

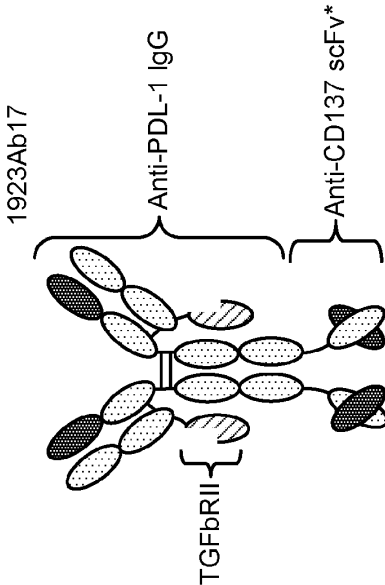


FIG. 13I

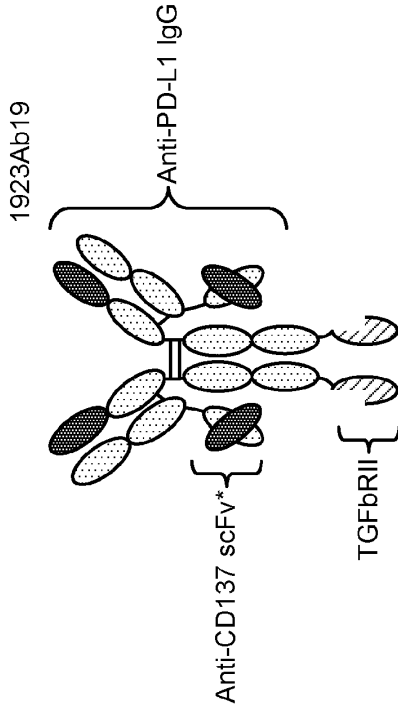


FIG. 13K

*:scFv is stabilized by disulfide bond; (LH; order as VL- VH)

FIG. 14A

Bispecific (* introduced disulfide bond to stabilize scFv)

Proteinaceous Molecule	Heavy chain (HC)	Light chain (LC)
1923Ab8	Ab3 VH-hlgG1 LALA-3x(G4S)-Ab4 VH-3x(G4S)-Ab4 VL	Ab3 VL-hKappa
1923Ab11	Ab3 VH-hlgG1 LALA-3x(G4S)-Ab4 VL-3x(G4S)-Ab4 VH	Ab3 VL-hKappa
1923Ab12	Ab3 VH-hlgG1 LALA	Ab4 VH*-3x(G4S)-Ab4 VL*-4x(G4S)-Ab3 VL-hKappa
1923Ab13	Ab4 VH*-3x(G4S)-Ab4 VL*-4x(G4S)-Ab3 VH-hlgG1 LALA	Ab3 VL-hKappa
1923Ab18	Ab3 VH-hlgG1 LALA-3x(G4S)-Ab4 VH*-4x(G4S)-Ab4 VL*	Ab3 VL-hKappa
1923Ab20	Ab3 VH-hlgG1 LALA-3x(G4S)-TGFbRII	Ab3 VL-hKappa

FIG. 14B

Trispecific (* introduced disulfide bond to stabilize scFv)

Proteinaceous Molecule	Heavy chain (HC) 1	Heavy chain (HC) 2	Light chain (LC)
1923Ab7	Ab3 VH-hlgG1 LALA-3x(G4S)-Ab4 VH-3x(G4S)-Ab4 VL		Ab3 VL-hKappa-3x(G4S)-TGFbRII
1923Ab9	Ab3 VH-hlgG1 LALA Knob-3x(G4S)-Ab4 VH-3x(G4S)-Ab4 VL	Ab3 VH-hlgG1 LALA Hole	Ab3 VL-hKappa-3x(G4S)-TGFbRII
1923Ab10	Ab3 VH-hlgG1 LALA Knob-3x(G4S)-Ab4 VL-3x(G4S)-Ab4 VH	Ab3 VH-hlgG1 LALA Hole	Ab3 VL-hKappa-3x(G4S)-TGFbRII
1923Ab16	Ab4 VH-hlgG1 LALA-3x(G4S)-Ab3 VL-3x(G4S)-Ab3 VH		Ab4 VL-Lambda-3x(G4S)-TGFbRII
1923Ab17	Ab3 VH-hlgG1 LALA-3x(G4S)-Ab4 VH*-4x(G4S)-Ab4 VL*		Ab3 VL-hKappa-3x(G4S)-TGFbRII
1923Ab19	Ab3 VH-hlgG1 LALA-3x(G4S)-TGFbRII		Ab3 VL-hKappa-3x(G4S)-Ab4 VH*-4x(G4S)-Ab4 VL*

FIG. 15

Ab	Symmetry	Specificity	Antibody Scaffold Module 1 (IgG)		Binding Module (scFv)						Binding Module (TME modulator)	
			Target	Fc	Binding Module location to IgG	Inter Linker	Target	scFv format	Stabilized	Binding Module location to IgG	Inter Linker	
1923Ab7	Symmetric	Tri-	PD-L1	hIgG1 LALA	HC C-terminus	3x (G4S)	CD137	VH-3x(G4S)-VL	No	LC C-terminus	3x (G4S)	
1923Ab8	Symmetric	Bi-	PD-L1	hIgG1 LALA	HC C-terminus	3x (G4S)	CD137	VH-3x(G4S)-VL	No			
1923Ab9	Asymmetric	Tri-	PD-L1	hIgG1 LALA, knob-in hole	HC (knob) C-terminus	3x (G4S)	CD137	VH-3x(G4S)-VL	No	LC C-terminus	3x (G4S)	
1923Ab10	Asymmetric	Tri-	PD-L1	hIgG1 LALA, knob-in hole	HC (knob) C-terminus	3x (G4S)	CD137	VL-3x(G4S)-VH	No	LC C-terminus	3x (G4S)	
1923Ab11	Symmetric	Bi-	PD-L1	hIgG1 LALA	HC C-terminus	3x (G4S)	CD137	VL-3x(G4S)-VH	No			
1923Ab12	Symmetric	Bi-	PD-L1	hIgG1 LALA	LC N-terminus	4x (G4S)	CD137	VH-3x(G4S)-VL	Yes			
1923Ab13	Symmetric	Bi-	PD-L1	hIgG1 LALA	HC N-terminus	4x (G4S)	CD137	VH-3x(G4S)-VL	Yes			
1923Ab16	Symmetric	Tri-	CD137	hIgG1 LALA	HC C-terminus	3x (G4S)	PD-L1	VL-3x(G4S)-VH	No	LC C-terminus	3x (G4S)	
1923Ab17	Symmetric	Tri-	PD-L1	hIgG1 LALA	HC C-terminus	3x (G4S)	CD137	VH-4x(G4S)-VL	Yes	LC C-terminus	3x (G4S)	
1923Ab18	Symmetric	Bi-	PD-L1	hIgG1 LALA	HC C-terminus	3x (G4S)	CD137	VH-4x(G4S)-VL	Yes			
1923Ab19	Symmetric	Tri-	PD-L1	hIgG1 LALA	LC C-terminus	3x (G4S)	CD137	VH-4x(G4S)-VL	Yes	HC C-terminus	3x (G4S)	
1923Ab20	Symmetric	Bi-	PD-L1	hIgG1 LALA						HC C-terminus	3x (G4S)	

FIG. 16A

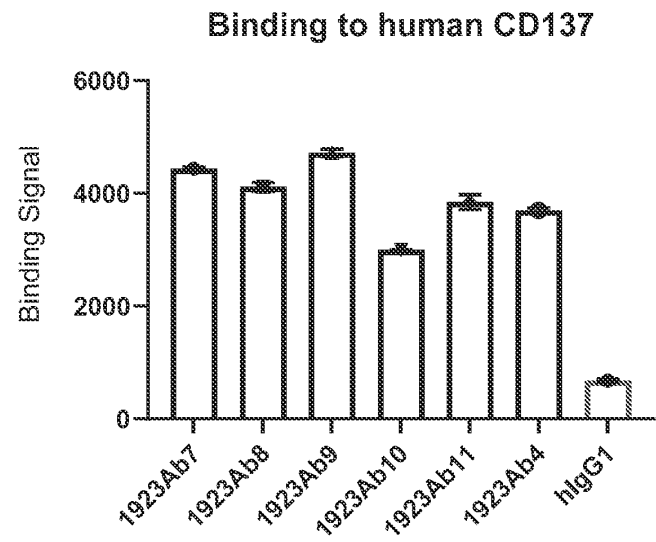


FIG. 16B

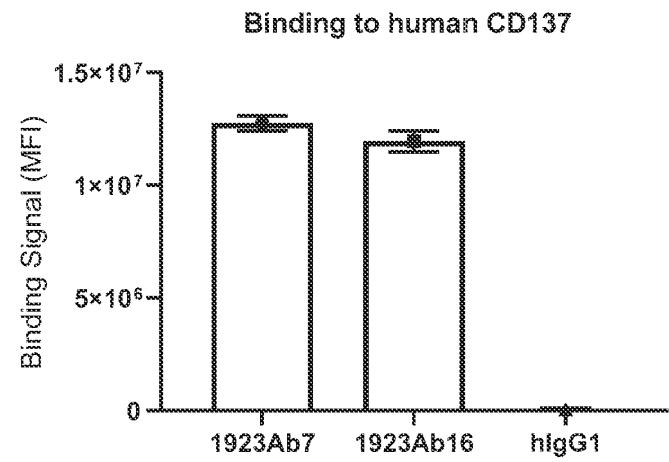


FIG. 17A

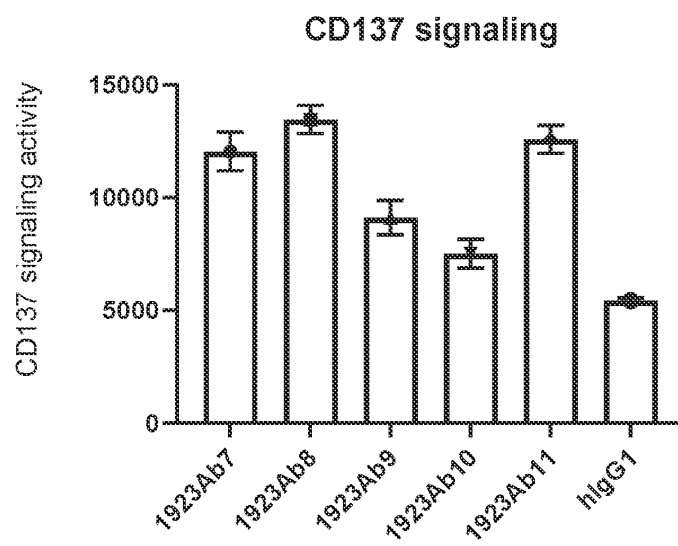
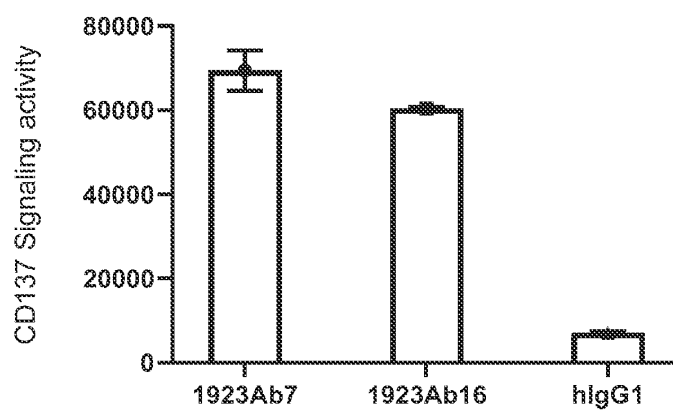


FIG. 17B



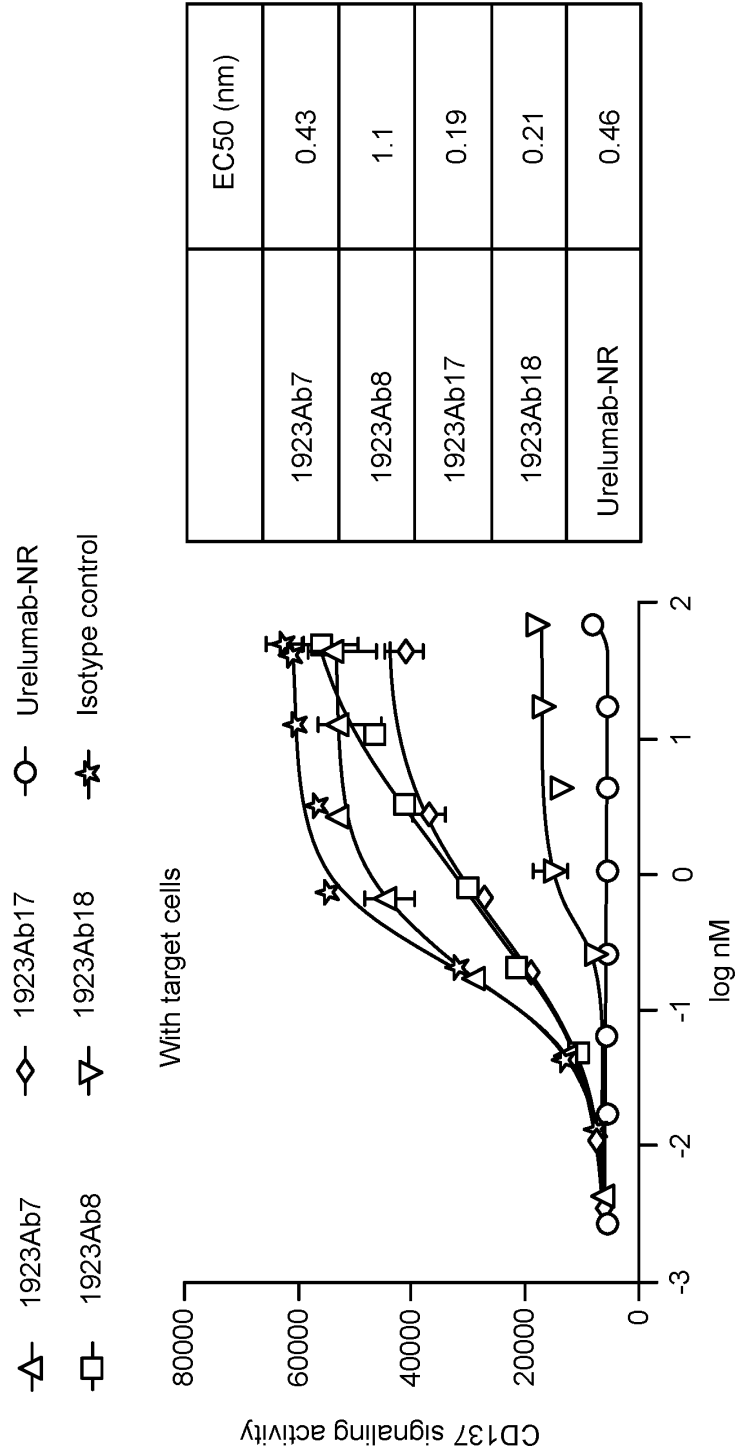
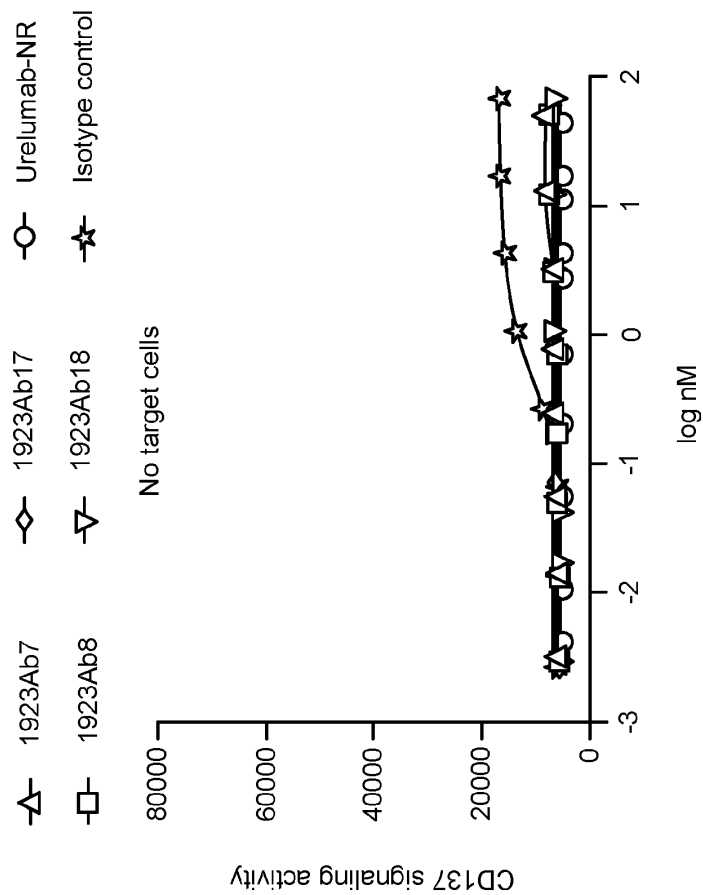


FIG. 18A



SUBSTITUTE SHEET (RULE 26)

FIG. 18B

	EC50 (nm)
1923Ab7	Inactive
1923Ab8	Inactive
1923Ab17	Inactive
1923Ab18	Inactive
Urelumab-NR	0.57

FIG. 19A

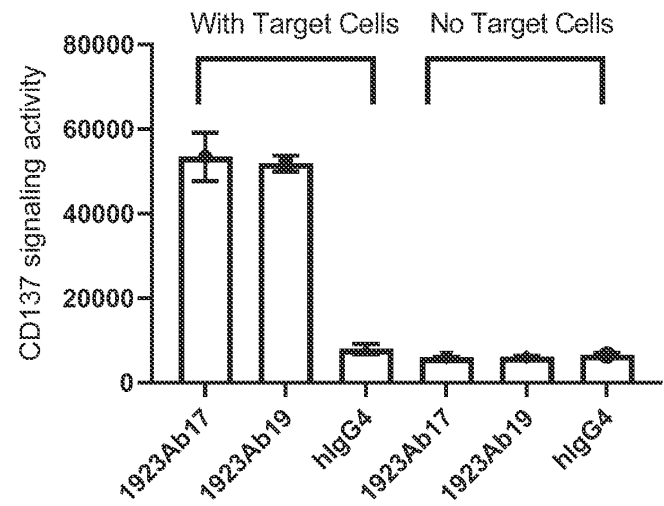


FIG. 19B

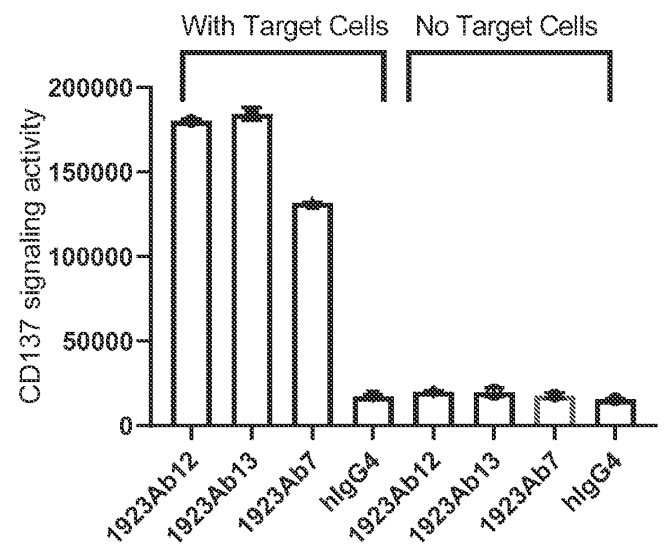


FIG. 20

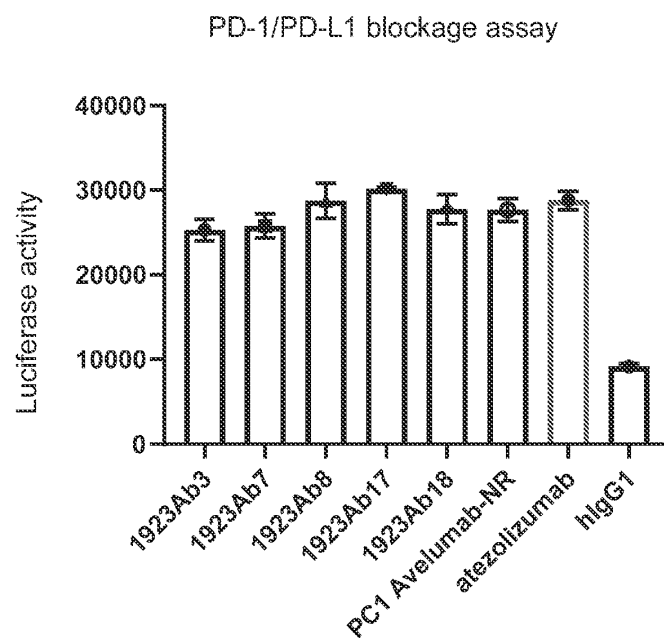


FIG. 21

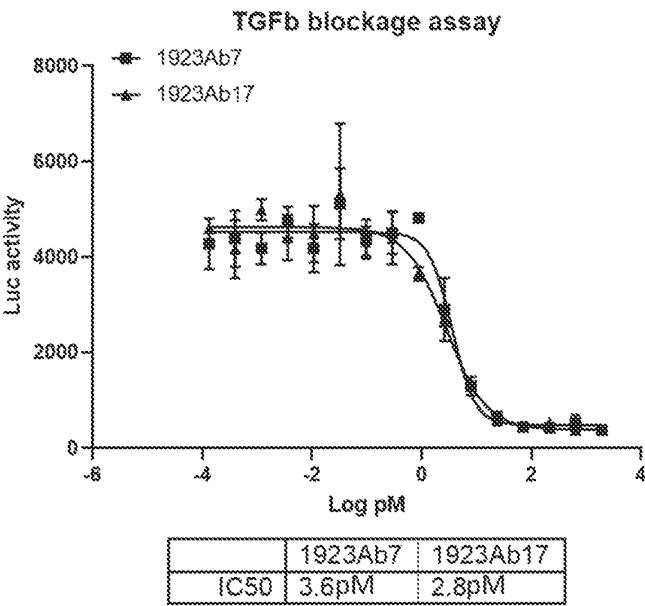


FIG. 22A

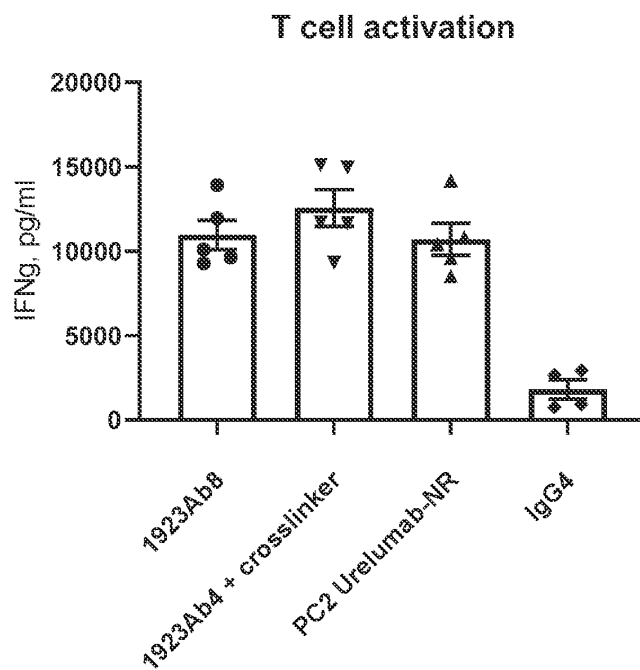


FIG. 22B

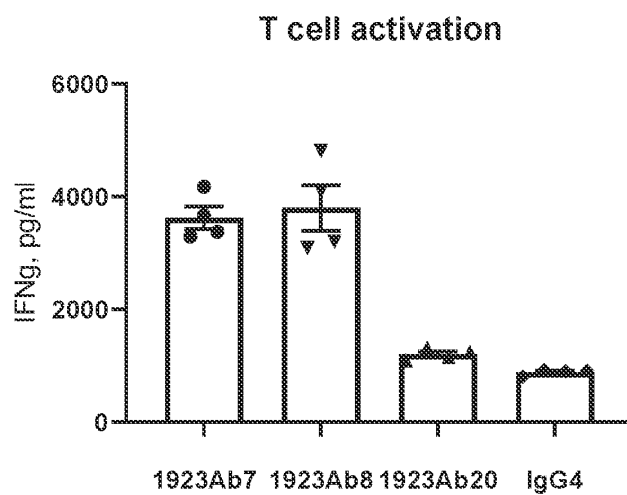


FIG. 23A

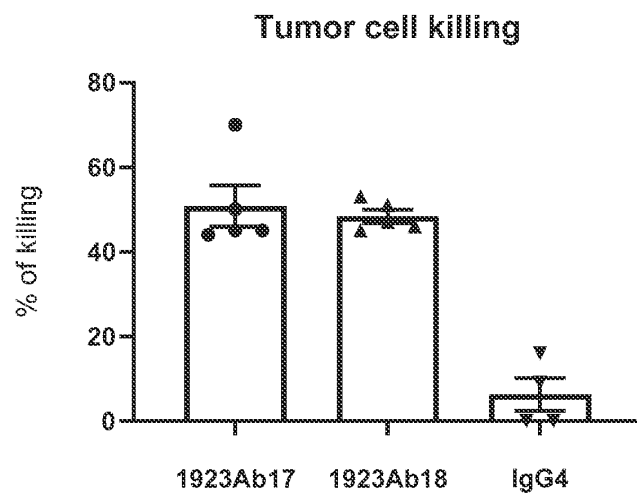


FIG. 23B

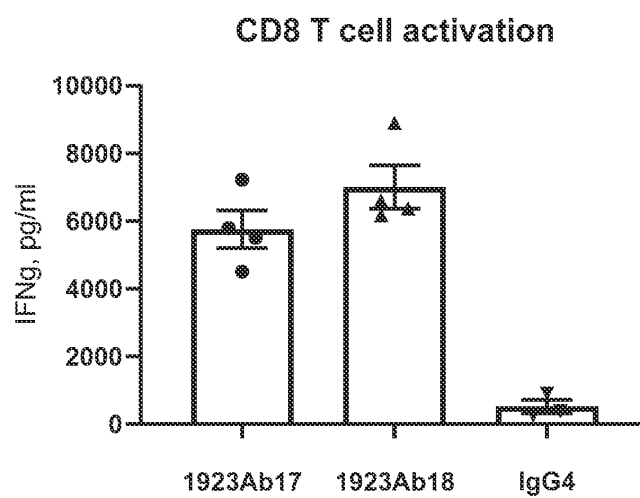


FIG. 24

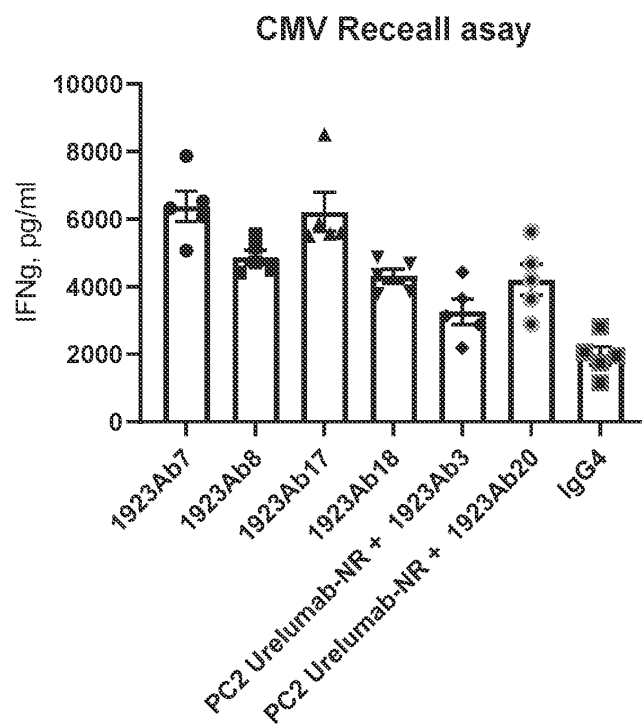


FIG. 25

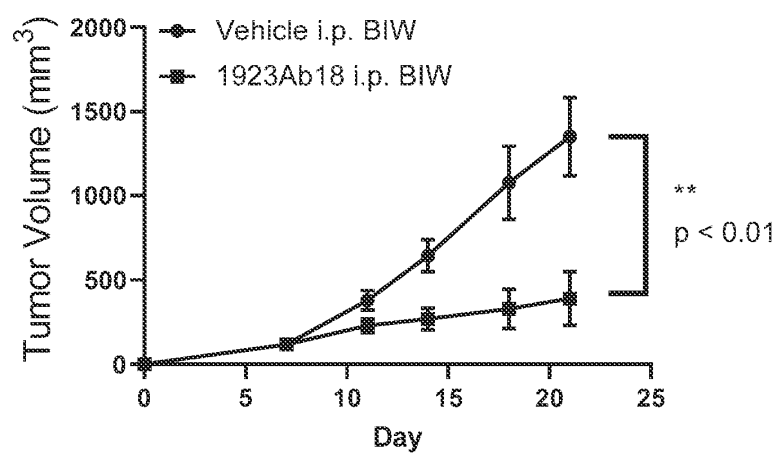


FIG. 26A

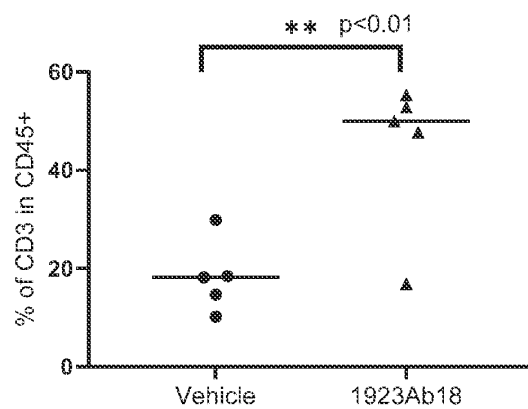


FIG. 26B

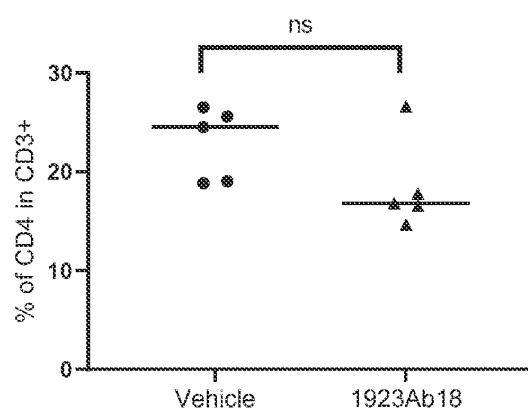


FIG. 26C

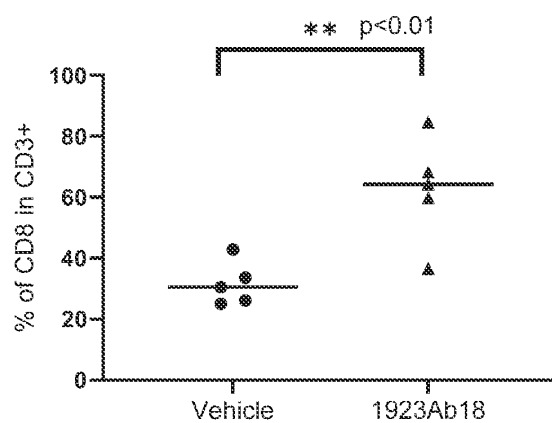


FIG. 26D

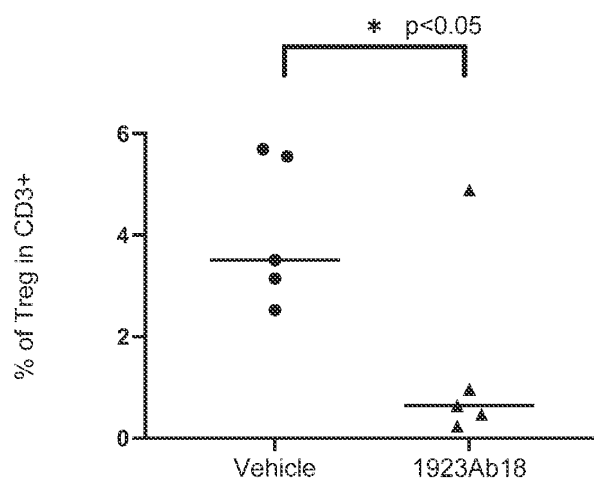


FIG. 26E

