

FIG. 1A

SEQ ID NO: 1 > 1923Ab2 VH

QVQLVESGGGVVQPGRSLRLSCAASGFTFRNYGMHWVRQAPGKGLEWVAVIWFDGIN
KYYADSVKGRFTISRDNSENTLYLQMNSLRAEDTAVYYCARDRSSSPFDFFWGQGLVT
VSS

NYGMH	VIWFDGINKYYADSVKG	DRSSSPFDFF
SEQ: 5	SEQ: 6	SEQ: 7

SEQ ID NO: 2 > 1923Ab2 VL

EIVMTQSPATLSLSPGERATLSCRASQNFSNNYLSWYQQTPGQAPRLLIYGASTRATGIP
ARFSGSGSGTDFTLTISLQPEDFAVYYCQQDYNLFTFGPGTKVDIK

RASQNFSNNYLS	GASTRAT	QQDYNLFT
SEQ: 8	SEQ: 9	SEQ: 10

SEQ ID NO: 3 > 1923Ab3 VH

QVQLVQSGAEVKKPGASVKVSCKASGYTFTSYDINWVRQATGQGLEWMGWMNPNSG
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 SKNTLYLQMNSLKAEDTAVYYCARDDQDYDILTGYYKEDYFD
FWGQGTLTVSS

NYGMH	IIWYDGINKYYADSVKG	DQDYDILTGY YKEDYFDF
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

QVQLVESGGGVVQPGRSLRLSCAASGFTFSSYGMH WVRQAPGKGLEWVAVIWYDGSN
EYYADSVKGRFTISRDN SKNTLYLQMNSLRAEDTAVYYCARERWQWLVLFDYWGQGT
LTVSS

SYGMH	VIWYDGSNEY YADSVKG	ERWQWLVLFDY
SEQ: 27	SEQ: 28	SEQ: 29

SEQ ID NO: 19 > 1923Ab5 VL

EIVLTQSPATLSLSPGERATLSRASQTITSSYLSWYQOKPGQAPRLLIYGASTRATGIPA
RFSGSGSGTDFLTITSSLPEDFALYFCQQDFNLPYTFGQGTKLEIK

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

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FIG. 1C

SEQ ID NO: 20 > 1923Ab6 VH

EVHLL~~ESGGGLVQPGGSLRLSCAASGFTFS~~SYAMGWVRQAPGKGLEWVSIIIGGGGGST
YYADSVKGRFTISRDN~~SKNTLYLQMNSLRAEDTAVYYCAKVG~~YSGTYGGWFDPWGQG
TLVTVSS

SYAMG	IIIGGGGGSTYYADSVKG	VGYS
SEQ: 32	SEQ: 33	SEQ: 34

SEQ ID NO: 21 > 1923Ab6 VL

DIQMTQSPSSLSASIGDRVAITCRASQGISNYLAWFQQKPGKAPKSLIYAASSLQSGVPSK
FSGSGSGTDFTLTIS~~SLQPEDFATYYCQQYN~~SYPLTFGGGTKVEIK

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

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

QVQLVQSGAEVKKPGASVKVSCKASGYTFTSYDINWVRQATGQGLEWMGWMNPNSG
ITGYAQR~~FQGRVTMTRDTSISTAYMELSSLR~~SEDTAVYYCARHRWGKGYLDLWGRGTL
VTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPA
VLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAP
EAAGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTK
PREEQYNSTYRVVSVLTVLHQDWLNGKEYCKCKVSNKALPAPIEKTISKAKGQPREPQV
YTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPVLDSDGSFFLYS
KLTVDKSRWQQGNV~~FSCVMHEALHNHYTQKSLSLSP~~GGGGSGGGGSGGGGSGVQLV
ESGGGVVQPG~~SLRLSCAASGFTFS~~NYGMHWVRQAPGKGLEWVAIIWYDGIN~~KYYAD~~
SVKGRFTISRDN~~SKNTLYLQMNSLKAEDTAVYYCARDQDYDILT~~GY~~YKEDYFD~~FWGQG
TLVTVSSGGGGSGGGGSGGGGSSYELTPPSVSVSPGQTARITCSGDALPKKYAYWYQ
QKSGQAPVLVIYEDSKRPSGIPERFSGSSSGTMTLTISGAQVEDEADYYCYSTDSSGNR
VFGGGTKLTVL

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

EIVMAQSPATLSLSPGERATLSCRASQSVSSSYLSWFQQKPGQAPRLLIYGASTRATGIPA
RFGGSGSGTDFTLTIS~~SLQPEDFAVYYCQQDYNLPYTFGQ~~GTKLEIKRTVAAPSVFIFPPS
DEQLKSGTASVVCLLN~~NFY~~PREAKVQWKVDNALQSGNSQESVTEQDSKDS~~TYSLSSTL~~
TL~~SKADYEKHKVYACEVTHQGLSSPVTKSFNR~~GECGGGGSGGGGSGGGGSTIPPHVQK
SVNNDMIVTDNNGAVKFPQLCKFC~~DVRFSTCDNQKSCMSNCSITSICEK~~PQEVCAVW
RKNDENITLETVCHDPKLPYHDFILEDAA~~SPK~~CIMKEKKKPGETFFMCSCSSDECNDNIIF
SEELYNTSNPD

FIG. 1D

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

EIVMAQSPATLSLSPGERATLSCRASQSVSSSYLSWFQQKPGQAPRLLIYGASTRATGIPA
RFGGSGSGTDFLTITSSLPEDFAVYYCQQDYNLPYTFGGQGTKLEIKRTVAAPSVFIFPPS
DEQLKSGTASVVCLLNMFYPREAKVQWKVDNALQSGNSQESVTEQDSKDSSTLSSTL
TLISKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC

SEQ ID NO:41 > 1923Ab9 Heavy Chain 1

QVQLVQSGAEVKKPGASVKVSCKASGYTFTSYDINWVRQATGQGLEWMGWMNPNSG
ITGYAQRFFQGRVTMTRDTSISTAYMELSSLRSEDTAVYYCARHRWGKGYLDLWGRGTL
VTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPA
VLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAP
EAAGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTK
PREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQV
YTLPPCRDELTKNQVSLWCLVKGFYPSDIAVEWESNGQPENNYKTTTPVLDSDGSFFLY
SKLTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGGGGSGGGGSGGGGSSQVQL
VESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKGLEWVAIIWYDGINKYYA
DSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYDFDFWGQ
GTLVTVSSGGGGSGGGGSGGGGSSYELTQPPSVSVSPGQTARITCSGDALPKKYAYWY
QQKSGQAPVLVIYEDSKRPSGIPERFSGSSSGTMTLTISGAQVEDEADYYCYSTDSSGN
RVFGGGTKLTVL

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

QVQLVQSGAEVKKPGASVKVSCKASGYTFTSYDINWVRQATGQGLEWMGWMNPNSG
ITGYAQRFFQGRVTMTRDTSISTAYMELSSLRSEDTAVYYCARHRWGKGYLDLWGRGTL
VTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPA
VLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAP
EAAGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTK
PREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVC
TLPPSRDELTKNQVSLSCAVKGFYPSDIAVEWESNGQPENNYKTTTPVLDSDGSFFLVSK
LTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK

FIG. 1E**SEQ ID NO: 43** > 1923Ab10 Heavy Chain 1

QVQLVQSGAEVKKPGASVKVSCKASGYTFTSYDINWVRQATGQGLEWMGWMNPNSG
ITGYAQRFFQGRVTMTRDTSISTAYMELSSLRSEDTAVYYCARHRWGKGYLDLWGRGTL
VTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPA
VLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAP
EAAGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTK
PREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQV
YTLPPCRDELTKNQVSLWCLVKGFYPSDIAVEWESNGQPENNYKTTTPVLDSDGSFFLY
SKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSPGGGGSGGGGSGGGGSSYELT
QPPSVSVSPGQTARITCSGDALPKKYAYWYQQKSGQAPVLVIYEDSKRPSGIPERFSGSS
SGTMATLTISGAQVEDEADYYCYSTDSSGNRVFGGGTKLTVLGGGGSGGGGSGGGGSQ
VQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKGLEWVAIIWYDGINK
YYADSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKKEDYFDF
WGQGTLVTVSS

SEQ ID NO: 44 > 1923Ab11 Heavy Chain

QVQLVQSGAEVKKPGASVKVSCKASGYTFTSYDINWVRQATGQGLEWMGWMNPNSG
ITGYAQRFFQGRVTMTRDTSISTAYMELSSLRSEDTAVYYCARHRWGKGYLDLWGRGTL
VTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPA
VLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAP
EAAGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTK
PREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQV
YTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPVLDSDGSFFLYS
KLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSPGGGGSGGGGSGGGGSSYELT
QPPSVSVSPGQTARITCSGDALPKKYAYWYQQKSGQAPVLVIYEDSKRPSGIPERFSGSS
SGTMATLTISGAQVEDEADYYCYSTDSSGNRVFGGGTKLTVLGGGGSGGGGSGGGGSQ
VQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKGLEWVAIIWYDGINK
YYADSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKKEDYFDF
WGQGTLVTVSS

FIG. 1F**SEQ ID NO: 45** > 1923Ab12 Heavy Chain

QVQLVQSGAEVKKPGASVKVSCKASGYTFTSYDINWVRQATGQGLEWMGWMNPNSG
ITGYAQRFFQGRVTMTRDTSISTAYMELSSLRSEDTAVYYCARHRWGKGYLDLWGRGTL
VTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPA
VLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAP
EAAGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTK
PREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQV
YTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPVLDSDGSFFLYS
KLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSPGK

SEQ ID NO: 46 > 1923Ab12 Light Chain

QVQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKCLEWVAIIWYDGIN
KYYADSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYFD
FWGQGT LVT VSSGGGGSGGGGSGGGGSSYELTQPPSVSVSPGQTARITCSGDALPKKYA
YWYQQKSGQAPVLVIYEDSKRPSGIPERFSGSSSGT MATLTISGAQVEDEADYYCYSTD
SGNRVFGCGTKLTVLGGGGSGGGGSGGGGSGGGGSEIVMAQSPATLSLSPGERATLSCR
ASQSVSSSYLSWFFQQKPGQAPRLLIYGASTRATGIPARFGGSGSGTDFTLTISLQPEDFA
VYYCQQDYNLPYTFGGQGTKLEIKRTVAAPS VFIFPPSDEQLKSGTASVVCLLNNFYPREA
KVQWKVDNALQSGNSQESVTEQDSKDSYSLSTLTLSKADYEKHKVYACEVTHQGLS
SPVTKSFNRGEC

SEQ ID NO: 47 > 1923Ab13 Heavy Chain

QVQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKCLEWVAIIWYDGIN
KYYADSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYFD
FWGQGT LVT VSSGGGGSGGGGSGGGGSSYELTQPPSVSVSPGQTARITCSGDALPKKYA
YWYQQKSGQAPVLVIYEDSKRPSGIPERFSGSSSGT MATLTISGAQVEDEADYYCYSTD
SGNRVFGCGTKLTVLGGGGSGGGGSGGGGSGGGGSGVQLVQSGAEVKKPGASVKVSC
KASGYTFTSYDINWVRQATGQGLEWMGWMNPNSGITGYAQRFFQGRVTMTRDTSISTA
YMELSSLRSEDTAVYYCARHRWGKGYLDLWGRGTLVTVSSASTKGPSVFPLAPSSKST
SGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPAVLQSSGLYSLSSVVTVPSSSLGT
QTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAPEAAGGPSVFLFPPKPKDTLMISR
TPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYNSTYRVVSVLTVLHQD
WLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSRDELTKNQVSLTCLVKG
FYPSDIAVEWESNGQPENNYKTPPVLDSDGSFFLYSKLTVDKSRWQQGNVFCFSVMHE
ALHNHYTQKSLSLSPGK

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FIG. 1G

SEQ ID NO: 48 > 1923Ab16 Heavy Chain

QVQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKGLEWVAIIWYDGIN
KYYADSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYFD
FWGQGT LVT VSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVT VSWNSGALT
SGVHTFPAVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTH
TCPPCPAPEAAGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVE
VHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKG
QPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLD S
DGSFFLYSKLTVDKSRWQQGNV FSCSVMHEALHNHYTQKSLSLSPGGGGSGGGGSGGG
GSEIVMAQSPATLSLSPGERATLSCRASQSVSSSYLSWFQKPGQAPRLLIYGA STRATGI
PARFGGSGSGTDFTLTISSLQPEDFAVYYCQQDYNLPTFGQGTKLEIKGGGGSGGGGS
GGGGSQVQLVQSGAEVKKPGASVKVSCKASGYTFTSYDINWVRQATGQGLEWMGWM
NPNSGITGYAQR FQGRVTMTRDTSISTAYMELSSLRSEDTAVYYCARHRWGKG YLDLW
GRGTLVTVSS

SEQ ID NO: 49 > 1923Ab16 Light Chain

SYELTQPPSVSVSPGQTARITCSGDALPKKYAYWYQQKSGQAPVLVIYEDSKRPSGIPER
FSGSSSGT MATLTISGAQVEDEADYYCYSTDSSGNRVFGGGTKLTVLGQPKANPTVTLF
PPSSEELQANKATLVCLISDFYPGAVTVAWKADGSPVKAGVETTKPSKQSNKYAASSY
LSLTPEQWKSHRSYSCQVTHEGSTVEKTVAPTECSGGGGSGGGGSGGGGSTIPPHVQKS
VNNDMIVTDNNGAVKFPQLCKFCDFRSTCDNQKSCMSNCSITSICEK PQEVCVAVWR
KNDENITLTVCHDPKLPYHDFILED AASPKCIMKEKKKPGETFFMCSCSSDECNDNIIFS
EEYNTSNPD

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

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

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FIG. 1H**SEQ ID NO: 51** > 1923Ab19 and 1923Ab20 Heavy Chain

QVQLVQSGAEVKKPGASVKVSCKASGYTFTSYDINWVRQATGQGLEWMGWMNPNSG
ITGYAQRFGQGRVTMTRDTSISTAYMELSSLRSEDNAVYYCARHRWGKGYLDLWGRGTL
VTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPA
VLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAP
EAAGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTK
PREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQV
YTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTPPVLDSDGSFFLYS
KLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSPGGGGSGGGGSGGGGSTIPPHV
QKSVNNDMIVTDNNGAVKFPQLCKFCDFRSTCDNQKSCMSNCSITSICEKPQEVCAV
WRKNDENITLETVCHDPKLPYHDFILEDAAAPKCMKEKKKPGETFFMCSCSSDECNDNI
IFSEEYNTSNPD

SEQ ID NO: 52 > 1923Ab19 Light Chain

EIVMAQSPATLSLSPGERATLSCRASQSVSSSYLSWFQQKPGQAPRLLIYGASTRATGIPA
RFGGSGSGTDFLTITSSLPEDFAVYYCQQDYNLPTYFGQGTKLEIKRTVAAPSVFIFPPS
DEQLKSGTASVVCLLNFPYAPREKAVQWKVDNALQSGNSQESVTEQDSKDSTYLSSTL
TLKADYEKHKVYACEVTHQGLSSPVTKSFNRGECGGGGSGGGGSGGGGSQVQLVESG
GGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKCLEWVAIIWYDGINKYYADSVK
GRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYDFWGGQGLV
TVSSGGGGSGGGGSGGGGSGGGGSSYELTQPPSVSVSPGQTARITCSGDALPKKYAYW
YQQKSGQAPVLVIYEDSKRPSGIPERFSGSSSGTMTLTISGAQVEDEADYYCYSTDSSG
NRVFGCGTKLTVL

SEQ ID NO: 53 > scFv that binds CD137

QVQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKGLEWVAIIWYDGIN
KYYADSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYFD
FWGGQGLVTVSSGGGGSGGGGSGGGGSSYELTQPPSVSVSPGQTARITCSGDALPKKYA
YWYQQKSGQAPVLVIYEDSKRPSGIPERFSGSSSGTMTLTISGAQVEDEADYYCYSTD
SGNRVFGGGTKLTVL

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

YELTQPPSVSVSPGQTARITCSGDALPKKYAYWYQQKSGQAPVLVIYEDSKRPSGIPERF
SGSSSGTMTLTISGAQVEDEADYYCYSTDSSGNRVFGGGTKLTVLGGGGSGGGGSGG
GGSQVQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKGLEWVAIIWYD
GINKYYADSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKED
YDFWGGQGLVTVSS

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FIG. 11**SEQ ID NO: 55** > scFv* with 4x (G4S) linker that binds CD137

QVQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKCLEWVAIIWYDGIN
KYYADSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYFD
FWGQGT LVT VSSGGGSGGGGSGGGGSSYELTQPPSVSVSPGQTARITCSGDAL
PKKYAYWYQKSGQAPVLVIYEDSKRPSGIPERFSGSSSGTMTLTISGAQVEDEADYY
CYSTDSSGNRVFGCGTKLTVL

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

QVQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKCLEWVAIIWYDGIN
KYYADSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYFD
FWGQGT LVT VSSGGGSGGGGSGGGGSSYELTQPPSVSVSPGQTARITCSGDALPKKYA
YWYQKSGQAPVLVIYEDSKRPSGIPERFSGSSSGTMTLTISGAQVEDEADYYCYSTD
SGNRVFGCGTKLTVL

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

EIVMAQSPATLSLSPGERATLSCRASQSVSSSYLSWFQKPGQAPRLLIYGA STRATGIPA
RFGGSGSGTDFTLTISSLPEDFAVYYCQQDYNLPYTFGQGTKLEIKGGGGSGGGSGG
GGSQVQLVQSGAEVKKPGASVKVSCKASGYTFTSYDINWVRQATGQGLEWMGMWNP
NSGITGYAQRFGQGRVTMTRDTSISTAYMELSSLRSEDTAVYYCARHRWGKG YLDLWGR
GTLVTVSS

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

GGGGSGGGSGGGGS

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

GGGGSGGGSGGGSGGGGS

SEQ ID NO: 60 > Human IgG1 constant region

ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPAVLQSS
GLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAPELLGG
PSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQY
NSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSR
DELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPVLDSDGSFFLYSKLTVDK
SRWQQGNVFSCSVMHEALHNHYTQKSLSLSPK

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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
GLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKRVESKYGPPCPPCPAPEFLGGPSV
FLFPPKPKDTLMISRTPEVTCVVVDVSQEDPEVQFNWYVDGVEVHNAKTKPREEQFNST
YRVVSVLTVLHQDWLNGKEYKCKVSNKGLPSSIEKTISKAKGQPREPQVYTLPPSQEEM
TKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSRLTVDKSRW
QEGNVFSCSVMHEALHNHYTQKSLSLGLGK

SEQ ID NO: 65 > Human Kappa constant region

RTVAAPSVFIFPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNSQESVTEQ
DSKDSTYLSSTLTLSKADYEEKHKVYACEVTHQGLSPVTKSFNRGEC

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

GQPKANPTVTLPFPSSEELQANKATLVCLISDFYPGAVTVAWKADGSPVKAGVETTKPS
KQSNNKYAASSYLSLTPEQWKSHRSYSCQVTHEGSTVEKTVAPTECS

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

TIPPHVQKSVNNDMIVTDNNGAVKFPQLCKFCDVRFSTCDNQKSCMSNCSITSICEKPQE
VCVAVWRKNDENITLETVCHDPKLPYHDFILEDAAAPKCIMKEKKKPGETFFMCSCSSD
ECNDNIIFSEEYNTSNPD

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

QVQLVESGGGVVQPGRSLRLSCAASGFTFSNYGMHWVRQAPGKGLEWVAIIWYDGIN
KYYADSVKGRFTISRDN SKNTLYLQMNSLKAEDTAVYYCARDQDYDILTGYKEDYFD
FWGQGTLVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALT
SGVHTFPAVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTH
TCPPCPAPEAAGGPSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVE
VHNAKTKPREEQYNSTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKG
QPREPQVYTLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDS
DGSFFLYSKLTVDKSRWQQGNVFCFSVMHEALHNHYTQKSLSLSP

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

SYELTQPPSVSVSPGQTARITCSGDALPKKYAYWYQKSGQAPVLVIYEDSKRPSGIPER
FSGSSSGTMTALTISGAQVEDEADYYCYSTDSSGNRVFGGGTKLTVLGQPKANPTVTLF
PPPSSEELQANKATLVCLISDFYPGAVTVAWKADGSPVKAGVETTKPSKQSNNKYAASSY
LSLTPEQWKSHRSYSCQVTHEGSTVEKTVAPTECS

FIG. 2A

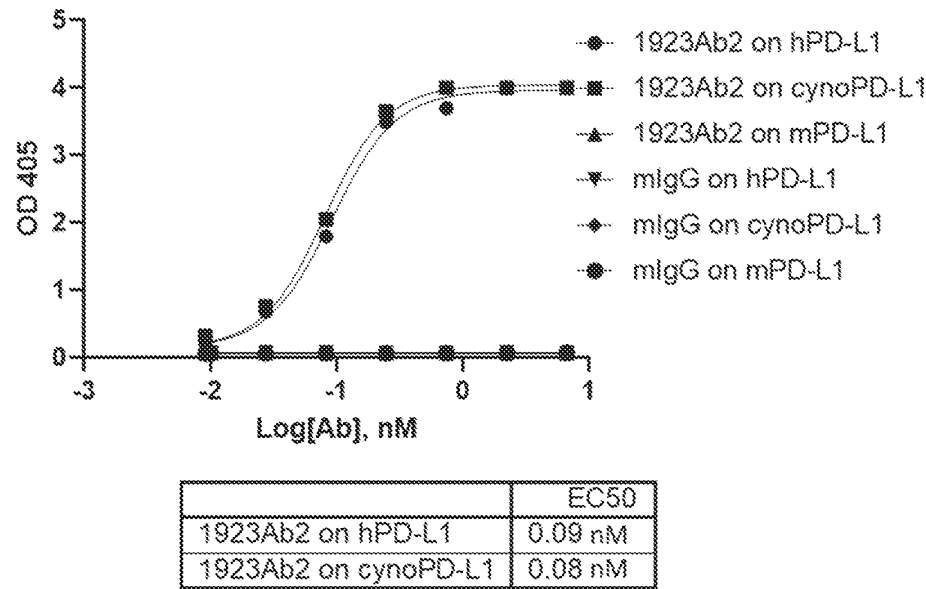


FIG. 2B

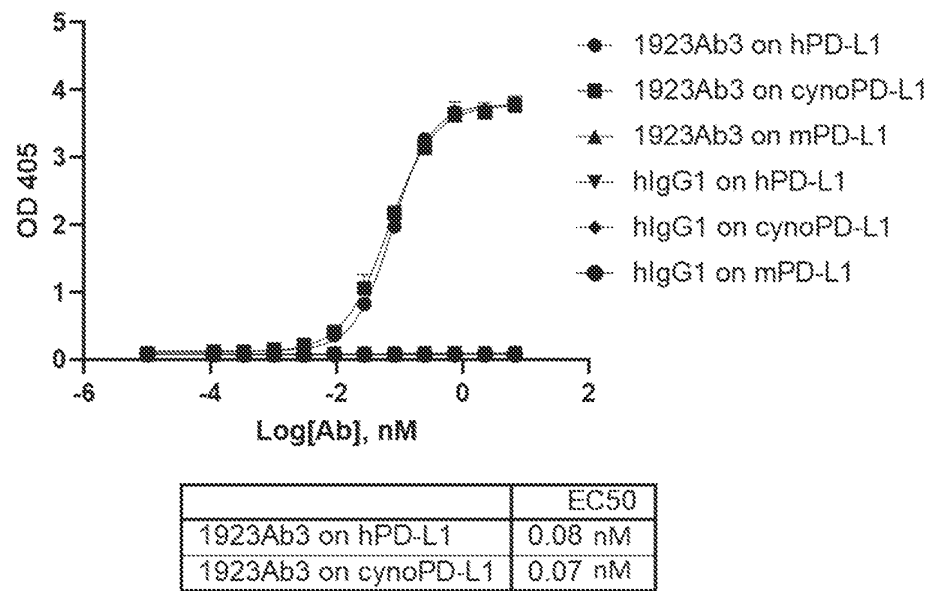


FIG. 3

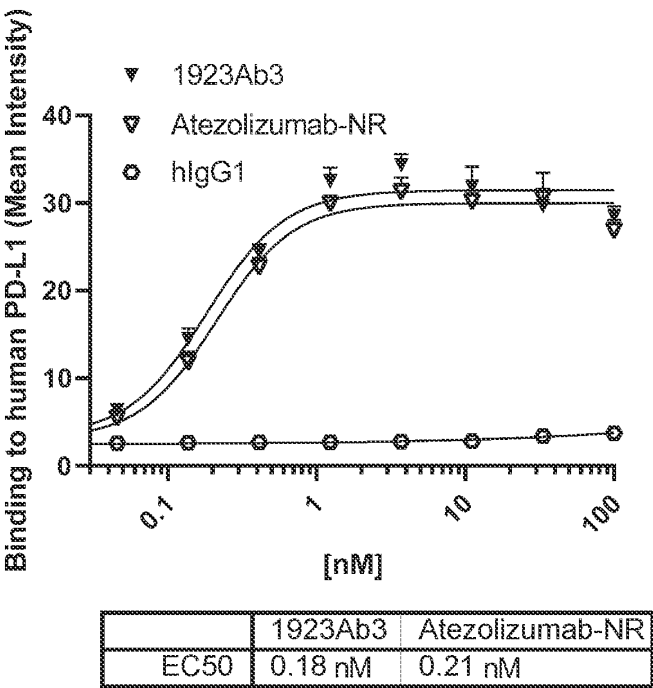


FIG. 4A

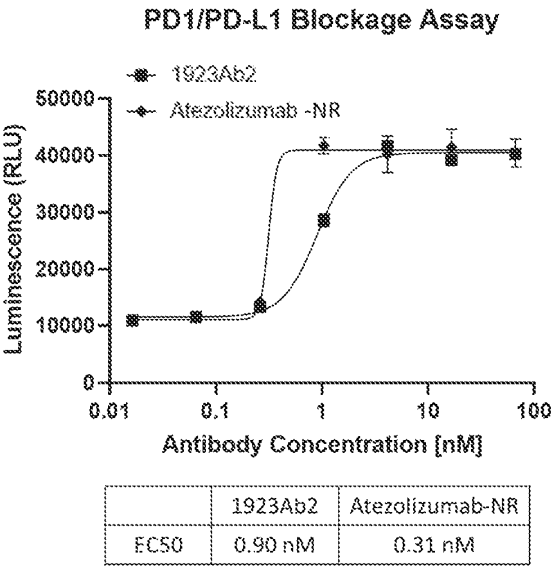


FIG. 4B

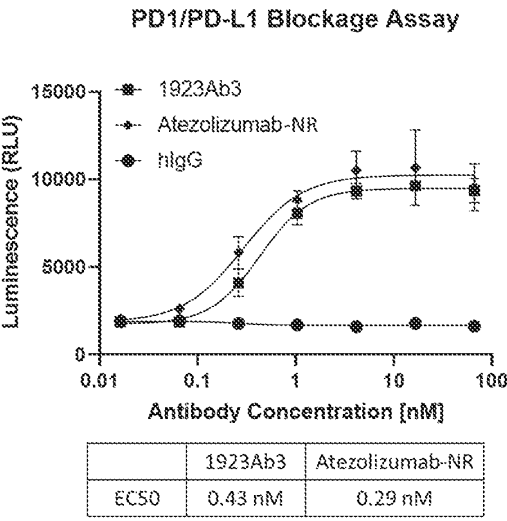


FIG. 5A

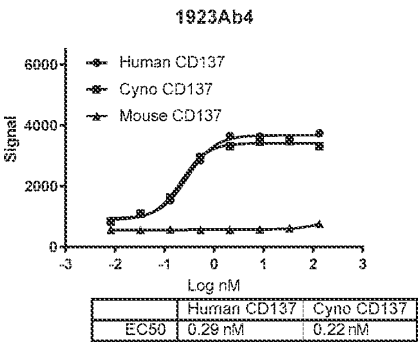


FIG. 5B

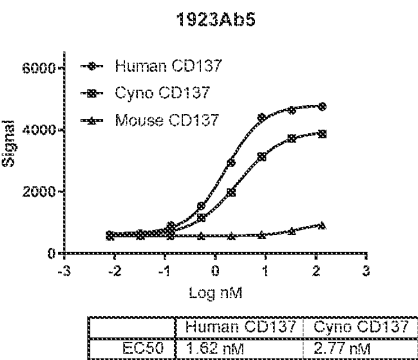


FIG. 5C

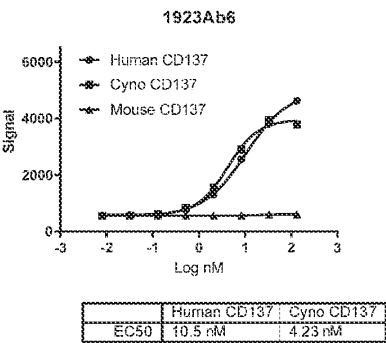


FIG. 6

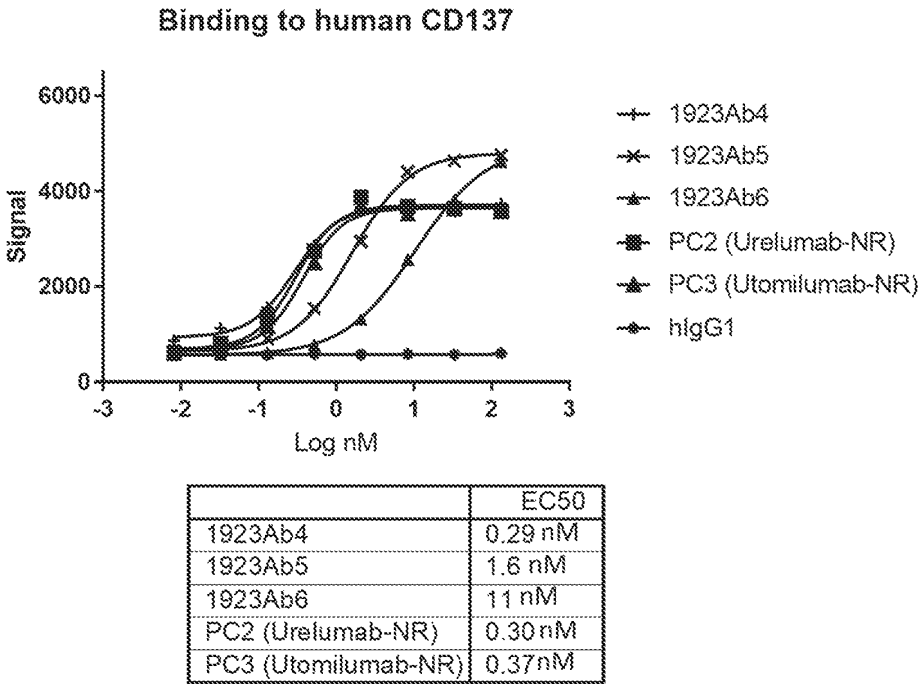


FIG. 7

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

FIG. 8

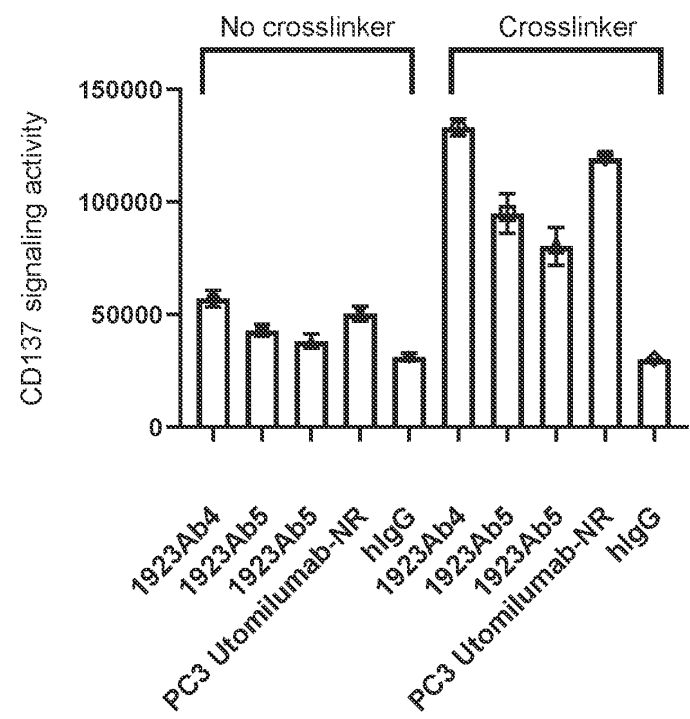


FIG. 9

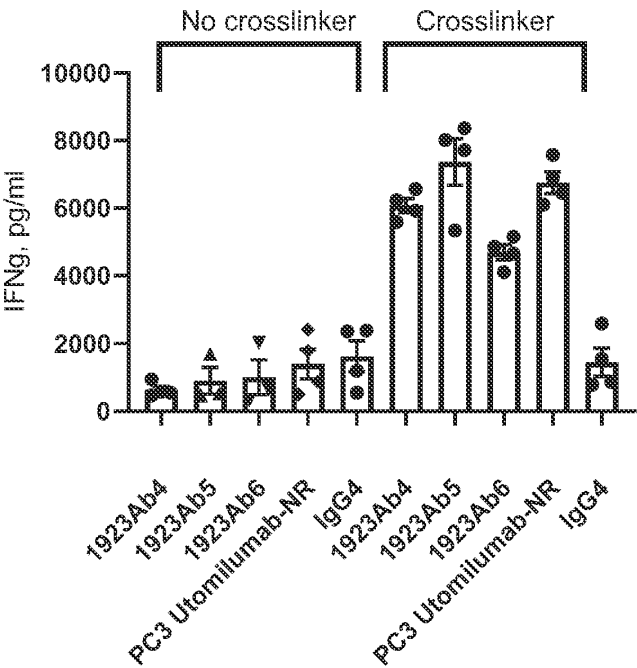


FIG. 10A

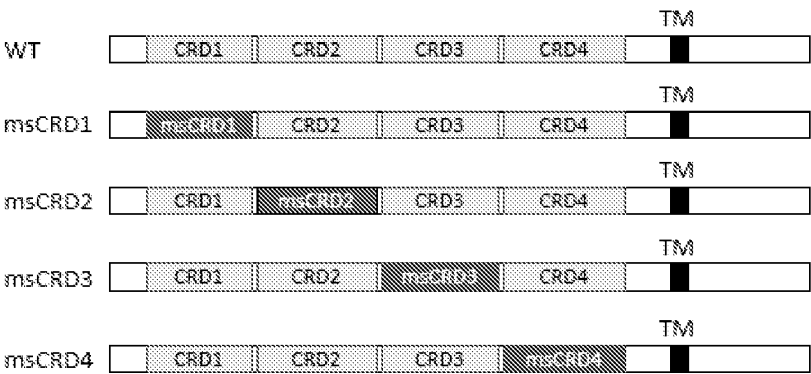


FIG. 10B

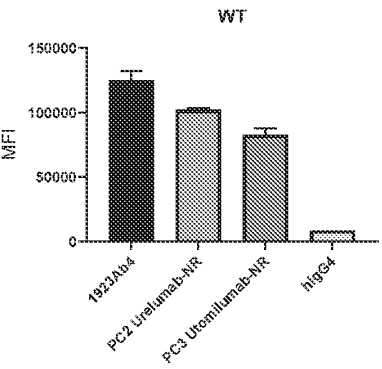


FIG. 10C

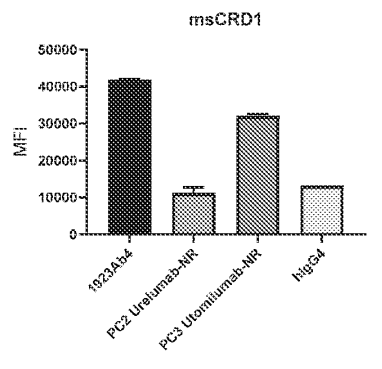


FIG. 10D

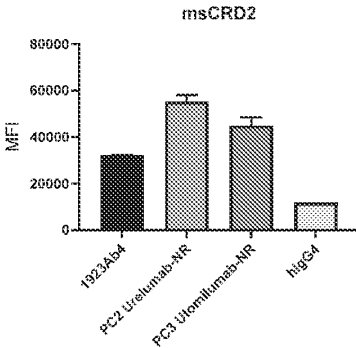


FIG. 10E

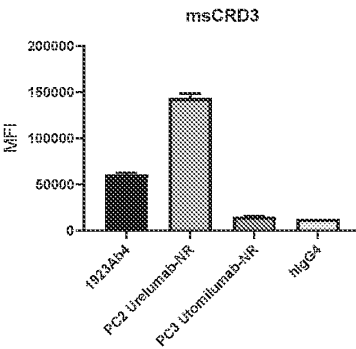


FIG. 10F

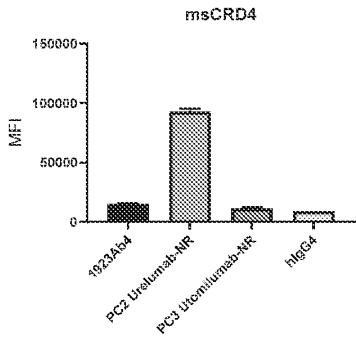


FIG. 11A

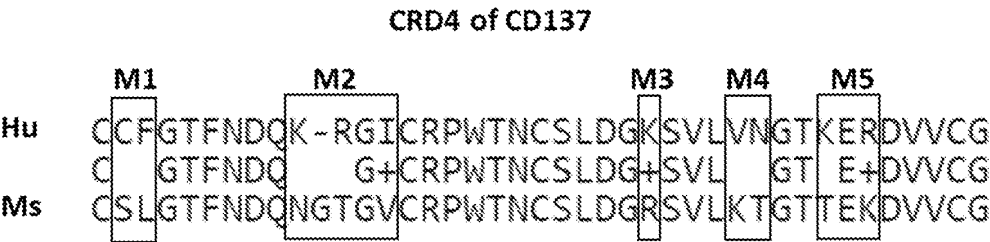


FIG. 11B

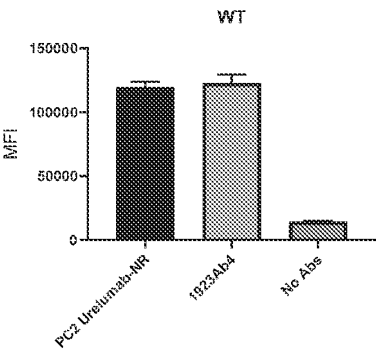


FIG. 11C

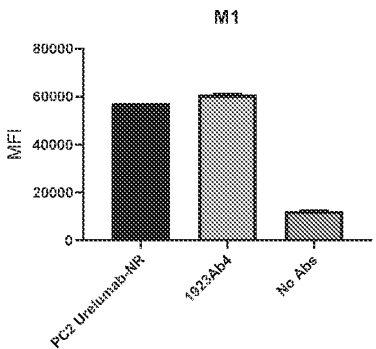


FIG. 11D

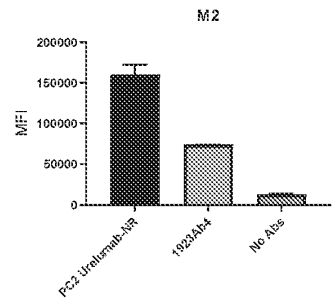


FIG. 11E

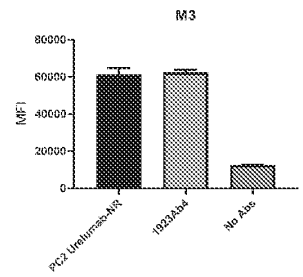


FIG. 11F

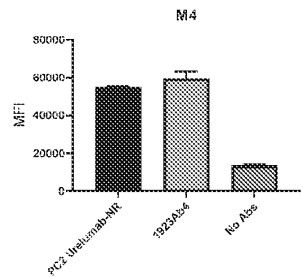
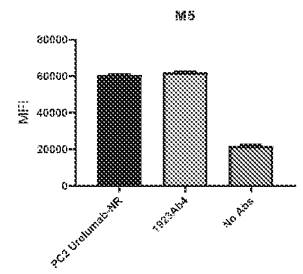


FIG. 11G



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FIG. 12

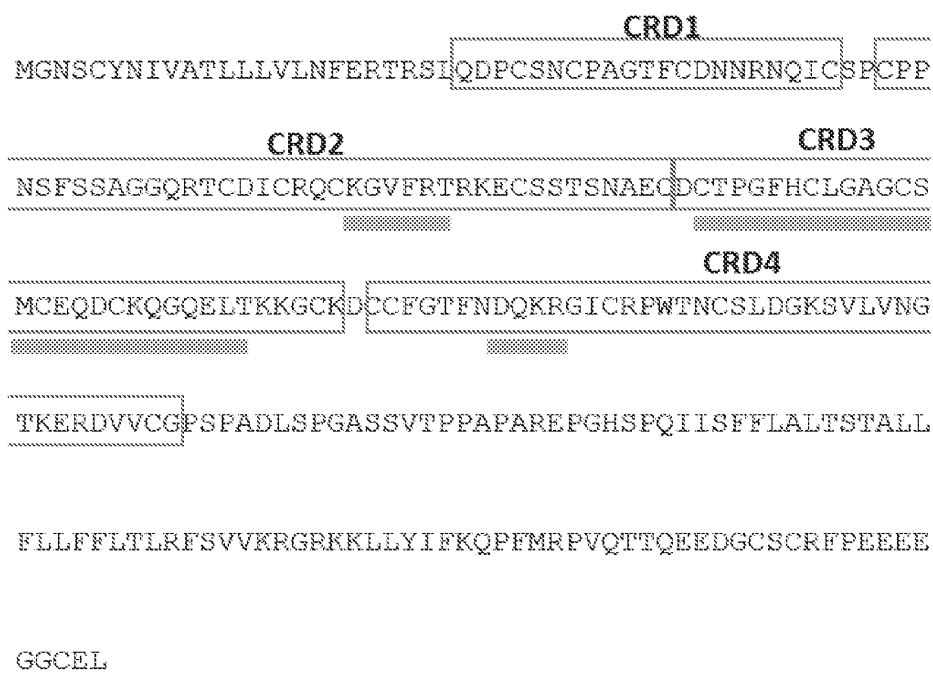
 Epitope of 1923Ab4

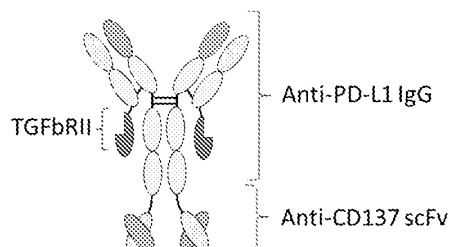
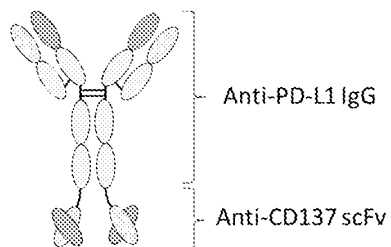
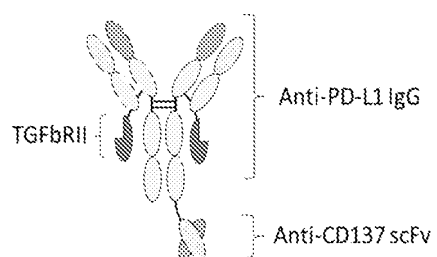
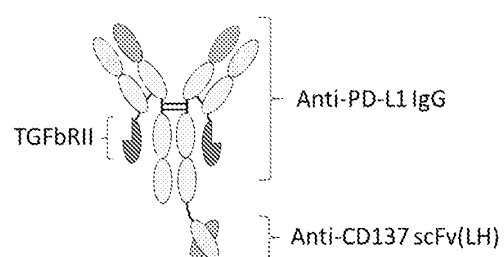
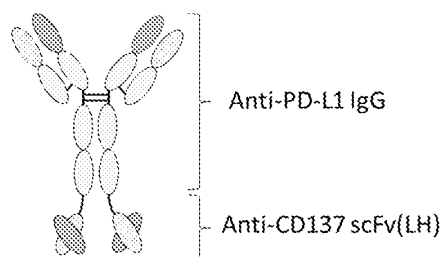
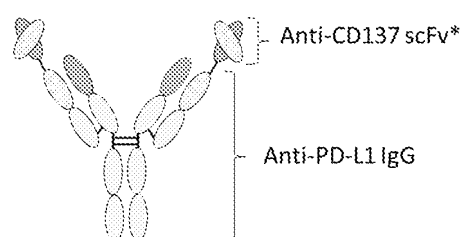
FIG. 13A 1923Ab7**FIG. 13B** 1923Ab8**FIG. 13C** 1923Ab9**FIG. 13D** 1923Ab10**FIG. 13E** 1923Ab11**FIG. 13F** 1923Ab12

FIG. 13G

1923Ab13

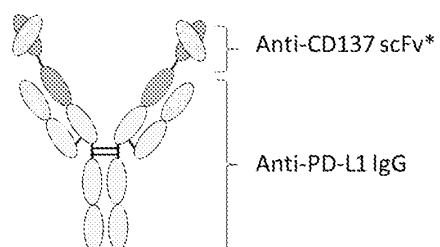


FIG. 13H

1923Ab16

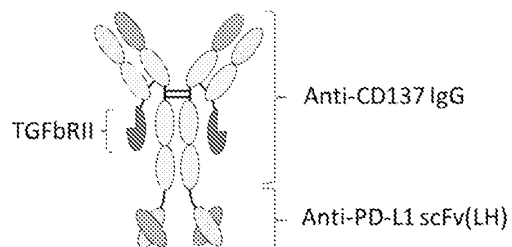


FIG. 13I

1923Ab17

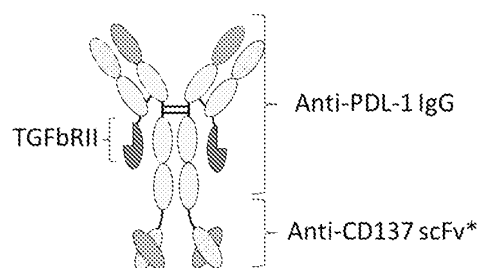


FIG. 13J

1923Ab18

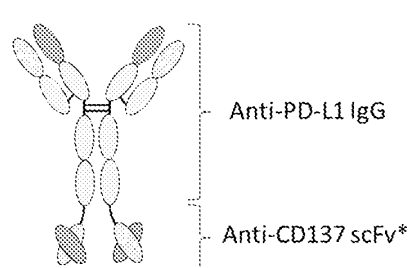


FIG. 13K

1923Ab19

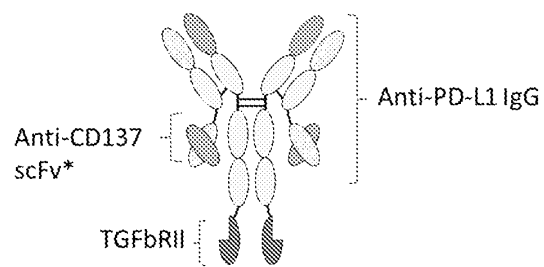
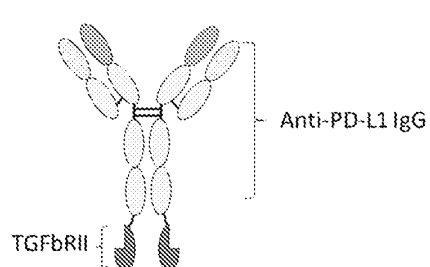


FIG. 13L

1923Ab20



*: 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	hlgG1 LALA	HC C-terminus	3x (G4S)	CD137	VH-3x(G4S)-VL	No	LC C-terminus	3x (G4S)
1923Ab8	Symmetric	Bi-	PD-L1	hlgG1 LALA	HC C-terminus	3x (G4S)	CD137	VH-3x(G4S)-VL	No		
1923Ab9	Asymmetric	Tri-	PD-L1	hlgG1 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	hlgG1 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	hlgG1 LALA	HC C-terminus	3x (G4S)	CD137	VL-3x(G4S)-VH	No		
1923Ab12	Symmetric	Bi-	PD-L1	hlgG1 LALA	LC N-terminus	4x (G4S)	CD137	VH-3x(G4S)-VL	Yes		
1923Ab13	Symmetric	Bi-	PD-L1	hlgG1 LALA	HC N-terminus	4x (G4S)	CD137	VH-3x(G4S)-VL	Yes		
1923Ab16	Symmetric	Tri-	CD137	hlgG1 LALA	HC C-terminus	3x (G4S)	PD-L1	VL-3x(G4S)-VH	No	LC C-terminus	3x (G4S)
1923Ab17	Symmetric	Tri-	PD-L1	hlgG1 LALA	HC C-terminus	3x (G4S)	CD137	VH-4x(G4S)-VL	Yes	LC C-terminus	3x (G4S)
1923Ab18	Symmetric	Bi-	PD-L1	hlgG1 LALA	HC C-terminus	3x (G4S)	CD137	VH-4x(G4S)-VL	Yes		
1923Ab19	Symmetric	Tri-	PD-L1	hlgG1 LALA	LC C-terminus	3x (G4S)	CD137	VH-4x(G4S)-VL	Yes	HC C-terminus	3x (G4S)
1923Ab20	Symmetric	Bi-	PD-L1	hlgG1 LALA					Yes	HC C-terminus	3x (G4S)

FIG. 16A

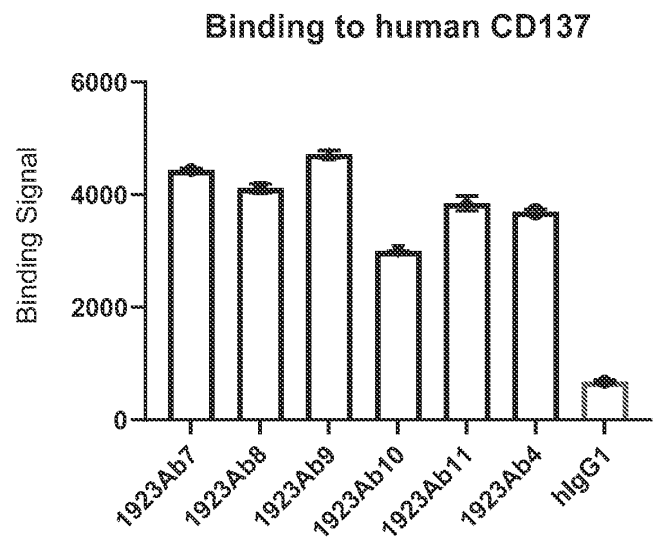


FIG. 16B

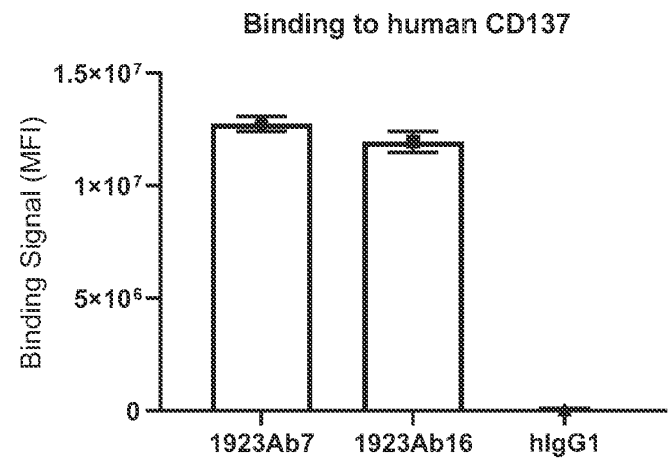


FIG. 17A

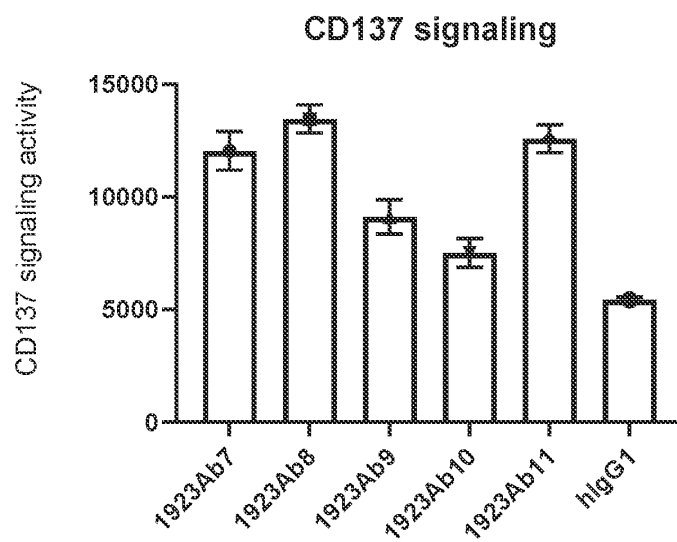


FIG. 17B

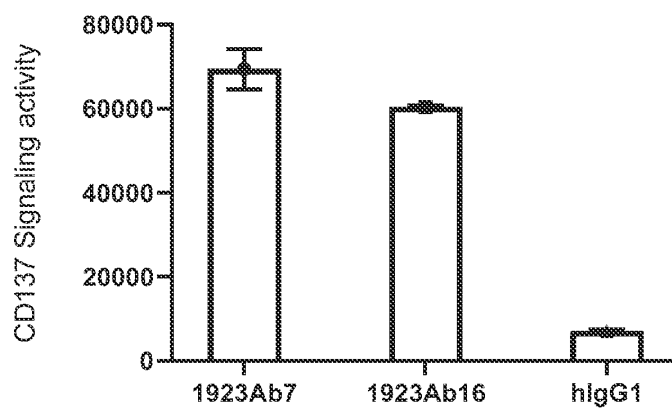


FIG. 18A

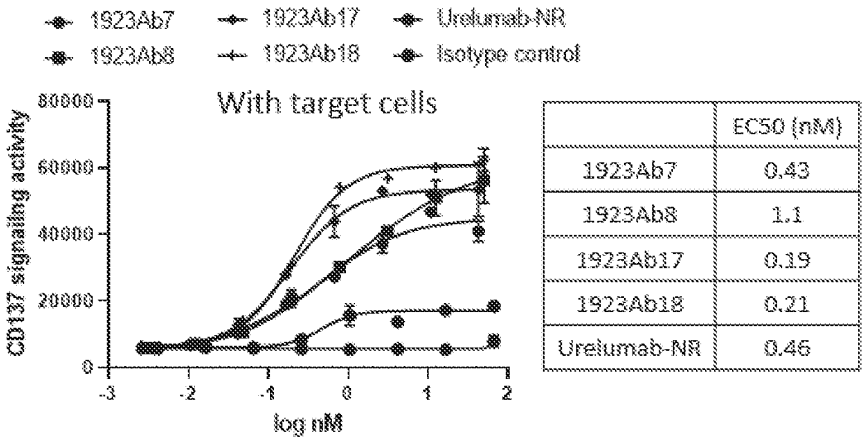


FIG. 18B

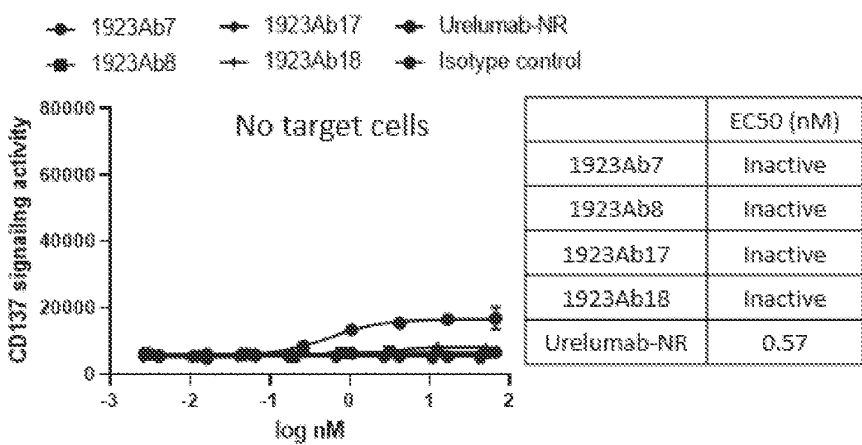


FIG. 19A

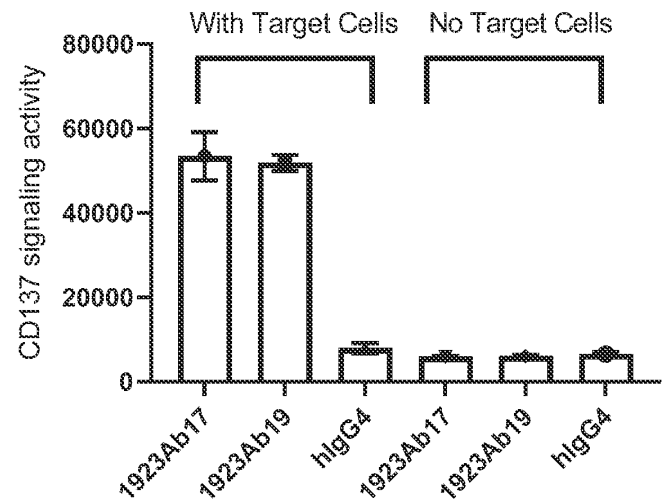
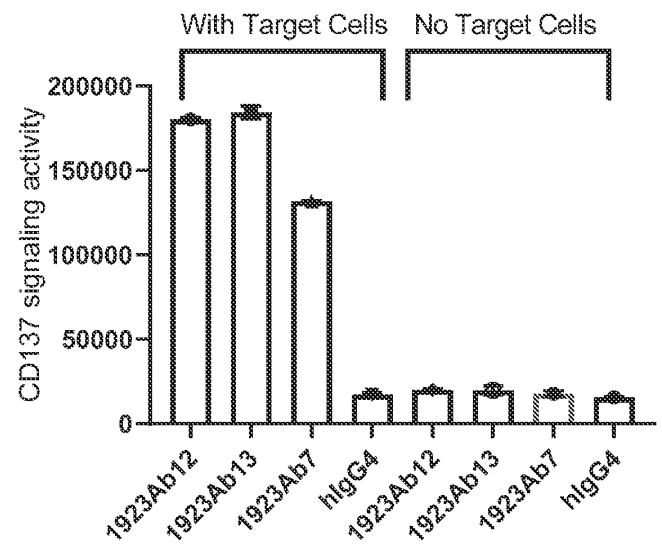


FIG. 19B



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FIG. 20

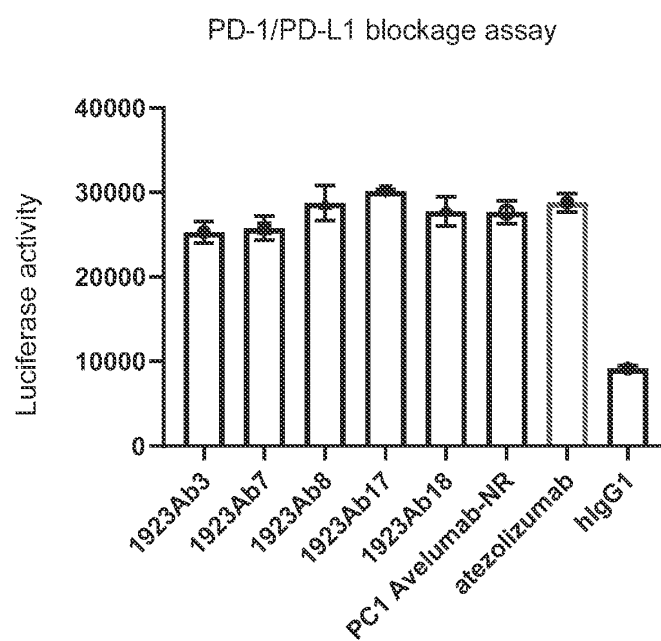


FIG. 21

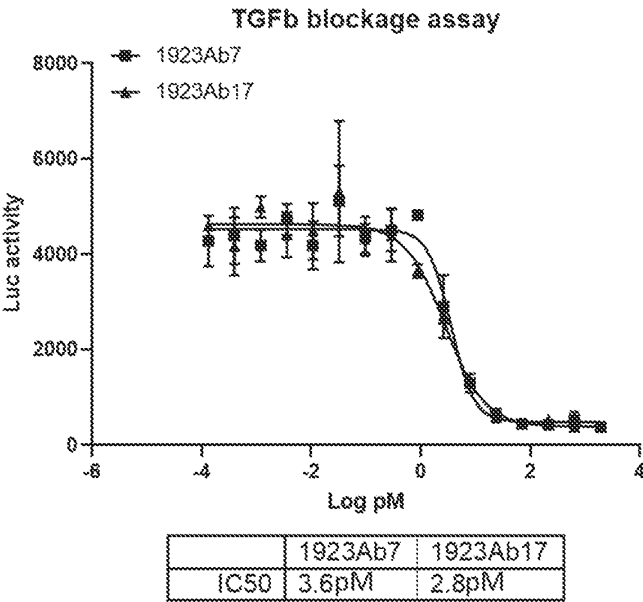


FIG. 22A

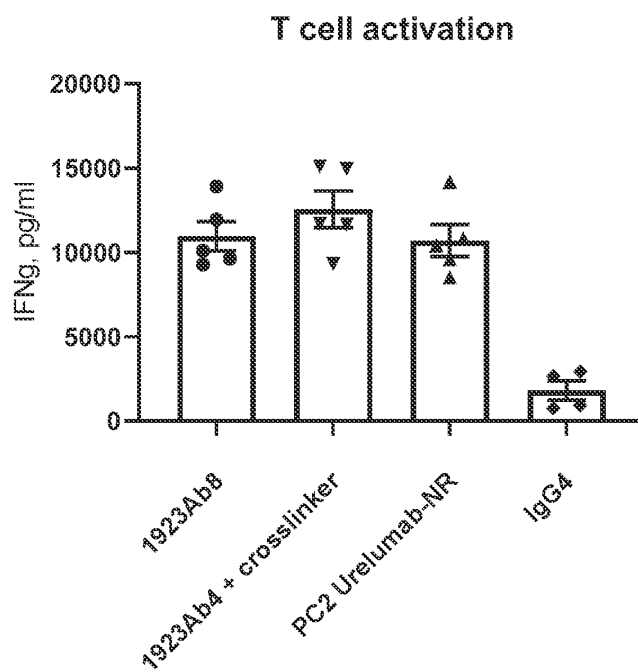
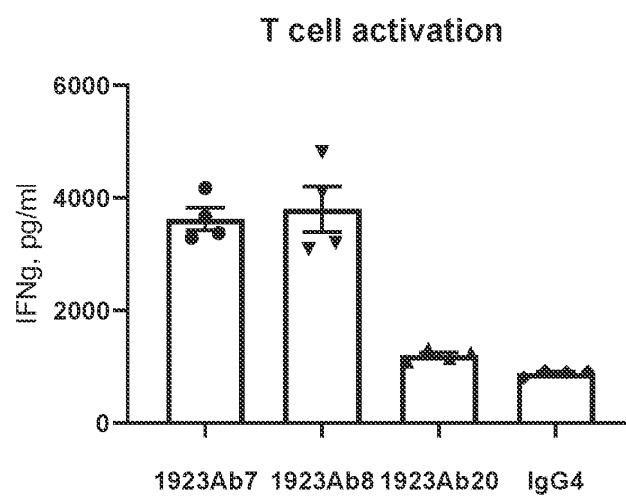


FIG. 22B



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FIG. 23A

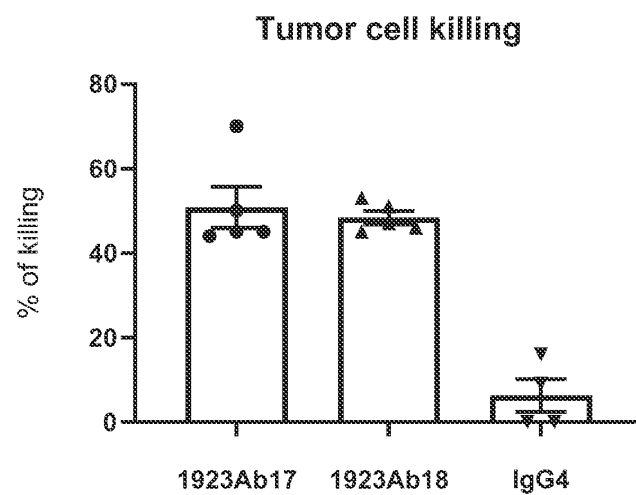
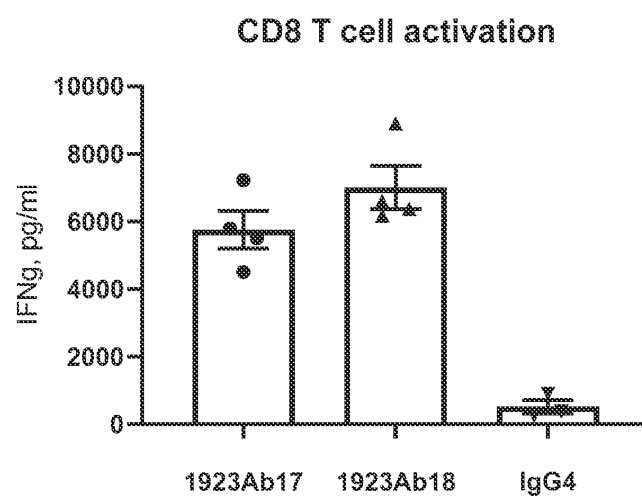
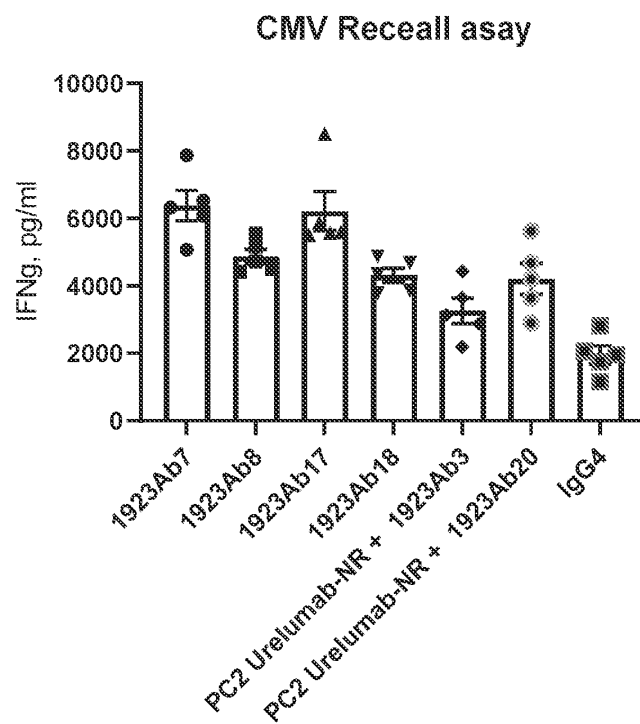


FIG. 23B



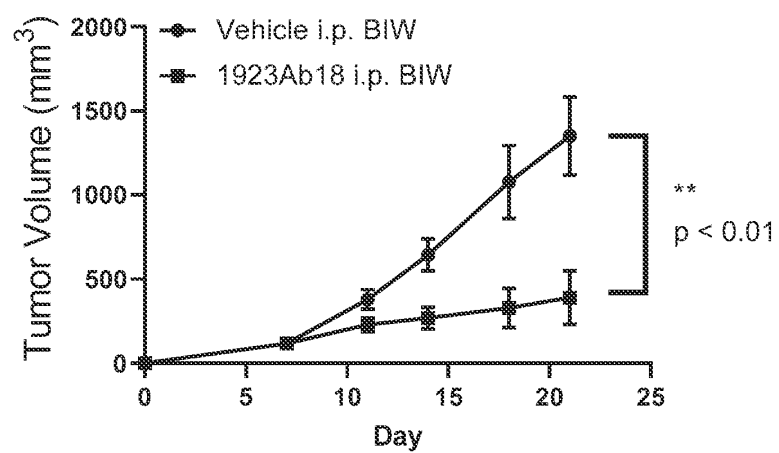
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FIG. 24



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FIG. 25



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FIG. 26A

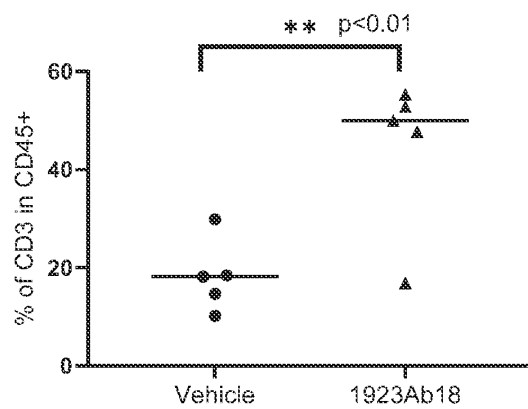


FIG. 26B

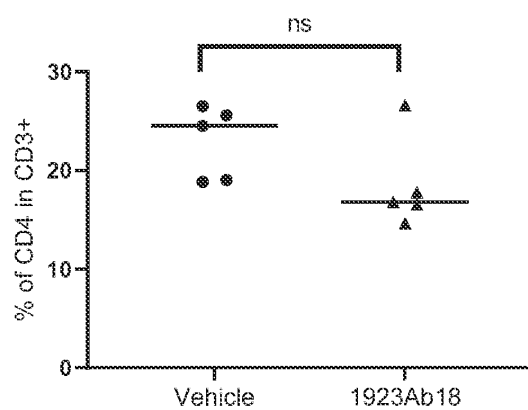
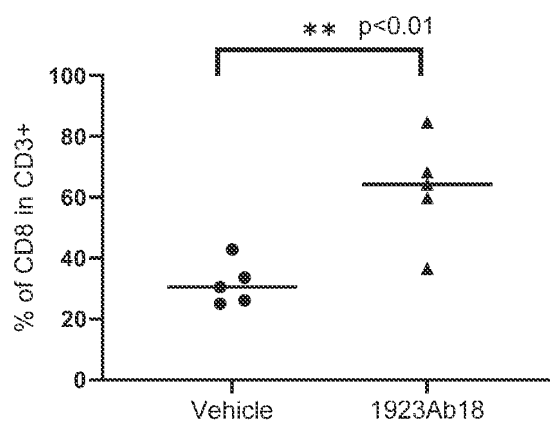


FIG. 26C



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FIG. 26D

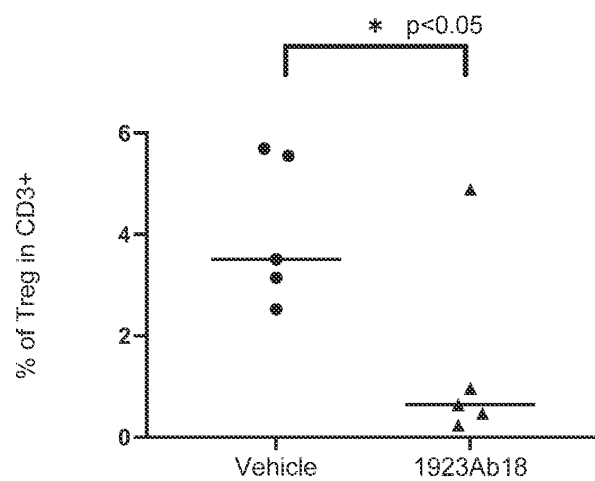


FIG. 26E

