

Humanization results: 25 sequence pairs

Legend:

- Line 1: Nearest human germline to experimentally humanized sequence
- Line 2: Experimentally humanized sequence
- Line 3: Parental sequence
- Line 4: Sequence humanized by Sapiens (3 iterations)
- Line 5: Nearest human germline to Sapiens humanized sequence

Parental and humanized sequences are colored in red gradient based on number of non-human overlapping 9-mers at given position (based on OASis relaxed identity)

Germline sequences are colored in green when the humanized sequence matches germline

CDR and Vernier regions are shown using dark and light grey border around parental sequence

AntiCD28

Heavy chain

Line 1: EVQLVQSGGLVQPGGSLRLSCAGSGFTFSSYAMHWVRQAPGKGLEWVSAIGTGGGTYYADSVKGRFTISRDNAKNSLYLQMNSLRAEDMAVYCAR-----YFDYWQGTLTVVSS IGHV3/0R16-10*02, IGHJ4*01
Line 2: EVQLVQSGGLVQPGGSLRLSCAGSGFTFSDYGVHWRQAPGKGLEWVSAIWAGGGTNYASSVMGRFTISRDNAKNSLYLQMNSLRAEDMAVYCARDKGYSYYYSMYWQGTLTVVSS Humanized (Experimental)
Line 3: EVKLQQSGPGLVTPSQSLSITCTVSGFSLSDYGVHWRQSPGQGLEWLGVWIWAGGGTNYNSALMSRSKISKDNKSQVFLKMNSLQADDTAVYYCARDKGYSYYYSMYWQGQGTTVTVSS Parental
Line 4: QVQLQESGPGLVKPSQTLSLTCTVSGGSLSDYGVHWRQSPGKGLEWLGVWIWAGGGTNYNSALMSRSVISLDTSKSVSLKLNSTAAADTAVYYCARDKGYSYYYSMYWQGQGTTVTVSS Humanized (Sapiens^3)
Line 5: QVQLQESGPGLVKPSETLSLTCTVSGGSISSYWSWIRQPGKGLEWIGIYTSGTNYNPLSKSRVTISVDTSKNQFSLKLSSVTAADTAVYYCAR-----YYYGMDVWQGQGTTVTVSS IGHV4-4*08, IGHJ6*01

Light chain

Line 1: DIVMTQSPDLSAVSLGERATINCSSQSVLNNKNYLAWYQQKPGQPPKLLIYWA-----TRESGPDRFSGSGSGTDFLTISLQAEDAVYYCQYY-----YTFGQGTTKLEIK IGKV4-1*01, IGKJ2*01
Line 2: DIVMTQSPDLSAVSLGERATINCRASESEVEYYVTSLMQWYQQKPGQPPKLLIYAASNVESGPDRFSGSGSGTNSLTISLQAEDAVYYCQQSRSKYPVYTFGQGTTKLEIK Humanized (Experimental)
Line 3: DIETLQSPASLAVSLGQRATISCRASESEVEYYVTSLMQWYQQKPGQPPKLLIIFAASNVESGPDRFSGSGSGTNSLNIHPVDEDDVAMYFCQQSRSKYPVYTFGQGTTKLEIK Parental
Line 4: DIVMTQSPASLAVSPGERATISCRASESEVEYYVTSLMQWYQQKPGQPPKLLIYAASNVESGPDRFSGSGSGTDFLTISRVQADDVAVYYCQQSRSKYPVYTFGQGTTKLEIK Humanized (Sapiens^3)
Line 5: DIVMTQSPDLSAVSLGERATINCSSQSVLNNKNYLAWYQQKPGQPPKLLIYWA-----TRESGPDRFSGSGSGTDFLTISLQAEDAVYYCQYY-----YTFGQGTTKLEIK IGKV4-1*01, IGKJ2*01

Bevacizumab

Heavy chain

Line 1: EVQLVESGGGLVQPGGSLRLSCAASGFTFSSYAMSWVRQAPGKGLEWVSAISGSGGSTYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVYYCAK-----YWFDLWGRGTLTVVSS IGHV3-23*04, IGHJ2*01
Line 2: EVQLVESGGGLVQPGGSLRLSCAASGYTFTNYGMNWVRQAPGKGLEWVWINTYTGEPTYAADFKRRTFTSLDTSKSTAYLQMNISLRAEDTAVYYCAKYPHYYGSSHWFDWGAGTTVTVSS Humanized (Experimental)
Line 3: EIQLVQSGPELKQPGETVRISCKASGYTFTNYGMNWVKQAPGKGLKWMGWINTYTGEPTYAADFKRRTFTSLETSASTAYLQISNLKNDDTATYFCAKYPHYYGSSHWFDWGAGTTVTVSS Parental
Line 4: QVQLVQSGSELKKPGASVRISCKASGYTFTNYGMNWVRQAPGQGLEWMGWINTYTGEPTYAADFKRRTFVFSLTSVSTAYLQISNLKADDTAVYYFCARYPHYYGSSHWFDWGAGTTVTVSS Humanized (Sapiens^3)
Line 5: QVQLVQSGSELKKPGASVKVSCKASGYTFTSYAMNWVRQAPGQGLEWMGWINTNTGNPTYAQFTGRFVFSLTSVSTAYLQISSLKAEDTAVYYCAR-----YWFDLWGRGTLTVVSS IGHV7-4-1*02, IGHJ2*01

Light chain

Line 1: DIQMTQSPSSLSASVGDRVTITCRASQGISNYLWFQQKPGKAPKSLIYAASSLQSGVPSRSGSGSGTDFLTISLQPEDFATYYCQYNS-----WTFGQGTTKVEIK IGKV1-16*01, IGKJ1*01
Line 2: DIQMTQSPSSLSASVGDRVTITCSASQDISNLYLNWYQQKPGKAPKVLITYFTSSLHSGVPSRSGSGSGTDFLTISLQPEDFATYYCQYSTVWTFGQGTTKVEIK Humanized (Experimental)
Line 3: DIQMTQSPSSLSASLGDRVIIITCSASQDISNLYLNWYQQKPDGTVKVLITYFTSSLHSGVPSRSGSGSGTDFLTISLQPEDFATYYCQYSTVWTFGQGTTKVEIK Parental
Line 4: DIQMTQSPSSLSASVGDRVTITCSASQDISNLYLNWYQQKPGKAPKLLIYFTSSLHSGVPSRSGSGSGTDFLTISLQPEDFATYYCQYSTVWTFGQGTTKVEIK Humanized (Sapiens^3)
Line 5: DIQMTQSPSSLSASVGDRVTITCSASQDISNLYLNWYQQKPGKAPKLLIYDA-----TETGVPSRSGSGSGTDFTTISLQPEDFATYYCQYDN-----WTFGQGTTKVEIK IGKV1-33*01, IGKJ1*01

Campath

Heavy chain

QVQLQESGPLVKPSQTLSTCTVSGGSIGDYYWSWIRQPPGKGLEWIGIYIYS---GSTYNNPSLKSRTISVDTSKNQFSLKLSVTAAADTAVYYCAR-----YFDYWQGTLTVSS IGHV4-30-4*01, IGKJ4*01
QVQLQESGPLVRPSQTLSTCTVSGFTFTDFYMNWVRQPPGRGLEWIGFIRDKAKGTYTEYNPSVKGRVTMLVDTSKNQFSLRLSSVTAADTAVYYCAREGHTAAPFDYWGQGSLTVSS Humanized (Experimental)
EVKLLESGGLVQPGGSMRLSCAGSFTFTDFYMNWIRQAPGKLEWVGIFIRDKAKGTYTEYNPSVKGRFTISRDNNTQNMLYLQMNTLRAEDTAVYYCAREGHTAAPFDYWGQGVMVTVSS Parental
EVQLVESGGLVQPGGSLRLSCAASGFTSDYMSWVRQAPGKLEWVGIFRNKANGTTE-TTSVKGRFTISRDDSKSITYLQMNSLRAEDTAVYYCAR-----YFDYWQGTLTVSS Humanized (Sapiens^3)
EVQLVESGGLVQPGGSLRLSCAASGFTSDYMSWVRQAPGKLEWVGIFRNKANGTTE-TTSVKGRFTISRDDSKSITYLQMNSLRAEDTAVYYCAR-----YFDYWQGTLTVSS IGHV3-71*01, IGKJ4*01

Light chain

DIQMTQSPSSLASAVGDRVTITCQASQDISSYLNWYQQKPGKAPKLLIYDASNLTGVPSRSGSGSGTDFTFTISSLQPEDIATYYCQYDN--WTFQGQGTKEIK IGKV1-33*01, IGKJ1*01
DIQMTQSPSSLASAVGDRVTITCKASQNIDKYLNWLWYQQKPGKAPKLLIYNTNNLQQTGVPSRSGSGSGTDFTFTISSLQPEDIATYYCQYDN--WTFQGQGTKEIK Humanized (Experimental)
DIKMTQSPSFLSASVGDRVTLNCKASQNIDKYLNWLWYQQKPGKAPKLLIYNTNNLQQTGVPSRSGSGSGTDFTFTISSLQPEDIATYYCQYDN--WTFQGQGTKEIK Parental
DIQMTQSPSSLASAVGDRVTITCKASQNIDKYLNWLWYQQKPGKAPKLLIYNTNNLQQTGVPSRSGSGSGTDFTFTISSLQPEDFATYFCLOHISRPRTFGQGTLKLEIK Humanized (Sapiens^3)
DIQMTQSPSSLASAVGDRVTITCRASQISSYLNWYQQKPGKAPKLLIYASSLQSGVPSRSGSGSGTDFTFTISSLQPEDFATYYCQSYS--YTFQGQGTKEIK IGKV1-39*01, IGKJ2*01

Certolizumab

Heavy chain

EVQLVESGGLVQPGGSLRLSCAASGFTSSYAMSWVRQAPGKLEWVSAISGSGSTYADSVKGRFTISRDNKNTLYLQMNSLRAEDTAVYYCAR-----YFDYWQGTLTVSS IGHV3-23*04, IGHJ4*01
EVQLVESGGLVQPGGSLRLSCAASGYVFTDYGMNWVRQAPGKLEWMGWINTYIGEPIYADSVKGRFTISRDNKNTLYLQMNSLRAEDTAVYYCARGYRSYAMDYWGQGTLTVSS Humanized (Experimental)
QIQLVQSGPELKKPGETVKISCKASGTYFTDYGMNWVKQAPGKAFKWMGWINTYIGEPIYVDDFKGRFAFSLETSASTAFLQINNLKNEDTATYFCARGYRSYAMDYWGQGTSVTVSS Parental
EVQLVQSGSELKKPGASVKISCKASGTYFTDYGMNWVKQAPGKAFKWMGWINTYIGEPIYVDDFKGRFAFSLETSASTAFLQINNLKNEDTATYFCARGYRSYAMDYWGQGTSVTVSS Humanized (Sapiens^3)
EVQLVQSGSELKKPGASVKISCKASGTYFTSYAMNWVRQAPGKLEWMGWINNTNGNPTYAQGFTGRFVFSLDTSVSTAYLQICSLKAEDTAVYYCAR-----YFDYWQGTLTVSS IGHV7-4-1*01, IGHJ4*01

Light chain

DIQMTQSPSSLASAVGDRVTITCRASQGINSYLAFOQKPGKAPKSLIYASSLQSGVPSRSGSGSGTDFTFTISSLQPEDFATYYCQSYS--WTFQGQGTKEIK IGKV1-16*01, IGKJ1*01
DIQMTQSPSSLASAVGDRVTITCKASQNVTNAWYQQKPGKAPKALIYASFLYSGVPRFSGSGSGTDFTFTISSLQPEDFATYYCQYNIYPLTFGQGTLKVEIK Humanized (Experimental)
DIVMTQSQKFMSTSVGDRVSVTCKASQNVTNAWYQQKPGQSPKALIYASFLYSGVPRFSGSGSGTDFTFTISSLQPEDFATYYCQYNIYPLTFGQGTLKLEIK Parental
DIQMTQSPSSLASAVGDRVTITCKASQNVTNAWYQQKPGKAPKLLIYASFLYSGVPRFSGSGSGTDFTFTISSLQPEDFATYYCQYNIYPLTFGQGTLKLEIK Humanized (Sapiens^3)
DIQMTQSPSSLASAVGDRVTITCRASQGISSWLAWYQQKPGKAPKLLIYASSLQSGVPSRSGSGSGTDFTFTISSLQPEDFATYYCQQANS--YTFQGQGTKEIK IGKV1-12*01, IGKJ2*01

Clazakizumab

Heavy chain

EVQLVESGGLVQPGGSLRLSCAASGFTVSSNYMSWVRQAPGKLEWSVIYSGGSTYYADSVKGRFTISRDNKNTLYLQMNSLRAEDTAVYYCAR-----AEYFQHWQGQGTTLTVSS IGHV3-66*01, IGHJ1*01
EVQLVESGGLVQPGGSLRLSCAASGFLSNYYWTWVRQAPGKLEWGIYIGSDETAYATSAIGRFTISRDNKNTLYLQMNSLRAEDTAVYYCARDSSDWDAKFLNLWGQGTLTVSS Humanized (Experimental)
QSLEESGGRLVTGTPPTPLTCASGFSLSNYYWTWVRQAPGKLEWIGIYIGSDETAYATWAIGRFTISKTTVDLKMTSLTAADTATYFCARDSSDWDAKFLNLWGQGTLTVSS Parental
EVQLVESGGLVQPGESLRSLCTASGFSLSNYYWTWVRQAPGKLEWISIYIGSDETAYATWAIGTISIDSKNTVYLKMTSLTAADTAVYFCARDSSDWDAKFLNLWGQGTLTVSS Humanized (Sapiens^3)
EVQLVESGGLVQPGGSLRLSCAASGFTVSSNYMSWVRQAPGKLEWSVIYSGGSTYYADSVKFTISRDNKNTLYLQMNSLRAEDTAVYYCAR-----AEYFQHWQGQGTTLTVSS IGHV3-66*01, IGHJ1*01

Light chain

DIQMTQSPSSLASAVGDRVTITCRASQISSYLNWYQQKPGKAPKLLIYASSLQSGVPSRSGSGSGTDFTFTISSLQPEDFATYYCQSYS---LTFGGGTKVEIK IGKV1-39*01, IGKJ4*01
AIQMTQSPSSLASAVGDRVTITCQASQSIINNELSWYQQKPGKAPKLLIYRASTLASGVPSRSGSGSGTEFTLTISLQPDDFATYYCQGYSLRNIDNAFGGGTKVEIK Humanized (Experimental)
AYDMTQTPASVAAVGGTVTIKCQASQSIINNELSWYQQKPGQRPKLLIYRASTLASGVSSRFKGSGSGTEFTLTISLQPDDFATYYCQGYSLRNIDNAFGGGTEVVK Parental
DIQMTQSPSSLASAVGDRVTITCQASQSIINNELSWYQQKPGKAPKLLIYRASTLASGVPSRSGSGSGTEFTLTISLQPDDFATYYCQGYSLRNIDNAFGGGTKVEIK Humanized (Sapiens^3)
DIQMTQSPSSLASAVGDRVTITCRASQISSYLNWYQQKPGKAPKLLIYASSLQSGVPSRSGSGSGTDFTFTISSLQPEDFATYYCQSYS---LTFGGGTKVEIK IGKV1-39*01, IGKJ4*01

Crizanlizumab

Heavy chain

Light chain

DIQMTQSPSSLSASVGDRVTITCRASQI----SSYLNWYQQKPGKAPKLLIYAASSLQSGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQQSYS--LTFGGTKVEIK IGKV1-39*01, IGKJ4*01
 DIQMTQSPSSLSASVGDRVTITCKASQSVYDGHSYMWYQQKPGKAPKLLIYAASNLESGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCQQSDENPLTFGGTKVEIK Humanized (Experimental)
 DIVLTQSPASLASLGQRATISCKASQSVYDGHSYMWYQQKPGQPPKLLIYAASNLESGIPARFSGSGSGTDFTLNIHVEEADATYYCQQSDENPLTFGTGKLEIK Parental
 DIVLTQSPASLASVSPGERATISCKASQSVYDGHSYMWYQQKPGQPPKLLIYAASNLESGVPDFRSGSGSGTDFTLTISRVAEDAVAYCQQSDENPLTFGTGKLEIK Humanized (Sapiens^3)
 DIVMTQSPDSLAVSLGERATINCKSSQSYLNNKLYAWYQQKPGQPPKLLIYWASTRESGVPDFRSGSGSGTDFTLTISSLQAEADVAYYYCQQYS--YTFGTGKLEIK IGKV4-1*01, IGKJ2*01

Eculizumab

Heavy chain

Light chain

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DIQMTQSPSSLSASVGRVTITCQASQDINSYLNWYQQPKGKAPKLLIYDASNLGETGVPSRFSGSGSGTDFTTISSLQPEDIATYYCQYDN--WTFQGQTKVEIK IGKV1-33*01, IGKJ1*01
DIQMTQSPSSLSASVGRVTITCGASENIYGALENWYQQPKGKAPKLLIYGATNLADGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCONVLNPLTFQGQTKVEIK Humanized (Experimental)
DIQMTQSPASLSASVGETVTITCGASENIYGALENWYQRKQGKSPQLLIYGATNLADGMSRFSGSGSGRQYLLKISSLHPPDVATYYCONVLNPLTFQAGTKLELK Parental
DIQMTQSPSSLSASVGRVTITCGASENIYGALENWYQQPKGKAPKLLIYGATNLADGVPSRFSGSGSGTDFTLTISSLQPEDFATYYCONVLNPLTFQGQTKVEIK Humanized (Sapiens^3)
DIQMTQSPSSLSASVGRVTITCQASQDINSYLNWYQQPKGKAPKLLIYDASNLGETGVPSRFSGSGSGTDFTTISSLQPEDIATYYCQYDN--YTFQGQTKLEIK IGKV1-33*01, IGKJ2*01

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Etaracizumab

Heavy chain

Light chain

Herceptin

Heavy chain

Light chain

AIQLTQS PSSLSAS VGRVTITCRAS QGK ISSALW YQQ KPGK APK LLIY DASS L EGV PSR FSG S GSG TDF TL TISS L QP EFD AT YYC QF NS -- W FGQ GTK VEIK IGKV1-13*02, IGKJ1*01
 DIQMT QSP SSS L AS VGR VTIT CRAS QD VNTA VAW YQQ KPGK APK LLIY SAS FLES G VPS RFS G SRS GTDF TL TISS L QP EFD AT YYC QH YY TT PPT FGQ GTK VEIK Humanized (Experimental)
 DIVMT QSH KF MTS VGR VS ITK AS QDV NTAV A W YQQ KPGH SPK LLIY SAS FRY TGV PDR FTG NRSG TDFTL TISS VQA EDL AVY YY CQH YY TT PPT FG GGT KVEIK Parental
 DIQMT QSP SFLS AS VGR VTIT CK AS QDV NTAV A W YQQ KPGK APK LLIY SAS FRY TGV PSR FSG S GSG TDF TL TISS L QP EFD AT YYC QH YY TT PPT FG GGT KVEIK Humanized (Sapiens^3)
 DIQMT QSP SSS L AS VGR VTIT CR AS QSI SS YLN W YQQ KPGK APK LLIY ASSL QSG VPS RFS G S GSG TDF TL TISS L QP EFD AT YYC QSY S -- LT FG GGT KVEIK IGKV1-39*01, IGKJ4*01

Idarucizumab

Heavy chain

QVQLQESQGPLVKPSETLSLCTVSGGSISSYYWSIRQPPGKLEWIGIYTGSTNTNPSLKSRTVTSVDTSKNQFLSKLSSVTAADTAVYCAR-----YFDYWQGTLVTVSS IGHV4-4*08,IGHJ4*01
 QVQLQESQGPLVKPSETLSLCTVSGFSLTSYIVDWIQRQPPGKLEWIGVIWAGGSTGYNSALRSRSLSTKDTSKNQFLSKLSSVTAADTAVYCASAAYYSYNYDGFAYWGQGTLVTVSS Humanized (Experimental)
 QVQLQESQGPLVAPSQRLSITCTSGFSLTSYIVDWVRQSPGKLEWLGLVIWAGGSTGYNSALRSRSLSTKSNSKSQVFLQMSNLQDDTAIYYCASAAYYSYNYDGFAYWGQGTLVTVSA Parental
 QVQLQESQGPLVKPSETLSLCTVSGGSLTSYIVDWVRQSPGKLEWLGLVIWAGGSTGYNSALRSRSLISLDTSKSQVFLQNSLTAADTDIAIYYCARAAYYSYNYDGFAYWGQGTLVTVSS Humanized (Sapiens^3)
 QVQLQESQGPLVKPSETLSLCTVSGGSISSYYWSIRQPPGKLEWIGIYTGSTNTNPSLKSRTVTSVDTSKNQFLSKLSSVTAADTAVYCAR-----YFDYWQGTLVTVSS IGHV4-4*08,IGHJ4*01

Light chain

DVVMTQSPSLSPVTLGQPASISCRSSQLVYSDGNTYLWNFQQRPGQSPRRLIYKVSNRDSGVPDFRSFGSGSTDFTLKISRVEAEDVGYYCMQGTH--LTFGGGTKEIK IGKV2-30*01, IGKJ4*01
 DVVMTQSPSLSPVTLGQPASISCKSSQSLLYTDGKTYLYWFQQRPGQSPRRLIYLVSKLDGSVPDFRSFGSGSTDFTLKISRVEAEDVGYYCLQSTHFPTFGGGTKEIK Humanized (Experimental)
 DVVMTQTPLTLSVTIGQPASISCKSSQSLLYTNKGKTYLYWLLQRPGQSPKRRIYLVSKLDGSVPDFRSFGSGSTDFTLKISRVEAEDVGYYCLQSTHFPTFGGGTKEIK Parental
 DVVMTQSPSLSVTPGQPASISCKSSQSLLYTNKGKTYLYWFQQRPGQSPRRLIYLVSKLDGSVPDFRSFGSGSTDFTLKISRVEAEDVGYYCLQSTHFPTFQQGTTKEIK Humanized (Sapiens^3)
 DVVMTQSPSLSPVTLGQPASISCRSSQLVYSDGNTYLWNFQQRPGQSPRRLIYKVSNRDSGVPDFRSFGSGSTDFTLKISRVEAEDVGYYCMQGTH--YTFGQGTKEIK IGKV2-30*01, IGKJ2*01

Ixekizumab

Heavy chain

QVQLVQSGAEVKPGSSVKVSKCAGSGTFSYYAISWVRQAPGQGLEWMGGIPIFGTANYAQKFQGRVTITADESTSTAYMELSSLRSEDATAVYCCAR-----YFDYWQGTLTVSS IGHV1-69*01,IGHJ4*01
 QVQLVQSGAEVKPGSSVKVSKCAGSGTSFYDHIIHWVRQAPGQGLEWMGVINPMTGTTDYNQRFKGRVTITADESTSTAYMELSSLRSEDATAVYCCARYDYFTGTGVYWGQGTLTVSS Humanized (Experimental)
 QVQLQOSRPELVLKPGASVKISCKSAGSYFSTDYNNNNWVKQSONGKSLEWIGVINPNYGTTDYNQRFKGKATLTDQSSRTAYMLQNLNLTSEDASAVYYCVIYDYATGTGGYWQGSPLTVSS Parental
 QVQLVQSGPELKKPGASVKVSKCAGSYFSTDYNNNNWVRQAPGQGLEWMGVINPNTGTTDYNQRFKGRVTLDRDSIRTALEYMLNLSLTSEDATAVYCCVIYDYATGTGGYWQGTLTVSS Humanized (Sapiens^3)
 QVQLVQSGAEVKPGASVKVSKCAGSYFTGYYIHWVRQAPGQGLEWMGVINPNSGTYAQKFQGRVTMTRDTSISTAYMELSSLRSDDTAVYCCAR-----YFDYWQGTLTVSS IGHV1-2*02,IGHJ4*01

Light chain

Ligelizumab

Heavy chain

Light chain

EIVMTQSPATLSVSPGERATL**SCRASQSVSSN**LW**YQQKPGQAPRLLIYGA**STRATGIPARFSGSGSGTEFTLT**ISSLQSEDFAVYYCQYNN**--**TFGGGTKVEIK** IGKV3-15*01, IGKJ4*01
EIVMTQSPATLSVSPGERATL**SCRASQSIGTNIH**W**YQQKPGQAPRLLIY**ASESISIGIPARFSGSGSGTEFTLT**ISSLQSEDFAVYYCQSQSWP**TTFGGGTKVEIK Humanized (Experimental)
DILLTQSPAILSVSPGERVS**FCRASQSIGTNIH**W**YQORTDGSPRLI**KYASESISIGIPSRFSGSGSGTEFTLN**INSVESEDIADYYCQSDSWP**TTFGGGTKLEIK Parental
DIVLTQSPATLSVSPGERV**TLSRASQSIGTNIH**W**YQORPGQAPRLLIY**ASESISIGIPARFSGSGSGTEFTLT**ISSLQSEDFAVYYCQSDSWP**TTFGGGTKVEIK Humanized (Sapiens^3)
EIVMTQSPATLSVSPGERATL**SCRASQSVSSN**LW**YQQKPGQAPRLLIYGA**STRATGIPARFSGSGSGTEFTLT**ISSLQSEDFAVYYCQYNN**--**WTFGQGTKVEIK** IGKV3-15*01, IGKJ1*01

Lorvotuzumab

Heavy chain

QVQLVESGGGVQPGRSRLRSCAASGFTSSYGMHWVRQAPGKGLEWVAISYDGNSKYYADSVKGRFTISRDNNSKNTLYLQMNSLRAEDTAVYYCAR----YFDYWQGQTLTVSS IGHV3-30*03,IGHJ4*01
 QVQLVESGGGVQPGRSRLRSCAASGFTSSFGMHWVRQAPGKGLEWVAYISSGSFTIYYADSVKGRFTISRDNNSKNTLYLQMNSLRAEDTAVYYCARMRKGYAMDYWGQGTLTVSS Humanized (Experimental)
 DVQLVESGGVLVPGGSRKLSCAASGFTSSFGMHWVRQAPEKGLEWVAYISSGSFTIYHADTVKGRFTISRDNPKNTLFQMLTSLRAEDTAHYYCARMRKGYAMDYWGQGTTVSS Parental
 EVQLVESGGGLVQPGGSRKLSCAASGFTSSFGMHWVRQAPGKGLEWVAYISSGSFTIYHADTVKGRFTISRDNNAKNSLYLQMNSLRAEDTAVYYCARMRKGYAMDYWGQGTTVSS Humanized (Sapiens^3)
 EVQLVESGGGLVQPGGSRRLRSCAASGFTSSYSNIVWRQAPGKGLEWVSYISSSSSTIYYADSVKGRFTISRDNNAKNSLYLQMNSLRAEDTAVYYCAR----DAFDYWQGQMTVTVSS IGHV3-48*01,IGHJ3*01

Light chain

DVVMTQSPSLSPVTLGQPASICRSSQSQLVHSDGNTYLWNFQQRPGQSPRRLIYKVSNRDSGPVDRFSGSGSTDFTLKISRVAEADGVYYCMQGH—WTFQGQGTKVEIK IGKV2-30*02, IGKV1J1*01
 DVVMTQSPSLSPVTLGQPASICRSSQIIHSDGNTYLEWFQQRPGQSPRRLIYKVSNRFSGPVDRFSGSGSTDFTLKISRVAEADGVYYCFQGSHVPHTFGQGTKVEIK Humanized (Experimental)
 DVLMTQTPLSLPVLGQASICRSSQIIIHSDGNTYLEWFQKPGQSPKLIIYKVSNRFSGPVDRFSGSGSTDFTLMISRVAEADLGYYCFQGSHVPHTFGGGTKLEIK Parental
 DVVMTQTPLSLPVTLGQPASICRSSQIIHSDGNTYLEWLQKPGQSPQLLIYKVSNRFSGPVDRFSGSGSTDFTLKISRVAEADGVYYCFQGSHVPHTFGQGTKLEIK Humanized (Sapiens^3)
 DIVMTQTPLSLSPVTPGQPASICSSQSQLLHSQDGKTYLYWQKPGQSPQLLIYEVSRSRFSGPVDRFSGSGSTDFTLKISRVAEADGVYYCMQGH—YTFQGQGTKLEIK IGKV2-29*02, IGKV2J2*01

Mogamulizumab

Heavy chain

Light chain

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DIVMTQSPSLPVTGEPASICRSSQSLHSNGNYLWYLOKPGQSPQLLIYLGNSRASGVVPDRFGSGSGTDFTLKISRVAEADVGYYCMQALQ--WTFQGTKEIK IGKV2-28*01, IGKJ1*01
DVLMTQSPSLPVTGEPASICRSSRNIVHINGDTYLEWYLOKPGQSPQLLIYKVSNRFSGVVPDRFGSGSGTDFTLKISRVAEADVGYYCFQGSLLPWTFGQGTKEIK Humanized (Experimental)
DVLMTQPLSLPVSLGDQASISCRSSRNIVHINGDTYLEWYLRPGQSPKLLIYKVSNRFSGVVPDRFGSGSGTDFTLKISRVAEADLGVYYCFQGSLLPWTFGGGTRLEIR Parental
DVVMTQSPSLPVTGLGPASICRSSRNIVHINGDTYLEWYLRPGQSPQLLIYKVSNRFSGVVPDRFGSGSGTDFTLKISRVAEADVGYYCFQGSLLPWTFGQGTRELIK Humanized (Sapiens^3)
DVVMTQSPSLPVTGLGPASICRSSQSLVHSQDNTYLWFF0ORPGQSPRLIYKVSNRDSGVVPDRFGSGSGTDFTLKISRVAEADVGYYCMQGTH--ITFGQTRLEIK IGKV2-30*02, IGKJ5*01

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Omalizumab

Heavy chain

Light chain

DIQMTQSPSSLSASVGDRVTITCRASQSI----SSYLNWYQQKPGKAPKLLIYAASSLQSGVPSRFSGSGSTDFTLTISSLQPEDFATYYCQQSYS--WTFQGQTKVEIK IGKV1-39*01, IGKJ1*01
 DIQLTQSPSSLSASVGDRVTITCRASQSYDGDSYMWNWYQQKPGKAPKLLIYAASYLESGVPSRFSGSGSTDFTLTISSLQPEDFATYYCQQSHEDPYTFQGQTKVEIK Humanized (Experimental)
 DIQLTQSPASLAvgLQRATISCKASQSVYDGDSYMWNWYQQKPGQPPIIIYAASYLGSEIPARFSGSGSTDFTLNIHPVEEDAATFYCQQSHEDPYTFGAGTKLEIK Parental
 DIVLTQSPDSLAVSPGERATISCKASQSYDGDSYMWNWYQQKPGQPPIIIYAASYLGSGVPDRFSGSGSTDFTLTISRVAEDAVYYCQQSHEDPYTFQGQTKLEIK Humanized (Sapiens^3)
 DIVMTQSPDSLAVSLGERATINCKSSQSYLNNKNLYAWYQQKPGQPPIIIYWASTRSGVPDFRSGSGSTDFTLTISSLQaedAVYYCQQYYS--WTFQGQTKLEIK IGKV4-1*01, IGKJ2*01

Palivizumab

Heavy chain

Light chain

Pembrolizumab

Heavy chain

Light chain

Pertuzumab

Heavy chain

Light chain

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DIQMTQSPSSLSASVGRVTITCQASQDI[NYLNWYQQPKGPKA[P]KLLIYDASNL[E]GVP[RS]FSGSGSGTDF[TT]ISLQ[P]EDIATYYCQCYD--WTFQGQGKVEIK IGKV1-33*01, IGKJ1*01
DIQMTQSPSSLSASVGRVTITCKASQDV[S]IGVAWYQQPKGPKA[P]KLLIYSASYRYTGVP[RS]FSGSGSGTDF[TT]ISLQ[P]EDIATYYCQCYYIYPYTFQGQGKVEIK Humanized (Experimental)
DIQMTQSHKIMTSVGDRV[S]ITCKASQDV[S]IGVAWYQQPKGPQS[P]KLLIYSASYRYTGVPDRFTGSGSGTDF[TT]ISLQ[V]AEDLAVYYCQCYYIYPYTFGGTKLEIK Parental
DTVMTQSHKIMTSVGDRV[S]ITCKASQDV[S]IGVAWYQQPKGPQS[P]KLLIYSASYRYTGVPDRFTGSGSGTDF[TT]ISLQ[V]AEDLAVYYCQCYYIYPYTFGGTKLEIK Parental
DIQMTQSPSSLSASVGRVTITCKASQDV[S]IGVAWYQQPKGPKA[P]KLLIYSASYRYTGVP[RS]FSGSGSGTDF[TT]ISLQ[P]EDIATYYCQCYD--WTFQGQGKVEIK Humanized (Sapiens^3)
DIQMTQSPSSLSASVGRVTITCQASQDI[NYLNWYQQPKGPKA[P]KLLIYDASNL[E]GVP[RS]FSGSGSGTDF[TT]ISLQ[P]EDIATYYCQCYD--YTFQGQGKVEIK IGKV1-33*01, IGKJ2*01

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Pinatuzumab

Heavy chain

Light chain

DIQMTQSPSSLSASVGRVTITCRASQSI----SSYLNWYQQKPGKAPKL^{LY}IASLQSGVPSRFSGSGSGTDFTLT^ISSLQQPEDFATY^CQQSYS--WTFQGQT^KVEIK IGKV1-39*01, IGKJ1*01
 DIQMTQSPSSLSASVGRVTITCRSSQ^{SIVH}S^VGNTFLEWYQQKPGKAPKL^{LY}IYKVS^NRFSGVPSRFSGSGSGTDFTLT^ISSLQQPEDFATY^CCFQGSQFPYTFQGQT^KVEIK Humanized (Experimental)
 DILMTQTPLS^LPVSLGDQASISCRSSQ^{SIVH}S^NGNTFLEWY^LQKPGQSPK^{LL}IYKVS^NRFSGVPSRFSGSGSGTDFTLK^IS^RVEAEDLGYYCFQGSQFPYTFGGGT^KVEIK Parental
 DIVMTQTPLS^LPVTLGQ^PASISCRSSQ^{SIVH}S^NGNTFLEWY^LQKPGQSPQ^LLIYKVS^NRFSGVPSRFSGSGSGTDFTLK^IS^RVEAEDVGYYCFQGSQFPYTFGGGT^KVEIK Humanized (Sapiens^3)
 DIVMTQTPLS^LS^TPGQ^PASISCKSS^SLLHS^DGKT^LY^WY^LQKPGQSPQ^LLIYEV^SNRFSGVPSRFSGSGSGTDFTLK^IS^RVEAEDVGYYCMQS^IQ---LTFGGGT^KVEIK IGKV2D-29*02, IGKJ4*01

Refanezumab

Heavy chain

QVQLVQSGSELKKPGASVKVSKASGYTFTSYAMINWRQAPGQGLEMWGINTNTGPNTYAOGFTGRFVFSLDTSVSTAYLQISSLKAEDTAVYYCAR-----YYYYYGMDVWQGQTTVTVSS IGHV7-4-1*02,IGHJ6*01
 QVQLVQSGSELKKPGASVKVSKASGYTFTNYGMNWVRQAPGQGLEMWGINTYTGEPTYADDFTGRFVFSLDTSVSTAYLQISSLKAEDTAVYYCARNPINYGGINYEGYVMDYWGQGTLTVSS Humanized (Experimental)
 EIOLVQSGPELKKPGETNKISKASGYTFTNYGMNWVKQAPGKGLKWMGWINTYTGEPTYADDFTGRFAFSLETSASTAYLQISNLKNEDTATYFCARNPINYGGINYEGYVMDYWGQGTLTVSS Parental
 QVQLVQSGSELKKPGASVKVSKASGYTFTNYGMNWVRQAPGQGLEMWGINTYTGEPTYADDFTGRFVFSLDTSVSTAYLQISSLKAEDTAVYYCARNPINYGGINYEGYVMDYWGQGTLTVSS Humanized (Sapiens^3)
 QVQLVQSGSELKKPGASVKVSKASGYTFTSYAMINWRQAPGQGLEMWGINTNTGPNTYAOGFTGRFVFSLDTSVSTAYLQISSLKAEDTAVYYCAR-----YYYYYGMDVWQGQTTVTVSS IGHV7-4-1*02,IGHJ6*01

Light chain

Reslizumab

Heavy chain

Light chain

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DIQMTQSPSSLSASVGDRVTITCRASQSISSYLNWQQPKGPKAPKLIYAASSLQGVPSRFSGSGSGTDFTLTISSLQPEDFATYCCQSQS--WTFGQGTKVEIK IGKV1-39*01, IGKJ1*01
DIQMTQSPSSLSASVGDRVTITCLASEGISSYLAWYQQPKGPKAPKLIYGANSLQTGVPSRFSGSGSATDYTLTISSLQPEDFATYCCQSQSYKFPNTFQGGTKVEVK Humanized (Experimental)
DIQMTQSPASSASLGETISEECLASEGISSYLAWYQQPKGPKSPLLIYGANSLQTGVPSRFSGSGSATQYSLKISSMQPEEGDYFCQSYKFPNTFGAGTKLEK Parental
DIQMTQSPSSLSASVGDRVTITCLASEGISSYLAWYQQPKGPKAPKLIYGANSLQTGVPSRFSGSGSGTDFTLTISSLQPEDFATYCCQSQSYKFPNTFQGGTKLEIK Humanized (Sapiens^3)
DIQMTQSPSSLSASVGDRVTITCRASQSISSYLNWQQPKGPKAPKLIYAASSLQGVPSRFSGSGSGTDFTLTISSLQPEDFATYCCQSQS--YTFGQGTKLEIK IGKV1-39*01, IGKJ2*01

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Rovalpituzumab

Heavy chain

Light chain

Solanezumab

Heavy chain

EVQLLESGGGLVQPGGSLRLSCAASGFTFSSYMSWVROAPGKGLEWVISYIYGGSSTYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVYYCAK-DYWQGQTLTVSS IGHV3-23*03,IGHJ4*01
 EVQLVESGGGLVQPGGSLRLSCAASGFTFSSYMSWVROAPGKGLEWVISYIYGGSSTYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVYYCAK-DYWQGQTLTVSS Humanized (Experimental)
 EVKLVESGGGLVQPGGSLKLSCAVSGFTFSSYMSWVRQTPEKRLLELVAQINSVGNSTYYPPDTVKGRFTISRDNAEYTLQLMSSLRSDDTATYYCASGDYWQGQTLTVSS Parental
 EVQLVESGGGLVQPGGSLRLSCAASGFTFSSYMSWVROAPGKGLEWVISYIYGGSSTYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVYYCAK-DYWQGQTLTVSS Humanized (Sapiens^3)
 EVQLLESGGGLVQPGGSLRLSCAASGFTFSSYMSWVROAPGKGLEWVISYIYGGSSTYYADSVKGRFTISRDNSKNTLYLQMNSLRAEDTAVYYCAK-DYWQGQTLTVSS IGHV3-23*03,IGHJ4*01

Light chain

DVVMTQSPLSPVTLGQ~~P~~**A**SICRSSQSLIYSDGNTLYWFLQPKGQSPRLLIYKVSNRDSGV~~P~~DRFSGSGSTDFLKISRVEAEDVG~~V~~Y~~C~~M0GTH--WTFQG~~O~~G~~T~~K~~V~~EIK IGKV2-30*01, IGKJ1*01
 DVVMTQSPLSPVTLGQ~~P~~**A**SICRSSQSLIYSDG~~N~~AYLHWFLQPKGQSPRLLIYKVSNRFSGV~~P~~DRFSGSGSTDFLKISRVEAEDVG~~V~~Y~~C~~SQSTHVPWTFG~~Q~~G~~T~~K~~V~~EIK Humanized (Experimental)
 DVVMTQTPSLPVSLGDQ~~A~~SICRSSQSLIYSDG~~N~~AYLHWFLQPKGQSPKLLIYKVSNRFSGV~~P~~DRFSGSGSTDFLKISRVETEDLG~~V~~Y~~C~~SQSTHVPWTGGT~~K~~L~~E~~I~~K~~ Parental
 DVVMTQTPSLPVTLGQ~~P~~**A**SICRSSQSLIYSDG~~N~~AYLHWFLQPKGQSPRLLIYKVSNRFSGV~~P~~DRFSGSGSTDFLKISRVEAEDVG~~V~~Y~~C~~SQSTHVPWTFG~~Q~~G~~T~~K~~V~~EIK Humanized (Sapiens^3)
 DVVMTQSPLSPVTLGQ~~P~~**A**SICRSSQSLIYSDGNTLYWFLQPKGQSPRLLIYKVSNRDSGV~~P~~DRFSGSGSTDFLKISRVEAEDVG~~V~~Y~~C~~M0GTH--WTFQG~~O~~G~~T~~K~~V~~EIK IGKV2-30*01, IGKJ1*01

Talacotuzumab

Heavy chain

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EVQLVQSGAEVKPGESLRISCKGSGYSFTSYWISWRQMPGKLEWMGRIDPSDSTYNSPSPQGQVTISADKSISTAYLQWSSLKASDTAMYYCAR---AEYFQHWGQGTLTVSS IGHV5-10-1*04,IGHJ1*01
EVQLVQSGAEVKPGESLKISCKGSGYSFTDYYMKWWRQMPGKLEWMGDIIPSNGATFYQNQFKFGQVTISADKSISTTYLQWSSLKASDTAMYYCARSHLLRASWFAYWGQGTMVTVSS Humanized (Experimental)
EVQLQSGPELVKPGASVKMSCKASGYTFTDYYMKWVKQSHGKSLWEIGIDIIPSNGATFYQNQFKKGATLTVDRSSSTAYMHLNSLTSEDAVYYCTRSHLLRASWFAYWGQGTLTVSA Parental
EVQLVQSGAEVKPGASVKMSCKASGYTFTDYYMKWWRQAPGQGLEWMGDIIPSNGATFYQNQFKGRVTLTDRTSTSTAYMELNSLTSEDAVYYCARSHLLRASWFAYWGQGTLTVSS Humanized (Sapiens^3)
EVQLVQSGAEVKPGASVKMSCKASGYTFTSYMMHWVRQAPGQGLEWMGIINPSGGTSYAQKFQGRVTMRDTSTVYMEMLSSLRSEDAVYYCAR---AEYFQHWGQGTLTVSS IGHV1-46*01,IGHJ1*01

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Light chain

DIVMTQSPDSLAVSLGERATINCKSSQSVYSSNNKYLAWYQQKPGOPPKLILYWASTRESGPDRFSGSGTDFTLTTSSLQAEDDVAVYYCQQY—YTFGQGTKTLEIK IGKV4-1*01, IGKJ2*01
 DIVMTQSPDSLAVSLGERATINCESSQSLNNSGNQKNYLTWYQQKPGOPPKLILYWASTRESGPDRFSGSGTDFTLTTSSLQAEDDVAVYYCQNDYSYPTFGQGTKTLEIK Humanized (Experimental)
 DFVMTQSPSSPLTVTAGEKVTMSCKSSQSLNNSGNQKNYLTWYLKPGOPPKLILYWASTRESGPDRFTGSGTDFTLTTISSVQAEDDVAVYYCQNDYSYPTFGGGTKTLEIK Parental
 DIVMTQSPDSLAVSLGERATINCKSSQSLNNSGNQKNYLTWYQQKPGOPPKLILYWASTRESGPDRFSGSGTDFTLTTSSLQAEDDVAVYYCQNDYSYPTFGQGTKTLEIK Humanized (Sapiens^3)
 DIVMTQSPDSLAVSLGERATINCKSSQSVYSSNNKYLAWYQQKPGOPPKLILYWASTRESGPDRFSGSGTDFTLTTSSLQAEDDVAVYYCQQY—YTFGQGTKTLEIK IGKV4-1*01, IGKJ2*01

Tocilizumab

Heavy chain

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QVQLQESGPGLVKPSETLSLCTVGGSI--SSHYWSIroppgkglewigiyysgsntynpslksrvtisvdtksnofslklssvtaadtaVYCAR-----YFDYWGQGTLTVSS IGHV4-59*11,IGHJ4*01
QVQLQESGPGLVRPSQTLSLCTVGGSITSDHAWSWRQPPGRGLEWIGIYISGITTYNPSLKSRVTMLRDTSKNQFSRLSSVTAADTAVYCARSLARTTAMDYWGQGSLTVSS Humanized (Experimental)

DVQLQESGPVLVKPSQSLSLCTVGGSITSDHAWSWIQFPGNKLEWIGIYISGITTYNPSLKSRISITRDTSKNQFFLQLNSVTTGDTSTYYCARSLARTTAMDYWGQGTSVTVSS Parental

QVQLQESGPGLVKPSETLSLCTVGGSI--SSHYWSIroppgkglewigiyysgsntynpslksrvtisvdtksnofslklssvtaadtaVYCAR-----YFDYWGQGTLTVSS Humanized (Sapiens^3)
QVQLQESGPGLVKPSETLSLCTVGGSI--SSHYWSIroppgkglewigiyysgsntynpslksrvtisvdtksnofslklssvtaadtaVYCAR-----YFDYWGQGTLTVSS IGHV4-59*11,IGHJ4*01

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Light chain

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DIQMTQSPSSLSASVGDRVTITCQASQDIISYLNWYQQKPGKAPKLLIYDASNLTGVPSRFSGSGSGTDFFTISSLQPEDEIATYYCQCYD--TFGQGTKVEIK IGKV1-33*01, IGKJ1*01
DIQMTQSPSSLSASVGDRVTITCRASQDISSYLNWYQQKPGKAPKLLIYYTSRLHSGVPSRFSGSGSGTDFFTISSLQPEDEIATYYCQCGNTLPYTFGQGTKVEIK Humanized (Experimental)
DIQMTQTSSLSASLGDRVTICRASQDISSYLNWYQQKPDTIKLLIYYTSRLHSGVPSRFSGSGSGTDYSLTINNLEQEDATYFCCQGNTLPYTFGGTKLEIN Parental
DIQMTQSPSSLSASVGDRVTITCRASQDISSYLNWYQQKPGKAPKLLIYYTSRLHSGVPSRFSGSGSGTDFFFTLTISSLQPEDATYCQGNTLPYTFGQGTKLEIK Humanized (Sapiens^3)
DIQMTQSPSSLSASVGDRVTITCRASQSISSYLNWYQQKPGKAPKLLIYAASSLQSGVPSRFSGSGSGTDFFFTLTISSLQPEDATYCQSYS--TFGQGTKLEIK IGKV1-39*01, IGKJ2*01

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