Figure 1

Ab1

Ab1 Heavy chain (chimera) Full length protein sequence.

QSLEESGGRLVTPGTPLTLTCTVSGLDLSSYYMQWVRQAPGKGLEWIGVIGINDNTYYASWAKGRFTISRASSTTVDLKMTS
LTTEDTATYFCARGDIWGPGTLVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPAV
LQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKRVEPKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKDTLMISRTP
EVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTIS
KAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQ
QGNVFSCSVMHEALHNHYTQKSLSLSPGK (SEQ ID NO: 4)

Ab1 Variable region heavy chain (chimera) protein sequence.

QSLEESGGRLVTPGTPLTLTCTVSGLDLSSYYMQWVRQAPGKGLEWIGVIGINDNTYYASWAKGRFTISRASSTTVDLKMTS
LTTEDTATYFCARGDIWGPGTLVTVSS (SEQ ID NO: 3)

Ab1 Variable region heavy chain (chimera) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

QSLEESGGRLVTPGTPLTLTCTVSGLDLS**SYYMQ**WVRQAPGKGLEWIGVIGINDNTYYASWAKGRFTISRASSTTVDLKMTS
LTTEDTATYFCAR*GDI*WGPGTLVTVSS (SEQ ID NOS: 8, 9, 10, respectively)

Ab1 Variable region heavy chain (chimera) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

CAGTCGCTGGAGGAGTCCGGGGGTCGCCTGGTCACGCCTGGGACACCCCTGACACTCACCTGCACAGTCTCTGGACTCG
ACCTCAGT**AGCTACTACATGCAA**TGGGTCCGCCAGGCTCCAGGGAAGGGGCTGGAATGGATCGGAGTCATTGGTATTA
ATGATAACACATACTACGCGAGCTGGGCGAAAGGCCGATTCACCATCTCCAGAGCCTCGTCGACCACGGTGGATCTGA
AAATGACCAGTCTGACAACCGAGGACACGGCCACCTATTTCTGTGCCAGA*GGGGACATC*TGGGGCCCAGGCACCCTCGT
CACCGTCTCGAGC (SEQ ID NO: 143)

Ab1 Heavy chain (chimera) Full length DNA sequence.

CAGTCGCTGGAGGAGTCCGGGGGTCGCCTGGTCACGCCTGGGACACCCCTGACACTCACCTGCACAGTCTCTGGACTCG
ACCTCAGTAGCTACTACATGCAATGGGTCCGCCAGGCTCCAGGGAAGGGGCTGGAATGGATCGGAGTCATTGGTATTA
ATGATAACACATACTACGCGAGCTGGGCGAAAGGCCGATTCACCATCTCCAGAGCCTCGTCGACCACGGTGGATCTGA
AAATGACCAGTCTGACAACCGAGGACACGGCCACCTATTTCTGTGCCAGAGGGGACATCTGGGGCCCAGGCACCCTCG
TCACCGTCTCGAGCGCCTCCACCAAGGGCCCATCGGTCTTCCCCCTGGCACCCTCCTCCAAGAGCACCTCTGGGGGCAC
AGCGGCCCTGGGCTGCCTGGTCAAGGACTACTTCCCCGAACCGGTGACGGTGTCGTGGAACTCAGGCGCCCTGACCAG
CGGCGTGCACACCTTCCCGGCTGTCCTACAGTCCTCAGGACTCTACTCCCTCAGCAGCGTGGTGACCGTGCCCTCCAGC
AGCTTGGGCACCCAGACCTACATCTGCAACGTGAATCACAAGCCCAGCAACACCAAGGTGGACAAGAGAGTTGAGCCC
AAATCTTGTGACAAAACTCACACATGCCCACCGTGCCCAGCACCTGAACTCCTGGGGGGACCGTCAGTCTTCCTCTTCC
CCCCAAAACCCAAGGACACCCTCATGATCTCCCGGACCCCTGAGGTCACATGCGTGGTGGTGGACGTGAGCCACGAAG
ACCCTGAGGTCAAGTTCAACTGGTACGTGGACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGGAGCAG
TACGCCAGCACGTACCGTGTGGTCAGCGTCCTCACCGTCCTGCACCAGGACTGGCTGAATGGCAAGGAGTACAAGTGC
AAGGTCTCCAACAAAGCCCTCCCAGCCCCCATCGAGAAAACCATCTCCAAAGCCAAAGGGCAGCCCCGAGAACCACAG
GTGTACACCCTGCCCCCATCCCGGGAGGAGATGACCAAGAACCAGGTCAGCCTGACCTGCCTGGTCAAAGGCTTCTATC
CCAGCGACATCGCCGTGGAGTGGGAGAGCAATGGGCAGCCGGAGAACAACTACAAGACCACGCCTCCCGTGCTGGACT
CCGACGGCTCCTTCTTCCTCTACAGCAAGCTCACCGTGGACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTCATGCTC
CGTGATGCATGAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCTCCGGGTAAATGA (SEQ ID NO: 144)

Ab1 Light chain (chimera) Full length protein sequence.

QVLTQTASPVSAAVGSTVTINCQASQSVYDNNYLAWYQQKPGQPPKQLIYSTSTLASGVSSRFKGSGSGTQFTLTISDLECAD
AATYYCLGSYDCSSGDCFVFGGGTEVVVKRTVAAPSVFIFPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNS
QESVTEQDSKDSTYSLSSTLTLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC (SEQ ID NO: 2)

Ab1 Variable region light chain (chimera) protein sequence.

QVLTQTASPVSAAVGSTVTINCQASQSVYDNNYLAWYQQKPGQPPKQLIYSTSTLASGVSSRFKGSGSGTQFTLTISDLECAD
AATYYCLGSYDCSSGDCFVFGGGTEVVVKR (SEQ ID NO: 1)

Ab1 Variable region light chain (chimera) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

QVLTQTASPVSAAVGSTVTINC**QASQSVYDNNYLA**WYQQKPGQPPKQLIYSTSTLASGVSSRFKGSGSGTQFTLTISDLECA
DAATYYC*CLGSYDCSSGDCFV*FGGGTEVVVKR (SEQ ID NOS: 5, 6, 7, respectively)

Ab1 Variable region light chain (chimera) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

CAAGTGCTGACCCAGACTGCATCCCCCGTGTCTGCAGCTGTGGGAAGCACAGTCACCATCAATTGC**CAGGCCAGTCAG**
AGTGTTTATGATAACAACTACCTAGCCTGGTATCAGCAGAAACCAGGGCAGCCTCCCAAGCAACTGATCTATTCTAC
ATCCACTCTGGCATCTGGGGTCTCATCGCGGTTCAAAGGCAGTGGATCTGGGACACAGTTCACTCTCACCATCAGCGAC
CTGGAGTGTGCCGATGCTGCCACTTACTACTGT*CTAGGCAGTTATGATTGTAGTAGTGGTGATTGTTTTGTTT*TCGGCGGAG
GGACCGAGGTGGTGGTCAAACGT (SEQ ID NO: 141)

Ab1 Light chain (chimera) Full length DNA sequence.

CAAGTGCTGACCCAGACTGCATCCCCCGTGTCTGCAGCTGTGGGAAGCACAGTCACCATCAATTGCCAGGCCAGTCAG
AGTGTTTATGATAACAACTACCTAGCCTGGTATCAGCAGAAACCAGGGCAGCCTCCCAAGCAACTGATCTATTCTACAT
CCACTCTGGCATCTGGGGTCTCATCGCGGTTCAAAGGCAGTGGATCTGGGACACAGTTCACTCTCACCATCAGCGACCT
GGAGTGTGCCGATGCTGCCACTTACTACTGTCTAGGCAGTTATGATTGTAGTAGTGGTGATTGTTTTGTTTTCGGCGGAG
GGACCGAGGTGGTGGTCAAACGTACGGTGGCTGCACCATCTGTCTTCATCTTCCCGCCATCTGATGAGCAGTTGAAATC
TGGAACTGCCTCTGTTGTGTGCCTGCTGAATAACTTCTATCCCAGAGAGGCCAAAGTACAGTGGAAGGTGGATAACGCC
CTCCAATCGGGTAACTCCCAGGAGAGTGTCACAGAGCAGGACAGCAAGGACAGCACCTACAGCCTCAGCAGCACCCTG
ACGCTGAGCAAAGCAGACTACGAGAAACACAAAGTCTACGCCTGCGAAGTCACCCATCAGGGCCTGAGCTCGCCCGTC
ACAAAGAGCTTCAACAGGGGAGAGTGTTAG (SEQ ID NO: 142)

Figure 2

Ab2

Ab2 Heavy chain (humanized) Full length protein sequence – mammalian produced.

EVQLVESGGGLVQPGGSLRLSCAVSGLDLSSYYMQWVRQAPGKGLEWVGVIGINDNTYYASWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCARGDIWGQGTLVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGV
HTFPAVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKRVEPKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKDTL
MISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPA
PIEKTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVD
KSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK (SEQ ID NO: 14)

Ab2 Variable region heavy chain (humanized) protein sequence.

EVQLVESGGGLVQPGGSLRLSCAVSGLDLSSYYMQWVRQAPGKGLEWVGVIGINDNTYYASWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCARGDIWGQGTLVTVSS (SEQ ID NO: 13)

Ab2 Variable region heavy chain (humanized) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

EVQLVESGGGLVQPGGSLRLSCAVSGLDLS**SYYMQ**WVRQAPGKGLEWVG<u>VIGINDNTYYASWAKG</u>RFTISRDNSKTTVYL
QMNSLRAEDTAVYFCAR*GDI*WGQGTLVTVSS (SEQ ID NOS: 18, 19, 20, respectively)

Ab2 Variable region heavy chain (humanized) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

GAGGTGCAGCTTGTGGAGTCTGGGGGAGGCTTGGTCCAGCCTGGGGGGTCCCTGAGACTCTCCTGTGCAGTCTCTGGAC
TCGACCTCAGT**AGCTACTACATGCAA**TGGGTCCGTCAGGCTCCAGGGAAGGGGCTGGAGTGGGTCGGA<u>GTCATTGGTA</u>
<u>TCAATGATAACACATACTACGCGAGCTGGGCGAAAGGC</u>CGATTCACCATCTCCAGAGACAATTCCAAGACCACGGTGT
ATCTTCAAATGAACAGCCTGAGAGCTGAGGACACTGCTGTGTATTTCTGTGCTAGA*GGGGACATC*TGGGGCCAAGGGAC
CCTCGTCACCGTCTCGAGC (SEQ ID NO: 153)

Ab2 Heavy chain (humanized) Full length DNA sequence – mammalian produced.

GAGGTGCAGCTTGTGGAGTCTGGGGGAGGCTTGGTCCAGCCTGGGGGGTCCCTGAGACTCTCCTGTGCAGTCTCTGGAC
TCGACCTCAGTAGCTACTACATGCAATGGGTCCGTCAGGCTCCAGGGAAGGGGCTGGAGTGGGTCGGAGTCATTGGTA
TCAATGATAACACATACTACGCGAGCTGGGCGAAAGGCCGATTCACCATCTCCAGAGACAATTCCAAGACCACGGTGT
ATCTTCAAATGAACAGCCTGAGAGCTGAGGACACTGCTGTGTATTTCTGTGCTAGAGGGGACATCTGGGGCCAAGGGA
CCCTCGTCACCGTCTCGAGCGCCTCCACCAAGGGCCCATCGGTCTTCCCCCTGGCACCCTCCTCCAAGAGCACCTCTGG
GGGCACAGCGGCCCTGGGCTGCCTGGTCAAGGACTACTTCCCCGAACCGGTGACGGTGTCGTGGAACTCAGGCGCCCT
GACCAGCGGCGTGCACACCTTCCCGGCTGTCCTACAGTCCTCAGGACTCTACTCCCTCAGCAGCGTGGTGACCGTGCCC
TCCAGCAGCTTGGGCACCCAGACCTACATCTGCAACGTGAATCACAAGCCCAGCAACACCAAGGTGGACAAGAGAGTT
GAGCCCAAATCTTGTGACAAAACTCACACATGCCCACCGTGCCCAGCACCTGAACTCCTGGGGGGACCGTCAGTCTTCC
TCTTCCCCCCAAAACCCAAGGACACCCTCATGATCTCCCGGACCCCTGAGGTCACATGCGTGGTGGTGGACGTGAGCCA
CGAAGACCCTGAGGTCAAGTTCAACTGGTACGTGGACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGG
AGCAGTACGCCAGCACGTACCGTGTGGTCAGCGTCCTCACCGTCCTGCACCAGGACTGGCTGAATGGCAAGGAGTACA
AGTGCAAGGTCTCCAACAAAGCCCTCCCAGCCCCCATCGAGAAAACCATCTCCAAAGCCAAAGGGCAGCCCCGAGAAC
CACAGGTGTACACCCTGCCCCCATCCCGGGAGGAGATGACCAAGAACCAGGTCAGCCTGACCTGCCTGGTCAAAGGCT
TCTATCCCAGCGACATCGCCGTGGAGTGGGAGAGCAATGGGCAGCCGGAGAACAACTACAAGACCACGCCTCCCGTGC
TGGACTCCGACGGCTCCTTCTTCCTCTACAGCAAGCTCACCGTGGACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTC
ATGCTCCGTGATGCATGAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCTCCGGGTAAATGA (SEQ ID NO: 154)

Ab2 Light chain (humanized) Full length protein sequence.

QVLTQSPSSLSASVGDRVTINCQASQSVYDNNYLAWYQQKPGKVPKQLIYSTSTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYCLGSYDCSSGDCFVFGGGTKVEIKRTVAAPSVFIFPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNSQ
ESVTEQDSKDSTYSLSSTLTLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC (SEQ ID NO: 12)

Ab2 Variable region Light chain (humanized) protein sequence.

QVLTQSPSSLSASVGDRVTINCQASQSVYDNNYLAWYQQKPGKVPKQLIYSTSTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYCLGSYDCSSGDCFVFGGGTKVEIKR (SEQ ID NO: 11)

Ab2 Variable region Light chain (humanized) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

QVLTQSPSSLSASVGDRVTINC**QASQSVYDNNYLA**WYQQKPGKVPKQLIYSTSTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYC*CLGSYDCSSGDCFV*FGGGTKVEIKR (SEQ ID NOS: 15, 16, 17, respectively)

Ab2 Variable region Light chain (humanized) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

CAAGTGCTGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGGAGACAGAGTCACCATCAATTGC**CAGGCCAGTCAG**
AGTGTTTATGATAACAACTACCTAGCCTGGTATCAGCAGAAACCAGGGAAAGTTCCTAAGCAACTGATCTATTCTAC
ATCCACTCTGGCATCTGGGGTCCCATCTCGTTTCAGTGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGC
CTGCAGCCTGAAGATGTTGCAACTTATTACTGT*CTAGGCAGTTATGATTGTAGTAGTGGTGATTGTTTTGTT*TTCGGCGGAG
GAACCAAGGTGGAAATCAAACGT (SEQ ID NO: 151)

Ab2 Light chain (humanized) Full length DNA sequence.

CAAGTGCTGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGGAGACAGAGTCACCATCAATTGCCAGGCCAGTCAGA
GTGTTTATGATAACAACTACCTAGCCTGGTATCAGCAGAAACCAGGGAAAGTTCCTAAGCAACTGATCTATTCTACATC
CACTCTGGCATCTGGGGTCCCATCTCGTTTCAGTGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTG
CAGCCTGAAGATGTTGCAACTTATTACTGTCTAGGCAGTTATGATTGTAGTAGTGGTGATTGTTTTGTTTTCGGCGGAGG
AACCAAGGTGGAAATCAAACGTACGGTGGCTGCACCATCTGTCTTCATCTTCCCGCCATCTGATGAGCAGTTGAAATCT
GGAACTGCCTCTGTTGTGTGCCTGCTGAATAACTTCTATCCCAGAGAGGCCAAAGTACAGTGGAAGGTGGATAACGCCC
TCCAATCGGGTAACTCCCAGGAGAGTGTCACAGAGCAGGACAGCAAGGACAGCACCTACAGCCTCAGCAGCACCCTGA
CGCTGAGCAAAGCAGACTACGAGAAACACAAAGTCTACGCCTGCGAAGTCACCCATCAGGGCCTGAGCTCGCCCGTCA
CAAAGAGCTTCAACAGGGGAGAGTGTTAG (SEQ ID NO: 152)

Figure 3

Ab3

Ab3 Heavy chain (humanized) Full length protein sequence – yeast produced.

EVQLVESGGGLVQPGGSLRLSCAVSGLDLSSYYMQWVRQAPGKGLEWVGVIGINDNTYYASWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCARGDIWGQGTLVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGV
HTFPAVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDARVEPKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKDTL
MISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPA
PIEKTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVD
KSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK (SEQ ID NO: 24)

Ab3 Variable region heavy chain (humanized) protein sequence.

EVQLVESGGGLVQPGGSLRLSCAVSGLDLSSYYMQWVRQAPGKGLEWVGVIGINDNTYYASWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCARGDIWGQGTLVTVSS (SEQ ID NO: 23)

Ab3 Variable region heavy chain (humanized) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

EVQLVESGGGLVQPGGSLRLSCAVSGLDLS**SYYMQ**WVRQAPGKGLEWVGVIGINDNTYYASWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCAR*GDI*WGQGTLVTVSS (SEQ ID NOS: 28, 29, 30, respectively)

Ab3 Variable region heavy chain (humanized) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

GAGGTGCAGCTTGTGGAGTCTGGGGGAGGCTTGGTCCAGCCTGGGGGGTCCCTGAGACTCTCCTGTGCAGTCTCTGGAC
TCGACCTCAGT**AGCTACTACATGCAA**TGGGTCCGTCAGGCTCCAGGGAAGGGGCTGGAGTGGGTCGGAGTCATTGGTA
TCAATGATAACACATACTACGCGAGCTGGGCGAAAGGCCGATTCACCATCTCCAGAGACAATTCCAAGACCACGGTGT
ATCTTCAAATGAACAGCCTGAGAGCTGAGGACACTGCTGTGTATTTCTGTGCTAGA*GGGGACATC*TGGGGCCAAGGGAC
CCTCGTCACCGTCTCGAGC (SEQ ID NO: 163)

Ab3 Heavy chain (humanized) Full length DNA sequence – yeast produced.

GAGGTGCAGCTTGTGGAGTCTGGGGGAGGCTTGGTCCAGCCTGGGGGGTCCCTGAGACTCTCCTGTGCAGTCTCTGGAC
TCGACCTCAGTAGCTACTACATGCAATGGGTCCGTCAGGCTCCAGGGAAGGGGCTGGAGTGGGTCGGAGTCATTGGTA
TCAATGATAACACATACTACGCGAGCTGGGCGAAAGGCCGATTCACCATCTCCAGAGACAATTCCAAGACCACGGTGT
ATCTTCAAATGAACAGCCTGAGAGCTGAGGACACTGCTGTGTATTTCTGTGCTAGAGGGGACATCTGGGGCCAAGGGA
CCCTCGTCACCGTCTCGAGCGCCTCCACCAAGGGCCCATCGGTCTTCCCCCTGGCACCCTCCTCCAAGAGCACCTCTGG
GGGCACAGCGGCCCTGGGCTGCCTGGTCAAGGACTACTTCCCCGAACCGGTGACGGTGTCGTGGAACTCAGGCGCCCT
GACCAGCGGCGTGCACACCTTCCCGGCTGTCCTACAGTCCTCAGGACTCTACTCCCTCAGCAGCGTGGTGACCGTGCCC
TCCAGCAGCTTGGGCACCCAGACCTACATCTGCAACGTGAATCACAAGCCCAGCAACACCAAGGTGGACGCGAGAGTT
GAGCCCAAATCTTGTGACAAAACTCACACATGCCCACCGTGCCCAGCACCTGAACTCCTGGGGGGACCGTCAGTCTTCC
TCTTCCCCCCAAAACCCAAGGACACCCTCATGATCTCCCGGACCCCTGAGGTCACATGCGTGGTGGTGGACGTGAGCCA
CGAAGACCCTGAGGTCAAGTTCAACTGGTACGTGGACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGG
AGCAGTACGCCAGCACGTACCGTGTGGTCAGCGTCCTCACCGTCCTGCACCAGGACTGGCTGAATGGCAAGGAGTACA
AGTGCAAGGTCTCCAACAAAGCCCTCCCAGCCCCCATCGAGAAAACCATCTCCAAAGCCAAAGGGCAGCCCCGAGAAC
CACAGGTGTACACCCTGCCCCCATCCCGGGAGGAGATGACCAAGAACCAGGTCAGCCTGACCTGCCTGGTCAAAGGCT
TCTATCCCAGCGACATCGCCGTGGAGTGGGAGAGCAATGGGCAGCCGGAGAACAACTACAAGACCACGCCTCCCGTGC
TGGACTCCGACGGCTCCTTCTTCCTCTACAGCAAGCTCACCGTGGACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTC
ATGCTCCGTGATGCATGAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCTCCGGGTAAATGA (SEQ ID
NO: 164)

Ab3 Light chain (humanized) Full length protein sequence.

QVLTQSPSSLSASVGDRVTINCQASQSVYDNNYLAWYQQKPGKVPKQLIYSTSTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYCLGSYDCSSGDCFVFGGGTKVEIKRTVAAPSVFIFPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNSQ
ESVTEQDSKDSTYSLSSTLTLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC (SEQ ID NO: 22)

Ab3 Variable region Light chain (humanized) protein sequence.

QVLTQSPSSLSASVGDRVTINCQASQSVYDNNYLAWYQQKPGKVPKQLIYSTSTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYCLGSYDCSSGDCFVFGGGTKVEIKR (SEQ ID NO: 21)

Ab3 Variable region Light chain (humanized) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

QVLTQSPSSLSASVGDRVTINC**QASQSVYDNNYLA**WYQQKPGKVPKQLIYSTSTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYC*LGSYDCSSGDCFV*FGGGTKVEIKR (SEQ ID NOS: 25, 26, 27, respectively)

Ab3 Variable region Light chain (humanized) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

CAAGTGCTGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGGAGACAGAGTCACCATCAATTGC**CAGGCCAGTCAG**
AGTGTTTATGATAACAACTACCTAGCCTGGTATCAGCAGAAACCAGGGAAAGTTCCTAAGCAACTGATCTATTCTAC
ATCCACTCTGGCATCTGGGGTCCCATCTCGTTTCAGTGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGC
CTGCAGCCTGAAGATGTTGCAACTTATTACTGT*CTAGGCAGTTATGATTGTAGTAGTGGTGATTGTTTTGTTT*TTCGGCGGAG
GAACCAAGGTGGAAATCAAACGT (SEQ ID NO: 161)

Ab3 Light chain (humanized) Full length DNA sequence.

CAAGTGCTGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGGAGACAGAGTCACCATCAATTGCCAGGCCAGTCAGA
GTGTTTATGATAACAACTACCTAGCCTGGTATCAGCAGAAACCAGGGAAAGTTCCTAAGCAACTGATCTATTCTACATC
CACTCTGGCATCTGGGGTCCCATCTCGTTTCAGTGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTG
CAGCCTGAAGATGTTGCAACTTATTACTGTCTAGGCAGTTATGATTGTAGTAGTGGTGATTGTTTTGTTTTCGGCGGAGG
AACCAAGGTGGAAATCAAACGTACGGTGGCTGCACCATCTGTCTTCATCTTCCCGCCATCTGATGAGCAGTTGAAATCT
GGAACTGCCTCTGTTGTGTGCCTGCTGAATAACTTCTATCCCAGAGAGGCCAAAGTACAGTGGAAGGTGGATAACGCCC
TCCAATCGGGTAACTCCCAGGAGAGTGTCACAGAGCAGGACAGCAAGGACAGCACCTACAGCCTCAGCAGCACCCTGA
CGCTGAGCAAAGCAGACTACGAGAAACACAAAGTCTACGCCTGCGAAGTCACCCATCAGGGCCTGAGCTCGCCCGTCA
CAAAGAGCTTCAACAGGGGAGAGTGTTAG (SEQ ID NO: 162)

Figure 4

Ab4

Ab4 Heavy chain (chimera) Full length protein sequence.

QSLEESGGRLVTPGTPLTLTCSVSGIDLSGYYMNWVRQAPGKGLEWIGVIGINGATYYASWAKGRFTISKTSSTTVDLKMTS
LTTEDTATYFCARGDIWGPGTLVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPAV
LQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKRVEPKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKDTLMISRTP
EVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTIS
KAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQ
QGNVFSCSVMHEALHNHYTQKSLSLSPGK (SEQ ID NO: 34)

Ab4 Variable region heavy chain (chimera) protein sequence.

QSLEESGGRLVTPGTPLTLTCSVSGIDLSGYYMNWVRQAPGKGLEWIGVIGINGATYYASWAKGRFTISKTSSTTVDLKMTS
LTTEDTATYFCARGDIWGPGTLVTVSS (SEQ ID NO: 33)

Ab4 Variable region heavy chain (chimera) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

QSLEESGGRLVTPGTPLTLTCSVSGIDLS**GYYMN**WVRQAPGKGLEWIGVIGINGATYYASWAKGRFTISKTSSTTVDLKMTS
LTTEDTATYFCAR*GDI*WGPGTLVTVSS (SEQ ID NOS: 38, 39, 40, respectively)

Ab4 Variable region heavy chain (chimera) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

CAGTCGCTGGAGGAGTCCGGGGGTCGCCTGGTCACGCCTGGGACACCCCTGACACTCACCTGTTCCGTCTCTGGCATCG
ACCTCAGT**GGCTACTACATGAAC**TGGGTCCGCCAGGCTCCAGGGAAGGGGCTGGAATGGATCGGAGTCATTGGTATT
AATGGTGCCACATACTACGCGAGCTGGGCGAAAGGCCGATTCACCATCTCCAAAACCTCGTCGACCACGGTGGATCTG
AAAATGACCAGTCTGACAACCGAGGACACGGCCACCTATTTCTGTGCCAGA*GGGGACATC*TGGGGCCCGGGCACCCTC
GTCACCGTCTCGAGC (SEQ ID NO: 173)

Ab4 Heavy chain (chimera) Full length DNA sequence.

CAGTCGCTGGAGGAGTCCGGGGGTCGCCTGGTCACGCCTGGGACACCCCTGACACTCACCTGTTCCGTCTCTGGCATCG
ACCTCAGTGGCTACTACATGAACTGGGTCCGCCAGGCTCCAGGGAAGGGGCTGGAATGGATCGGAGTCATTGGTATTA
ATGGTGCCACATACTACGCGAGCTGGGCGAAAGGCCGATTCACCATCTCCAAAACCTCGTCGACCACGGTGGATCTGA
AAATGACCAGTCTGACAACCGAGGACACGGCCACCTATTTCTGTGCCAGAGGGGACATCTGGGGCCCGGGCACCCTCG
TCACCGTCTCGAGCGCCTCCACCAAGGGCCCATCGGTCTTCCCCCTGGCACCCTCCTCCAAGAGCACCTCTGGGGGCAC
AGCGGCCCTGGGCTGCCTGGTCAAGGACTACTTCCCCGAACCGGTGACGGTGTCGTGGAACTCAGGCGCCCTGACCAG
CGGCGTGCACACCTTCCCGGCTGTCCTACAGTCCTCAGGACTCTACTCCCTCAGCAGCGTGGTGACCGTGCCCTCCAGC
AGCTTGGGCACCCAGACCTACATCTGCAACGTGAATCACAAGCCCAGCAACACCAAGGTGGACAAGAGAGTTGAGCCC
AAATCTTGTGACAAAACTCACACATGCCCACCGTGCCCAGCACCTGAACTCCTGGGGGGACCGTCAGTCTTCCTCTTCC
CCCCAAAACCCAAGGACACCCTCATGATCTCCCGGACCCCTGAGGTCACATGCGTGGTGGTGGACGTGAGCCACGAAG
ACCCTGAGGTCAAGTTCAACTGGTACGTGGACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGGAGCAG
TACGCCAGCACGTACCGTGTGGTCAGCGTCCTCACCGTCCTGCACCAGGACTGGCTGAATGGCAAGGAGTACAAGTGC
AAGGTCTCCAACAAAGCCCTCCCAGCCCCCATCGAGAAAACCATCTCCAAAGCCAAAGGGCAGCCCCGAGAACCACAG
GTGTACACCCTGCCCCCATCCCGGGAGGAGATGACCAAGAACCAGGTCAGCCTGACCTGCCTGGTCAAAGGCTTCTATC
CCAGCGACATCGCCGTGGAGTGGGAGAGCAATGGGCAGCCGGAGAACAACTACAAGACCACGCCTCCCGTGCTGGACT
CCGACGGCTCCTTCTTCCTCTACAGCAAGCTCACCGTGGACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTCATGCTC
CGTGATGCATGAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCTCCGGGTAAATGA (SEQ ID NO: 174)

Ab4 Light chain (chimera) Full length protein sequence.

QVLTQTPSPVSAAVGSTVTINCQASQSVYHNTYLAWYQQKPGQPPKQLIYDASTLASGVPSRFSGSGSGTQFTLTISGVQCND
AAAYYCLGSYDCTNGDCFVFGGGTEVVVKRTVAAPSVFIFPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNS
QESVTEQDSKDSTYSLSSTLTLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC (SEQ ID NO: 32)

Ab4 Variable region light chain (chimera) protein sequence.

QVLTQTPSPVSAAVGSTVTINCQASQSVYHNTYLAWYQQKPGQPPKQLIYDASTLASGVPSRFSGSGSGTQFTLTISGVQCND
AAAYYCLGSYDCTNGDCFVFGGGTEVVVKR (SEQ ID NO: 31)

Ab4 Variable region light chain (chimera) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

QVLTQTPSPVSAAVGSTVTINC**QASQSVYHNTYLA**WYQQKPGQPPKQLIYDASTLASGVPSRFSGSGSGTQFTLTISGVQCN
DAAAYYC*LGSYDCTNGDCFV*FGGGTEVVVKR (SEQ ID NOS: 35, 36, 37, respectively)

Ab4 Variable region light chain (chimera) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

CAAGTGCTGACCCAGACTCCATCCCCCGTGTCTGCAGCTGTGGGAAGCACAGTCACCATCAATTGC**CAGGCCAGTCAG**
AGTGTTTATCATAACACCTACCTGGCCTGGTATCAGCAGAAACCAGGGCAGCCTCCCAAACAACTGATCTATGATGC
ATCCACTCTGGCGTCTGGGGTCCCATCGCGGTTCAGCGGCAGTGGATCTGGGACACAGTTCACTCTCACCATCAGCGGC
GTGCAGTGTAACGATGCTGCCGCTTACTACTGT*CTGGGCAGTTATGATTGTACTAATGGTGATTGTTTTGTT*TTCGGCGGAG
GGACCGAGGTGGTGGTCAAACGT (SEQ ID NO: 171)

Ab4 Light chain (chimera) Full length DNA sequence.

CAAGTGCTGACCCAGACTCCATCCCCCGTGTCTGCAGCTGTGGGAAGCACAGTCACCATCAATTGCCAGGCCAGTCAGA
GTGTTTATCATAACACCTACCTGGCCTGGTATCAGCAGAAACCAGGGCAGCCTCCCAAACAACTGATCTATGATGCATC
CACTCTGGCGTCTGGGGTCCCATCGCGGTTCAGCGGCAGTGGATCTGGGACACAGTTCACTCTCACCATCAGCGGCGTG
CAGTGTAACGATGCTGCCGCTTACTACTGTCTGGGCAGTTATGATTGTACTAATGGTGATTGTTTTGTTTTCGGCGGAGG
GACCGAGGTGGTGGTCAAACGTACGGTGGCTGCACCATCTGTCTTCATCTTCCCGCCATCTGATGAGCAGTTGAAATCT
GGAACTGCCTCTGTTGTGTGCCTGCTGAATAACTTCTATCCCAGAGAGGCCAAAGTACAGTGGAAGGTGGATAACGCCC
TCCAATCGGGTAACTCCCAGGAGAGTGTCACAGAGCAGGACAGCAAGGACAGCACCTACAGCCTCAGCAGCACCCTGA
CGCTGAGCAAAGCAGACTACGAGAAACACAAAGTCTACGCCTGCGAAGTCACCCATCAGGGCCTGAGCTCGCCCGTCA
CAAAGAGCTTCAACAGGGGAGAGTGTTAG (SEQ ID NO: 172)

Figure 5

Ab5

Ab5 Heavy chain (humanized) Full length protein sequence – mammalian produced.

EVQLVESGGGLVQPGGSLRLSCAVSGIDLSGYYMNWVRQAPGKGLEWVGVIGINGATYYASWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCARGDIWGQGTLVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGV
HTFPAVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKRVEPKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKDTL
MISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPA
PIEKTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVD
KSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK (SEQ ID NO: 44)

Ab5 Variable region heavy chain (humanized) protein sequence.

EVQLVESGGGLVQPGGSLRLSCAVSGIDLSGYYMNWVRQAPGKGLEWVGVIGINGATYYASWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCARGDIWGQGTLVTVSS (SEQ ID NO: 43)

Ab5 Variable region heavy chain (humanized) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

EVQLVESGGGLVQPGGSLRLSCAVSGIDLS**GYYMN**WVRQAPGKGLEWVGVIGINGATYYASWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCAR*GDI*WGQGTLVTVSS (SEQ ID NOS: 48, 49, 50, respectively)

Ab5 Variable region heavy chain (humanized) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

GAGGTGCAGCTTGTGGAGTCTGGGGGAGGCTTGGTCCAGCCTGGGGGGTCCCTGAGACTCTCCTGTGCAGTCTCTGGAA
TCGACCTCAGT**GGCTACTACATGAAC**TGGGTCCGTCAGGCTCCAGGGAAGGGGCTGGAGTGGGTCGGAGTCATTGGT
ATTAATGGTGCCACATACTACGCGAGCTGGGCGAAAGGCCGATTCACCATCTCCAGAGACAATTCCAAGACCACGGTG
TATCTTCAAATGAACAGCCTGAGAGCTGAGGACACTGCTGTGTATTTCTGTGCTAGA*GGGGACATC*TGGGGCCAAGGGA
CCCTCGTCACCGTCTCGAGC (SEQ ID NO: 183)

Ab5 Heavy chain (humanized) Full length DNA sequence – mammalian produced.

GAGGTGCAGCTTGTGGAGTCTGGGGGAGGCTTGGTCCAGCCTGGGGGGTCCCTGAGACTCTCCTGTGCAGTCTCTGGAA
TCGACCTCAGTGGCTACTACATGAACTGGGTCCGTCAGGCTCCAGGGAAGGGGCTGGAGTGGGTCGGAGTCATTGGTA
TTAATGGTGCCACATACTACGCGAGCTGGGCGAAAGGCCGATTCACCATCTCCAGAGACAATTCCAAGACCACGGTGT
ATCTTCAAATGAACAGCCTGAGAGCTGAGGACACTGCTGTGTATTTCTGTGCTAGAGGGGACATCTGGGGCCAAGGGA
CCCTCGTCACCGTCTCGAGCGCCTCCACCAAGGGCCCATCGGTCTTCCCCCTGGCACCCTCCTCCAAGAGCACCTCTGG
GGGCACAGCGGCCCTGGGCTGCCTGGTCAAGGACTACTTCCCCGAACCGGTGACGGTGTCGTGGAACTCAGGCGCCCT
GACCAGCGGCGTGCACACCTTCCCGGCTGTCCTACAGTCCTCAGGACTCTACTCCCTCAGCAGCGTGGTGACCGTGCCC
TCCAGCAGCTTGGGCACCCAGACCTACATCTGCAACGTGAATCACAAGCCCAGCAACACCAAGGTGGACAAGAGAGTT
GAGCCCAAATCTTGTGACAAAACTCACACATGCCCACCGTGCCCAGCACCTGAACTCCTGGGGGGACCGTCAGTCTTCC
TCTTCCCCCCAAAACCCAAGGACACCCTCATGATCTCCCGGACCCCTGAGGTCACATGCGTGGTGGTGGACGTGAGCCA
CGAAGACCCTGAGGTCAAGTTCAACTGGTACGTGGACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGG
AGCAGTACGCCAGCACGTACCGTGTGGTCAGCGTCCTCACCGTCCTGCACCAGGACTGGCTGAATGGCAAGGAGTACA
AGTGCAAGGTCTCCAACAAAGCCCTCCCAGCCCCCATCGAGAAAACCATCTCCAAAGCCAAAGGGCAGCCCCGAGAAC
CACAGGTGTACACCCTGCCCCCATCCCGGGAGGAGATGACCAAGAACCAGGTCAGCCTGACCTGCCTGGTCAAAGGCT
TCTATCCCAGCGACATCGCCGTGGAGTGGGAGAGCAATGGGCAGCCGGAGAACAACTACAAGACCACGCCTCCCGTGC
TGGACTCCGACGGCTCCTTCTTCCTCTACAGCAAGCTCACCGTGGACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTC
ATGCTCCGTGATGCATGAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCTCCGGGTAAATGA (SEQ ID
NO: 184)

Ab5 Light chain (humanized) Full length protein sequence.

QVLTQSPSSLSASVGDRVTINCQASQSVYHNTYLAWYQQKPGKVPKQLIYDASTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYCLGSYDCTNGDCFVFGGGTKVEIKRTVAAPSVFIFPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNS
QESVTEQDSKDSTYSLSSTLTLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC (SEQ ID NO: 42)

Ab5 Variable region Light chain (humanized) protein sequence.

QVLTQSPSSLSASVGDRVTINCQASQSVYHNTYLAWYQQKPGKVPKQLIYDASTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYCLGSYDCTNGDCFVFGGGTKVEIKR (SEQ ID NO: 41)

Ab5 Variable region Light chain (humanized) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

QVLTQSPSSLSASVGDRVTINC**QASQSVYHNTYLA**WYQQKPGKVPKQLIYDASTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYC*CLGSYDCTNGDCFV*FGGGTKVEIKR (SEQ ID NOS: 45, 46, 47, respectively)

Ab5 Variable region Light chain (humanized) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

CAAGTGCTGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGGAGACAGAGTCACCATCAATTGC**CAGGCCAGTCAG**
AGTGTTTATCATAACACCTACCTGGCCTGGTATCAGCAGAAACCAGGGAAAGTTCCTAAGCAACTGATCTATGATGC
ATCCACTCTGGCATCTGGGGTCCCATCTCGTTTCAGTGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGC
CTGCAGCCTGAAGATGTTGCAACTTATTACTGT*CTGGGCAGTTATGATTGTACTAATGGTGATTGTTTTGTT*TTCGGCGGAG
GAACCAAGGTGGAAATCAAACGT (SEQ ID NO: 181)

Ab5 Light chain (humanized) Full length DNA sequence.

CAAGTGCTGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGGAGACAGAGTCACCATCAATTGCCAGGCCAGTCAGA
GTGTTTATCATAACACCTACCTGGCCTGGTATCAGCAGAAACCAGGGAAAGTTCCTAAGCAACTGATCTATGATGCATC
CACTCTGGCATCTGGGGTCCCATCTCGTTTCAGTGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTG
CAGCCTGAAGATGTTGCAACTTATTACTGTCTGGGCAGTTATGATTGTACTAATGGTGATTGTTTTGTTTTCGGCGGAGG
AACCAAGGTGGAAATCAAACGTACGGTGGCTGCACCATCTGTCTTCATCTTCCCGCCATCTGATGAGCAGTTGAAATCT
GGAACTGCCTCTGTTGTGTGCCTGCTGAATAACTTCTATCCCAGAGAGGCCAAAGTACAGTGGAAGGTGGATAACGCCC
TCCAATCGGGTAACTCCCAGGAGAGTGTCACAGAGCAGGACAGCAAGGACAGCACCTACAGCCTCAGCAGCACCCTGA
CGCTGAGCAAAGCAGACTACGAGAAACACAAAGTCTACGCCTGCGAAGTCACCCATCAGGGCCTGAGCTCGCCCGTCA
CAAAGAGCTTCAACAGGGGAGAGTGTTAG (SEQ ID NO: 182)

Figure 6

Ab6

Ab6 Heavy chain (humanized) Full length protein sequence – yeast produced.

EVQLVESGGGLVQPGGSLRLSCAVSGIDLSGYYMNWVRQAPGKGLEWVGVIGINGATYYASWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCARGDIWGQGTLVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGV
HTFPAVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDARVEPKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKDTL
MISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPA
PIEKTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVD
KSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK (SEQ ID NO: 54)

Ab6 Variable region heavy chain (humanized) protein sequence.

EVQLVESGGGLVQPGGSLRLSCAVSGIDLSGYYMNWVRQAPGKGLEWVGVIGINGATYYASWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCARGDIWGQGTLVTVSS (SEQ ID NO: 53)

Ab6 Variable region heavy chain (humanized) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

EVQLVESGGGLVQPGGSLRLSCAVSGIDLS**GYYMN**WVRQAPGKGLEWVGVIGINGATYYASWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCAR*GDI*WGQGTLVTVSS (SEQ ID NOS: 58, 59, 60, respectively)

Ab6 Variable region heavy chain (humanized) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

GAGGTGCAGCTTGTGGAGTCTGGGGGAGGCTTGGTCCAGCCTGGGGGGTCCCTGAGACTCTCCTGTGCAGTCTCTGGAA
TCGACCTCAGT**GGCTACTACATGAAC**TGGGTCCGTCAGGCTCCAGGGAAGGGGCTGGAGTGGGTCGGAGTCATTGGT
ATTAATGGTGCCACATACTACGCGAGCTGGGCGAAAGGCCGATTCACCATCTCCAGAGACAATTCCAAGACCACGGTG
TATCTTCAAATGAACAGCCTGAGAGCTGAGGACACTGCTGTGTATTTCTGTGCTAGA*GGGGACATC*TGGGGCCAAGGGA
CCCTCGTCACCGTCTCGAGC (SEQ ID NO: 193)

Ab6 Heavy chain (humanized) Full length DNA sequence – yeast produced.

GAGGTGCAGCTTGTGGAGTCTGGGGGAGGCTTGGTCCAGCCTGGGGGGTCCCTGAGACTCTCCTGTGCAGTCTCTGGAA
TCGACCTCAGTGGCTACTACATGAACTGGGTCCGTCAGGCTCCAGGGAAGGGGCTGGAGTGGGTCGGAGTCATTGGTA
TTAATGGTGCCACATACTACGCGAGCTGGGCGAAAGGCCGATTCACCATCTCCAGAGACAATTCCAAGACCACGGTGT
ATCTTCAAATGAACAGCCTGAGAGCTGAGGACACTGCTGTGTATTTCTGTGCTAGAGGGGACATCTGGGGCCAAGGGA
CCCTCGTCACCGTCTCGAGCGCCTCCACCAAGGGCCCATCGGTCTTCCCCCTGGCACCCTCCTCCAAGAGCACCTCTGG
GGGCACAGCGGCCCTGGGCTGCCTGGTCAAGGACTACTTCCCCGAACCGGTGACGGTGTCGTGGAACTCAGGCGCCCT
GACCAGCGGCGTGCACACCTTCCCGGCTGTCCTACAGTCCTCAGGACTCTACTCCCTCAGCAGCGTGGTGACCGTGCCC
TCCAGCAGCTTGGGCACCCAGACCTACATCTGCAACGTGAATCACAAGCCCAGCAACACCAAGGTGGACGCGAGAGTT
GAGCCCAAATCTTGTGACAAAACTCACACATGCCCACCGTGCCCAGCACCTGAACTCCTGGGGGGACCGTCAGTCTTCC
TCTTCCCCCCAAAACCCAAGGACACCCTCATGATCTCCCGGACCCCTGAGGTCACATGCGTGGTGGTGGACGTGAGCCA
CGAAGACCCTGAGGTCAAGTTCAACTGGTACGTGGACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGG
AGCAGTACGCCAGCACGTACCGTGTGGTCAGCGTCCTCACCGTCCTGCACCAGGACTGGCTGAATGGCAAGGAGTACA
AGTGCAAGGTCTCCAACAAAGCCCTCCCAGCCCCCATCGAGAAAACCATCTCCAAAGCCAAAGGGCAGCCCCGAGAAC
CACAGGTGTACACCCTGCCCCCATCCCGGGAGGAGATGACCAAGAACCAGGTCAGCCTGACCTGCCTGGTCAAAGGCT
TCTATCCCAGCGACATCGCCGTGGAGTGGGAGAGCAATGGGCAGCCGGAGAACAACTACAAGACCACGCCTCCCGTGC
TGGACTCCGACGGCTCCTTCTTCCTCTACAGCAAGCTCACCGTGGACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTC
ATGCTCCGTGATGCATGAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCTCCGGGTAAATGA (SEQ ID
NO: 194)

Ab6 Light chain (humanized) Full length protein sequence.

QVLTQSPSSLSASVGDRVTINCQASQSVYHNTYLAWYQQKPGKVPKQLIYDASTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYCLGSYDCTNGDCFVFGGGTKVEIKRTVAAPSVFIFPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNS
QESVTEQDSKDSTYSLSSTLTLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC (SEQ ID NO: 52)

Ab6 Variable region Light chain (humanized) protein sequence.

QVLTQSPSSLSASVGDRVTINCQASQSVYHNTYLAWYQQKPGKVPKQLIYDASTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYCLGSYDCTNGDCFVFGGGTKVEIKR (SEQ ID NO: 51)

Ab6 Variable region Light chain (humanized) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

QVLTQSPSSLSASVGDRVTINC**QASQSVYHNTYLA**WYQQKPGKVPKQLIYDASTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYC*LGSYDCTNGDCFV*FGGGTKVEIKR (SEQ ID NOS: 55, 56, 57, respectively)

Ab6 Variable region Light chain (humanized) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

CAAGTGCTGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGGAGACAGAGTCACCATCAATTGC**CAGGCCAGTCAG**
AGTGTTTATCATAACACCTACCTGGCCTGGTATCAGCAGAAACCAGGGAAAGTTCCTAAGCAACTGATCTATGATGC
ATCCACTCTGGCATCTGGGGTCCCATCTCGTTTCAGTGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGC
CTGCAGCCTGAAGATGTTGCAACTTATTACTGT*CTGGGCAGTTATGATTGTACTAATGGTGATTGTTTTGTT*TTCGGCGGAG
GAACCAAGGTGGAAATCAAACGT (SEQ ID NO: 191)

Ab6 Light chain (humanized) Full length DNA sequence.

CAAGTGCTGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGGAGACAGAGTCACCATCAATTGCCAGGCCAGTCAGA
GTGTTTATCATAACACCTACCTGGCCTGGTATCAGCAGAAACCAGGGAAAGTTCCTAAGCAACTGATCTATGATGCATC
CACTCTGGCATCTGGGGTCCCATCTCGTTTCAGTGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTG
CAGCCTGAAGATGTTGCAACTTATTACTGTCTGGGCAGTTATGATTGTACTAATGGTGATTGTTTTGTTTTCGGCGGAGG
AACCAAGGTGGAAATCAAACGTACGGTGGCTGCACCATCTGTCTTCATCTTCCCGCCATCTGATGAGCAGTTGAAATCT
GGAACTGCCTCTGTTGTGTGCCTGCTGAATAACTTCTATCCCAGAGAGGCCAAAGTACAGTGGAAGGTGGATAACGCCC
TCCAATCGGGTAACTCCCAGGAGAGTGTCACAGAGCAGGACAGCAAGGACAGCACCTACAGCCTCAGCAGCACCCTGA
CGCTGAGCAAAGCAGACTACGAGAAACACAAAGTCTACGCCTGCGAAGTCACCCATCAGGGCCTGAGCTCGCCCGTCA
CAAAGAGCTTCAACAGGGGAGAGTGTTAG (SEQ ID NO: 192)

Figure 7

Ab7

Ab7 Heavy chain (chimera) Full length protein sequence.

QEQLKESGGRLVTPGTSLTLTCTVSGIDLSNHYMQWVRQAPGKGLEWIGVVGINGRTYYASWAKGRFTISRTSSTTVDLKM
TRLTTEDTATYFCARGDIWGPGTLVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFP
AVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKRVEPKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKDTLMISR
TPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKT
ISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDKSRW
QQGNVFSCSVMHEALHNHYTQKSLSLSPGK (SEQ ID NO: 64)

Ab7 Variable region heavy chain (chimera) protein sequence.

QEQLKESGGRLVTPGTSLTLTCTVSGIDLSNHYMQWVRQAPGKGLEWIGVVGINGRTYYASWAKGRFTISRTSSTTVDLKM
TRLTTEDTATYFCARGDIWGPGTLVTVSS (SEQ ID NO: 63)

Ab7 Variable region heavy chain (chimera) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

QEQLKESGGRLVTPGTSLTLTCTVSGIDLS**NHYMQ**WVRQAPGKGLEWIGVVGINGRTYYASWAKGRFTISRTSSTTVDLKM
TRLTTEDTATYFCAR*GDI*WGPGTLVTVSS (SEQ ID NOS: 68, 69, 70, respectively)

Ab7 Variable region heavy chain (chimera) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

CAGGAGCAGCTGAAGGAGTCCGGGGGTCGCCTGGTCACGCCTGGGACATCCCTGACACTCACCTGCACCGTCTCTGGA
ATCGACCTCAGT**AACCACTACATGCAA**TGGGTCCGCCAGGCTCCAGGGAAGGGGCTGGAGTGGATCGGAGTCGTTGG
TATTAATGGTCGCACATACTACGCGAGCTGGGCGAAAGGCCGATTCACCATCTCCAGAACCTCGTCGACCACGGTGGAT
CTGAAAATGACCAGGCTGACAACCGAGGACACGGCCACCTATTTCTGTGCCAGA*GGGGACATC*TGGGGCCCAGGCACC
CTGGTCACCGTCTCGAGC (SEQ ID NO: 203)

Ab7 Heavy chain (chimera) Full length DNA sequence.

CAGGAGCAGCTGAAGGAGTCCGGGGGTCGCCTGGTCACGCCTGGGACATCCCTGACACTCACCTGCACCGTCTCTGGA
ATCGACCTCAGTAACCACTACATGCAATGGGTCCGCCAGGCTCCAGGGAAGGGGCTGGAGTGGATCGGAGTCGTTGGT
ATTAATGGTCGCACATACTACGCGAGCTGGGCGAAAGGCCGATTCACCATCTCCAGAACCTCGTCGACCACGGTGGAT
CTGAAAATGACCAGGCTGACAACCGAGGACACGGCCACCTATTTCTGTGCCAGAGGGGACATCTGGGGCCCAGGCACC
CTGGTCACCGTCTCGAGCGCCTCCACCAAGGGCCCATCGGTCTTCCCCCTGGCACCCTCCTCCAAGAGCACCTCTGGGG
GCACAGCGGCCCTGGGCTGCCTGGTCAAGGACTACTTCCCCGAACCGGTGACGGTGTCGTGGAACTCAGGCGCCCTGA
CCAGCGGCGTGCACACCTTCCCGGCTGTCCTACAGTCCTCAGGACTCTACTCCCTCAGCAGCGTGGTGACCGTGCCCTC
CAGCAGCTTGGGCACCCAGACCTACATCTGCAACGTGAATCACAAGCCCAGCAACACCAAGGTGGACAAGAGAGTTGA
GCCCAAATCTTGTGACAAAACTCACACATGCCCACCGTGCCCAGCACCTGAACTCCTGGGGGGACCGTCAGTCTTCCTC
TTCCCCCCAAAACCCAAGGACACCCTCATGATCTCCCGGACCCCTGAGGTCACATGCGTGGTGGTGGACGTGAGCCACG
AAGACCCTGAGGTCAAGTTCAACTGGTACGTGGACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGGAG
CAGTACGCCAGCACGTACCGTGTGGTCAGCGTCCTCACCGTCCTGCACCAGGACTGGCTGAATGGCAAGGAGTACAAG
TGCAAGGTCTCCAACAAAGCCCTCCCAGCCCCCATCGAGAAAACCATCTCCAAAGCCAAAGGGCAGCCCCGAGAACCA
CAGGTGTACACCCTGCCCCCATCCCGGGAGGAGATGACCAAGAACCAGGTCAGCCTGACCTGCCTGGTCAAAGGCTTC
TATCCCAGCGACATCGCCGTGGAGTGGGAGAGCAATGGGCAGCCGGAGAACAACTACAAGACCACGCCTCCCGTGCTG
GACTCCGACGGCTCCTTCTTCCTCTACAGCAAGCTCACCGTGGACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTCAT
GCTCCGTGATGCATGAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCTCCGGGTAAATGA (SEQ ID NO: 204)

Ab7 Light chain (chimera) Full length protein sequence.

QVLTQTASPVSAAVGSTVTINCQASQSVYNYNYLAWYQQKPGQPPKQLIYSTSTLASGVSSRFKGSGSGTQFTLTISDVQCD
DAATYYCLGSYDCSTGDCFVFGGGTEVVVKRTVAAPSVFIFPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGN
SQESVTEQDSKDSTYSLSSTLTLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC (SEQ ID NO: 62)

Ab7 Variable region light chain (chimera) protein sequence.

QVLTQTASPVSAAVGSTVTINCQASQSVYNYNYLAWYQQKPGQPPKQLIYSTSTLASGVSSRFKGSGSGTQFTLTISDVQCD
DAATYYCLGSYDCSTGDCFVFGGGTEVVVKR (SEQ ID NO: 61)

Ab7 Variable region light chain (chimera) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

QVLTQTASPVSAAVGSTVTINC**QASQSVYNYNYLA**WYQQKPGQPPKQLIYSTSTLASGVSSRFKGSGSGTQFTLTISDVQCD
DAATYYC*LGSYDCSTGDCFV*FGGGTEVVVKR (SEQ ID NOS: 65, 66, 67, respectively)

Ab7 Variable region light chain (chimera) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

CAAGTGCTGACCCAGACTGCATCCCCCGTGTCTGCAGCTGTGGGAAGCACAGTCACCATCAATTGC**CAGGCCAGTCAG**
AGTGTTTATAATTACAACTACCTTGCCTGGTATCAGCAGAAACCAGGGCAGCCTCCCAAGCAACTGATCTATTCTACA
TCCACTCTGGCATCTGGGGTCTCATCGCGATTCAAAGGCAGTGGATCTGGGACACAGTTCACTCTCACCATCAGCGACG
TGCAGTGTGACGATGCTGCCACTTACTACTGT*CTAGGCAGTTATGACTGTAGTACTGGTGATTGTTTTGTT*TTCGGCGGAGG
GACCGAGGTGGTGGTCAAACGT (SEQ ID NO: 201)

Ab7 Light chain (chimera) Full length DNA sequence.

CAAGTGCTGACCCAGACTGCATCCCCCGTGTCTGCAGCTGTGGGAAGCACAGTCACCATCAATTGCCAGGCCAGTCAG
AGTGTTTATAATTACAACTACCTTGCCTGGTATCAGCAGAAACCAGGGCAGCCTCCCAAGCAACTGATCTATTCTACAT
CCACTCTGGCATCTGGGGTCTCATCGCGATTCAAAGGCAGTGGATCTGGGACACAGTTCACTCTCACCATCAGCGACGT
GCAGTGTGACGATGCTGCCACTTACTACTGTCTAGGCAGTTATGACTGTAGTACTGGTGATTGTTTTGTTTTCGGCGGAG
GGACCGAGGTGGTGGTCAAACGTACGGTGGCTGCACCATCTGTCTTCATCTTCCCGCCATCTGATGAGCAGTTGAAATC
TGGAACTGCCTCTGTTGTGTGCCTGCTGAATAACTTCTATCCCAGAGAGGCCAAAGTACAGTGGAAGGTGGATAACGCC
CTCCAATCGGGTAACTCCCAGGAGAGTGTCACAGAGCAGGACAGCAAGGACAGCACCTACAGCCTCAGCAGCACCCTG
ACGCTGAGCAAAGCAGACTACGAGAAACACAAAGTCTACGCCTGCGAAGTCACCCATCAGGGCCTGAGCTCGCCCGTC
ACAAAGAGCTTCAACAGGGGAGAGTGTTAG (SEQ ID NO: 202)

Figure 8

Ab8

Ab8 Heavy chain (humanized) Full length protein sequence.

EVQLVESGGGLVQPGGSLRLSCAVSGIDLSNHYMQWVRQAPGKGLEWVGVVGINGRTYYASWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCARGDIWGQGTLVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGV
HTFPAVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKRVEPKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKDTL
MISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPA
PIEKTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVD
KSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK (SEQ ID NO: 74)

Ab8 Variable region heavy chain (humanized) protein sequence.

EVQLVESGGGLVQPGGSLRLSCAVSGIDLSNHYMQWVRQAPGKGLEWVGVVGINGRTYYASWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCARGDIWGQGTLVTVSS (SEQ ID NO: 73)

Ab8 Variable region heavy chain (humanized) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

EVQLVESGGGLVQPGGSLRLSCAVSGIDLS**NHYMQ**WVRQAPGKGLEWVGVVGINGRTYYASWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCAR*GDI*WGQGTLVTVSS (SEQ ID NOS: 78, 79, 80, respectively)

Ab8 Variable region heavy chain (humanized) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

GAGGTGCAGCTTGTGGAGTCTGGGGGAGGCTTGGTCCAGCCTGGGGGGTCCCTGAGACTCTCCTGTGCAGTCTCTGGAA
TCGACCTCAGT**AACCACTACATGCAA**TGGGTCCGTCAGGCTCCAGGGAAGGGGCTGGAGTGGGTCGGAGTCGTTGGTA
TCAATGGTCGCACATACTACGCGAGCTGGGCGAAAGGCCGATTCACCATCTCCAGAGACAATTCCAAGACCACGGTGT
ATCTTCAAATGAACAGCCTGAGAGCTGAGGACACTGCTGTGTATTTCTGTGCTAGA*GGGGACATC*TGGGGCCAAGGGAC
CCTCGTCACCGTCTCGAGC (SEQ ID NO: 213)

Ab8 Heavy chain (humanized) Full length DNA sequence.

GAGGTGCAGCTTGTGGAGTCTGGGGGAGGCTTGGTCCAGCCTGGGGGGTCCCTGAGACTCTCCTGTGCAGTCTCTGGAA
TCGACCTCAGTAACCACTACATGCAATGGGTCCGTCAGGCTCCAGGGAAGGGGCTGGAGTGGGTCGGAGTCGTTGGTA
TCAATGGTCGCACATACTACGCGAGCTGGGCGAAAGGCCGATTCACCATCTCCAGAGACAATTCCAAGACCACGGTGT
ATCTTCAAATGAACAGCCTGAGAGCTGAGGACACTGCTGTGTATTTCTGTGCTAGAGGGGACATCTGGGGCCAAGGGA
CCCTCGTCACCGTCTCGAGCGCCTCCACCAAGGGCCCATCGGTCTTCCCCCTGGCACCCTCCTCCAAGAGCACCTCTGG
GGGCACAGCGGCCCTGGGCTGCCTGGTCAAGGACTACTTCCCCGAACCGGTGACGGTGTCGTGGAACTCAGGCGCCCT
GACCAGCGGCGTGCACACCTTCCCGGCTGTCCTACAGTCCTCAGGACTCTACTCCCTCAGCAGCGTGGTGACCGTGCCC
TCCAGCAGCTTGGGCACCCAGACCTACATCTGCAACGTGAATCACAAGCCCAGCAACACCAAGGTGGACAAGAGAGTT
GAGCCCAAATCTTGTGACAAAACTCACACATGCCCACCGTGCCCAGCACCTGAACTCCTGGGGGGACCGTCAGTCTTCC
TCTTCCCCCCAAAACCCAAGGACACCCTCATGATCTCCCGGACCCCTGAGGTCACATGCGTGGTGGTGGACGTGAGCCA
CGAAGACCCTGAGGTCAAGTTCAACTGGTACGTGGACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGG
AGCAGTACGCCAGCACGTACCGTGTGGTCAGCGTCCTCACCGTCCTGCACCAGGACTGGCTGAATGGCAAGGAGTACA
AGTGCAAGGTCTCCAACAAAGCCCTCCCAGCCCCCATCGAGAAAACCATCTCCAAAGCCAAAGGGCAGCCCCGAGAAC
CACAGGTGTACACCCTGCCCCCATCCCGGGAGGAGATGACCAAGAACCAGGTCAGCCTGACCTGCCTGGTCAAAGGCT
TCTATCCCAGCGACATCGCCGTGGAGTGGGAGAGCAATGGGCAGCCGGAGAACAACTACAAGACCACGCCTCCCGTGC
TGGACTCCGACGGCTCCTTCTTCCTCTACAGCAAGCTCACCGTGGACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTC
ATGCTCCGTGATGCATGAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCTCCGGGTAAATGA (SEQ ID
NO: 214)

Ab8 Light chain (humanized) Full length protein sequence.

QVLTQSPSSLSASVGDRVTINCQASQSVYNYNYLAWYQQKPGKVPKQLIYSTSTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYCLGSYDCSTGDCFVFGGGTKVEIKRTVAAPSVFIFPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNS
QESVTEQDSKDSTYSLSSTLTLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC (SEQ ID NO: 72)

Ab8 Variable region Light chain (humanized) protein sequence.

QVLTQSPSSLSASVGDRVTINCQASQSVYNYNYLAWYQQKPGKVPKQLIYSTSTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYCLGSYDCSTGDCFVFGGGTKVEIKR (SEQ ID NO: 71)

Ab8 Variable region Light chain (humanized) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

QVLTQSPSSLSASVGDRVTINC**QASQSVYNYNYLA**WYQQKPGKVPKQLIYSTSTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYC*CLGSYDCSTGDCFV*FGGGTKVEIKR (SEQ ID NOS: 75, 76, 77, respectively)

Ab8 Variable region Light chain (humanized) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

CAAGTGCTGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGGAGACAGAGTCACCATCAATTGC**CAGGCCAGTCAG**
AGTGTTTACAATTACAACTACCTTGCCTGGTATCAGCAGAAACCAGGGAAAGTTCCTAAGCAACTGATCTATTCTAC
ATCCACTCTGGCATCTGGGGTCCCATCTCGTTTCAGTGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGC
CTGCAGCCTGAAGATGTTGCAACTTATTACTGT*CTGGGCAGTTATGATTGTAGTACTGGTGATTGTTTTGTT*TTCGGCGGAG
GAACCAAGGTGGAAATCAAACGT (SEQ ID NO: 211)

Ab8 Light chain (humanized) Full length DNA sequence.

CAAGTGCTGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGGAGACAGAGTCACCATCAATTGCCAGGCCAGTCAGA
GTGTTTACAATTACAACTACCTTGCCTGGTATCAGCAGAAACCAGGGAAAGTTCCTAAGCAACTGATCTATTCTACATC
CACTCTGGCATCTGGGGTCCCATCTCGTTTCAGTGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTG
CAGCCTGAAGATGTTGCAACTTATTACTGTCTGGGCAGTTATGATTGTAGTACTGGTGATTGTTTTGTTTTCGGCGGAGG
AACCAAGGTGGAAATCAAACGTACGGTGGCTGCACCATCTGTCTTCATCTTCCCGCCATCTGATGAGCAGTTGAAATCT
GGAACTGCCTCTGTTGTGTGCCTGCTGAATAACTTCTATCCCAGAGAGGCCAAAGTACAGTGGAAGGTGGATAACGCCC
TCCAATCGGGTAACTCCCAGGAGAGTGTCACAGAGCAGGACAGCAAGGACAGCACCTACAGCCTCAGCAGCACCCTGA
CGCTGAGCAAAGCAGACTACGAGAAACACAAAGTCTACGCCTGCGAAGTCACCCATCAGGGCCTGAGCTCGCCCGTCA
CAAAGAGCTTCAACAGGGGAGAGTGTTAG (SEQ ID NO: 212)

Figure 9

Ab9

Ab9 Heavy chain (chimera) Full length protein sequence.

QSLEESGGRLVTPGTPLTLTCTVSGIGLSSYYMQWVRQSPGRGLEWIGVIGSDGKTYYATWAKGRFTISKTSSTTVDLRMAS
LTTEDTATYFCTRGDIWGPGTLVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPAV
LQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKRVEPKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKDTLMISRTP
EVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTIS
KAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQ
QGNVFSCSVMHEALHNHYTQKSLSLSPGK (SEQ ID NO: 84)

Ab9 Variable region heavy chain (chimera) protein sequence.

QSLEESGGRLVTPGTPLTLTCTVSGIGLSSYYMQWVRQSPGRGLEWIGVIGSDGKTYYATWAKGRFTISKTSSTTVDLRMAS
LTTEDTATYFCTRGDIWGPGTLVTVSS (SEQ ID NO: 83)

Ab9 Variable region heavy chain (chimera) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

QSLEESGGRLVTPGTPLTLTCTVSGIGLS**SYYMQ**WVRQSPGRGLEWIGVIGSDGKTYYATWAKGRFTISKTSSTTVDLRMAS
LTTEDTATYFCTR*GDI*WGPGTLVTVSS (SEQ ID NOS: 88, 89, 90, respectively)

Ab9 Variable region heavy chain (chimera) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

CAGTCGCTGGAGGAGTCCGGGGGTCGCCTGGTCACGCCTGGGACACCCCTGACACTCACCTGCACAGTCTCTGGAATCG
GCCTCAGT**AGCTACTACATGCAG**TGGGTCCGCCAGTCTCCAGGGAGGGGGCTGGAATGGATCGGAGTCATTGGTAGT
GATGGTAAGACATACTACGCGACCTGGGCGAAAGGCCGATTCACCATCTCCAAGACCTCGTCGACCACGGTGGATCTG
AGAATGGCCAGTCTGACAACCGAGGACACGGCCACCTATTTCTGTACCAGA*GGGGACATC*TGGGGCCCGGGGACCCTC
GTCACCGTCTCGAGC (SEQ ID NO: 223)

Ab9 Heavy chain (chimera) Full length DNA sequence.

CAGTCGCTGGAGGAGTCCGGGGGTCGCCTGGTCACGCCTGGGACACCCCTGACACTCACCTGCACAGTCTCTGGAATCG
GCCTCAGTAGCTACTACATGCAGTGGGTCCGCCAGTCTCCAGGGAGGGGGCTGGAATGGATCGGAGTCATTGGTAGTG
ATGGTAAGACATACTACGCGACCTGGGCGAAAGGCCGATTCACCATCTCCAAGACCTCGTCGACCACGGTGGATCTGA
GAATGGCCAGTCTGACAACCGAGGACACGGCCACCTATTTCTGTACCAGAGGGGACATCTGGGGCCCGGGGACCCTCG
TCACCGTCTCGAGCGCCTCCACCAAGGGCCCATCGGTCTTCCCCCTGGCACCCTCCTCCAAGAGCACCTCTGGGGGCAC
AGCGGCCCTGGGCTGCCTGGTCAAGGACTACTTCCCCGAACCGGTGACGGTGTCGTGGAACTCAGGCGCCCTGACCAG
CGGCGTGCACACCTTCCCGGCTGTCCTACAGTCCTCAGGACTCTACTCCCTCAGCAGCGTGGTGACCGTGCCCTCCAGC
AGCTTGGGCACCCAGACCTACATCTGCAACGTGAATCACAAGCCCAGCAACACCAAGGTGGACAAGAGAGTTGAGCCC
AAATCTTGTGACAAAACTCACACATGCCCACCGTGCCCAGCACCTGAACTCCTGGGGGGACCGTCAGTCTTCCTCTTCC
CCCCAAAACCCAAGGACACCCTCATGATCTCCCGGACCCCTGAGGTCACATGCGTGGTGGTGGACGTGAGCCACGAAG
ACCCTGAGGTCAAGTTCAACTGGTACGTGGACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGGAGCAG
TACGCCAGCACGTACCGTGTGGTCAGCGTCCTCACCGTCCTGCACCAGGACTGGCTGAATGGCAAGGAGTACAAGTGC
AAGGTCTCCAACAAAGCCCTCCCAGCCCCCATCGAGAAAACCATCTCCAAAGCCAAAGGGCAGCCCCGAGAACCACAG
GTGTACACCCTGCCCCCATCCCGGGAGGAGATGACCAAGAACCAGGTCAGCCTGACCTGCCTGGTCAAAGGCTTCTATC
CCAGCGACATCGCCGTGGAGTGGGAGAGCAATGGGCAGCCGGAGAACAACTACAAGACCACGCCTCCCGTGCTGGACT
CCGACGGCTCCTTCTTCCTCTACAGCAAGCTCACCGTGGACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTCATGCTC
CGTGATGCATGAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCTCCGGGTAAATGA (SEQ ID NO: 224)

Ab9 Light chain (chimera) Full length protein sequence.

QVLTQTPSPVSAAVGSTVTINCQASQNVYNNNYLAWYQQKPGQPPKQLIYSTSTLASGVSSRFRGSGSGTQFTLTISDVQCD
DAATYYCLGSYDCSRGDCFVFGGGTEVVVKRTVAAPSVFIFPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGN
SQESVTEQDSKDSTYSLSSTLTLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC (SEQ ID NO: 82)

Ab9 Variable region light chain (chimera) protein sequence.

QVLTQTPSPVSAAVGSTVTINCQASQNVYNNNYLAWYQQKPGQPPKQLIYSTSTLASGVSSRFRGSGSGTQFTLTISDVQCD
DAATYYCLGSYDCSRGDCFVFGGGTEVVVKR (SEQ ID NO: 81)

Ab9 Variable region light chain (chimera) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

QVLTQTPSPVSAAVGSTVTINC**QASQNVYNNNYLA**WYQQKPGQPPKQLIYSTSTLASGVSSRFRGSGSGTQFTLTISDVQCD
DAATYYC*LGSYDCSRGDCFV*FGGGTEVVVKR (SEQ ID NOS: 85, 86, 87, respectively)

Ab9 Variable region light chain (chimera) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

CAAGTGCTGACCCAGACTCCATCCCCCGTGTCTGCAGCTGTGGGAAGCACAGTCACCATCAATTGC**CAGGCCAGTCAG**
AATGTTTATAATAACAACTACCTAGCCTGGTATCAGCAGAAACCAGGGCAGCCTCCCAAGCAACTGATCTATTCTAC
GTCCACTCTGGCATCTGGGGTCTCATCGCGATTCAGAGGCAGTGGATCTGGGACACAGTTCACTCTCACCATCAGCGAC
GTGCAGTGTGACGATGCTGCCACTTACTACTGT*CTAGGCAGTTATGATTGTAGTCGTGGTGATTGTTTTGTT*TTCGGCGGAG
GGACCGAGGTGGTGGTCAAACGT (SEQ ID NO: 221)

Ab9 Light chain (chimera) Full length DNA sequence.

CAAGTGCTGACCCAGACTCCATCCCCCGTGTCTGCAGCTGTGGGAAGCACAGTCACCATCAATTGCCAGGCCAGTCAGA
ATGTTTATAATAACAACTACCTAGCCTGGTATCAGCAGAAACCAGGGCAGCCTCCCAAGCAACTGATCTATTCTACGTC
CACTCTGGCATCTGGGGTCTCATCGCGATTCAGAGGCAGTGGATCTGGGACACAGTTCACTCTCACCATCAGCGACGTG
CAGTGTGACGATGCTGCCACTTACTACTGTCTAGGCAGTTATGATTGTAGTCGTGGTGATTGTTTTGTTTTCGGCGGAGG
GACCGAGGTGGTGGTCAAACGTACGGTGGCTGCACCATCTGTCTTCATCTTCCCGCCATCTGATGAGCAGTTGAAATCT
GGAACTGCCTCTGTTGTGTGCCTGCTGAATAACTTCTATCCCAGAGAGGCCAAAGTACAGTGGAAGGTGGATAACGCCC
TCCAATCGGGTAACTCCCAGGAGAGTGTCACAGAGCAGGACAGCAAGGACAGCACCTACAGCCTCAGCAGCACCCTGA
CGCTGAGCAAAGCAGACTACGAGAAACACAAAGTCTACGCCTGCGAAGTCACCCATCAGGGCCTGAGCTCGCCCGTCA
CAAAGAGCTTCAACAGGGGAGAGTGTTAG (SEQ ID NO: 222)

Figure 10

Ab10

Ab10 Heavy chain (humanized) Full length protein sequence.

EVQLVESGGGLVQPGGSLRLSCAVSGIGLSSYYMQWVRQAPGKGLEWVGVIGSDGKTYYATWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCTRGDIWGQGTLVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVH
TFPAVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKRVEPKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKDTLM
ISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDKS
RWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK (SEQ ID NO: 94)

Ab10 Variable region heavy chain (humanized) protein sequence.

EVQLVESGGGLVQPGGSLRLSCAVSGIGLSSYYMQWVRQAPGKGLEWVGVIGSDGKTYYATWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCTRGDIWGQGTLVTVSS (SEQ ID NO: 93)

Ab10 Variable region heavy chain (humanized) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

EVQLVESGGGLVQPGGSLRLSCAVSGIGLS**SYYMQ**WVRQAPGKGLEWVGVIGSDGKTYYATWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCTR*GDI*WGQGTLVTVSS (SEQ ID NOS: 98, 99, 100, respectively)

Ab10 Variable region heavy chain (humanized) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

GAGGTGCAGCTTGTGGAGTCTGGGGGAGGCTTGGTCCAGCCTGGGGGGTCCCTGAGACTCTCCTGTGCAGTCTCTGGAA
TCGGCCTCAGT**AGCTACTACATGCAA**TGGGTCCGTCAGGCTCCAGGGAAGGGGCTGGAGTGGGTCGGAGTCATTGGTA
GTGATGGTAAGACATACTACGCGACCTGGGCGAAAGGCCGATTCACCATCTCCAGAGACAATTCCAAGACCACGGTGT
ATCTTCAAATGAACAGCCTGAGAGCTGAGGACACTGCTGTGTATTTCTGTACCAGA*GGGGACATC*TGGGGCCAAGGGAC
CCTCGTCACCGTCTCGAGC (SEQ ID NO: 233)

Ab10 Heavy chain (humanized) Full length DNA sequence.

GAGGTGCAGCTTGTGGAGTCTGGGGGAGGCTTGGTCCAGCCTGGGGGGTCCCTGAGACTCTCCTGTGCAGTCTCTGGAA
TCGGCCTCAGTAGCTACTACATGCAATGGGTCCGTCAGGCTCCAGGGAAGGGGCTGGAGTGGGTCGGAGTCATTGGTA
GTGATGGTAAGACATACTACGCGACCTGGGCGAAAGGCCGATTCACCATCTCCAGAGACAATTCCAAGACCACGGTGT
ATCTTCAAATGAACAGCCTGAGAGCTGAGGACACTGCTGTGTATTTCTGTACCAGAGGGGACATCTGGGGCCAAGGGA
CCCTCGTCACCGTCTCGAGCGCCTCCACCAAGGGCCCATCGGTCTTCCCCCTGGCACCCTCCTCCAAGAGCACCTCTGG
GGGCACAGCGGCCCTGGGCTGCCTGGTCAAGGACTACTTCCCCGAACCGGTGACGGTGTCGTGGAACTCAGGCGCCCT
GACCAGCGGCGTGCACACCTTCCCGGCTGTCCTACAGTCCTCAGGACTCTACTCCCTCAGCAGCGTGGTGACCGTGCCC
TCCAGCAGCTTGGGCACCCAGACCTACATCTGCAACGTGAATCACAAGCCCAGCAACACCAAGGTGGACAAGAGAGTT
GAGCCCAAATCTTGTGACAAAACTCACACATGCCCACCGTGCCCAGCACCTGAACTCCTGGGGGGACCGTCAGTCTTCC
TCTTCCCCCCAAAACCCAAGGACACCCTCATGATCTCCCGGACCCCTGAGGTCACATGCGTGGTGGTGGACGTGAGCCA
CGAAGACCCTGAGGTCAAGTTCAACTGGTACGTGGACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGG
AGCAGTACGCCAGCACGTACCGTGTGGTCAGCGTCCTCACCGTCCTGCACCAGGACTGGCTGAATGGCAAGGAGTACA
AGTGCAAGGTCTCCAACAAAGCCCTCCCAGCCCCCATCGAGAAAACCATCTCCAAAGCCAAAGGGCAGCCCCGAGAAC
CACAGGTGTACACCCTGCCCCCATCCCGGGAGGAGATGACCAAGAACCAGGTCAGCCTGACCTGCCTGGTCAAAGGCT
TCTATCCCAGCGACATCGCCGTGGAGTGGGAGAGCAATGGGCAGCCGGAGAACAACTACAAGACCACGCCTCCCGTGC
TGGACTCCGACGGCTCCTTCTTCCTCTACAGCAAGCTCACCGTGGACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTC
ATGCTCCGTGATGCATGAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCTCCGGGTAAATGA (SEQ ID
NO: 234)

Ab10 Light chain (humanized) Full length protein sequence.

QVLTQSPSSLSASVGDRVTINCQASQNVYNNNYLAWYQQKPGKVPKQLIYSTSTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYCLGSYDCSRGDCFVFGGGTKVEIKRTVAAPSVFIFPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNS
QESVTEQDSKDSTYSLSSTLTLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC (SEQ ID NO: 92)

Ab10 Variable region Light chain (humanized) protein sequence.

QVLTQSPSSLSASVGDRVTINCQASQNVYNNNYLAWYQQKPGKVPKQLIYSTSTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYCLGSYDCSRGDCFVFGGGTKVEIKR (SEQ ID NO: 91)

Ab10 Variable region Light chain (humanized) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

QVLTQSPSSLSASVGDRVTINC**QASQNVYNNNYLA**WYQQKPGKVPKQLIYSTSTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYC*LGSYDCSRGDCFV*FGGGTKVEIKR (SEQ ID NOS: 95, 96, 97, respectively)

Ab10 Variable region Light chain (humanized) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

CAAGTGCTGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGGAGACAGAGTCACCATCAATTGC**CAGGCCAGTCAG**
AATGTTTACAATAACAACTACCTAGCCTGGTATCAGCAGAAACCAGGGAAAGTTCCTAAGCAACTGATCTATTCTAC
ATCCACTCTGGCATCTGGGGTCCCATCTCGTTTCAGTGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGC
CTGCAGCCTGAAGATGTTGCAACTTATTACTGT*CTGGGCAGTTATGATTGTAGTCGTGGTGATTGTTTTGTT*TTCGGCGGAG
GAACCAAGGTGGAAATCAAACGT (SEQ ID NO: 231)

Ab10 Light chain (humanized) Full length DNA sequence.

CAAGTGCTGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGGAGACAGAGTCACCATCAATTGCCAGGCCAGTCAGA
ATGTTTACAATAACAACTACCTAGCCTGGTATCAGCAGAAACCAGGGAAAGTTCCTAAGCAACTGATCTATTCTACATC
CACTCTGGCATCTGGGGTCCCATCTCGTTTCAGTGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTG
CAGCCTGAAGATGTTGCAACTTATTACTGTCTGGGCAGTTATGATTGTAGTCGTGGTGATTGTTTTGTTTTCGGCGGAGG
AACCAAGGTGGAAATCAAACGTACGGTGGCTGCACCATCTGTCTTCATCTTCCCGCCATCTGATGAGCAGTTGAAATCT
GGAACTGCCTCTGTTGTGTGCCTGCTGAATAACTTCTATCCCAGAGAGGCCAAAGTACAGTGGAAGGTGGATAACGCCC
TCCAATCGGGTAACTCCCAGGAGAGTGTCACAGAGCAGGACAGCAAGGACAGCACCTACAGCCTCAGCAGCACCCTGA
CGCTGAGCAAAGCAGACTACGAGAAACACAAAGTCTACGCCTGCGAAGTCACCCATCAGGGCCTGAGCTCGCCCGTCA
CAAAGAGCTTCAACAGGGGAGAGTGTTAG (SEQ ID NO: 232)

Figure 11

Ab11

Ab11 Heavy chain (chimera) Full length protein sequence.

QSLEESGGRLVTPGGSLTLTCTVSGIDVTNYYMQWVRQAPGKGLEWIGVIGVNGKRYYASWAKGRFTISKTSSTTVDLKMT
SLTTEDTATYFCARGDIWGPGTLVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPA
VLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKRVEPKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKDTLMISRT
PEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTI
SKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDKSRWQ
QGNVFSCSVMHEALHNHYTQKSLSLSPGK (SEQ ID NO: 104)

Ab11 Variable region heavy chain (chimera) protein sequence.

QSLEESGGRLVTPGGSLTLTCTVSGIDVTNYYMQWVRQAPGKGLEWIGVIGVNGKRYYASWAKGRFTISKTSSTTVDLKMT
SLTTEDTATYFCARGDIWGPGTLVTVSS (SEQ ID NO: 103)

Ab11 Variable region heavy chain (chimera) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

QSLEESGGRLVTPGGSLTLTCTVSGIDVT**NYYMQ**WVRQAPGKGLEWIGVIGVNGKRYYASWAKGRFTISKTSSTTVDLKMT
SLTTEDTATYFCAR*GDI*WGPGTLVTVSS (SEQ ID NOS: 108, 109, 110, respectively)

Ab11 Variable region heavy chain (chimera) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

CAGTCGCTGGAGGAGTCCGGGGGTCGCCTGGTCACGCCTGGAGGATCCCTGACACTCACCTGCACAGTCTCTGGAATCG
ACGTCACT**AACTACTATATGCAA**ATGGGTCCGCCAGGCTCCAGGGAAGGGGCTGGAATGGATCGGAGTCATTGGTGTGA
ATGGTAAGAGATACTACGCGAGCTGGGCGAAAGGCCGATTCACCATCTCCAAAACCTCGTCGACCACGGTGGATCTGA
AAATGACCAGTCTGACAACCGAGGACACGGCCACCTATTTCTGTGCCAGA*GGCGACATC*TGGGGCCCGGGGACCCTCGT
CACCGTCTCGAGC (SEQ ID NO: 243)

Ab11 Heavy chain (chimera) Full length DNA sequence.

CAGTCGCTGGAGGAGTCCGGGGGTCGCCTGGTCACGCCTGGAGGATCCCTGACACTCACCTGCACAGTCTCTGGAATCG
ACGTCACTAACTACTATATGCAATGGGTCCGCCAGGCTCCAGGGAAGGGGCTGGAATGGATCGGAGTCATTGGTGTGA
ATGGTAAGAGATACTACGCGAGCTGGGCGAAAGGCCGATTCACCATCTCCAAAACCTCGTCGACCACGGTGGATCTGA
AAATGACCAGTCTGACAACCGAGGACACGGCCACCTATTTCTGTGCCAGAGGCGACATCTGGGGCCCGGGGACCCTCG
TCACCGTCTCGAGCGCCTCCACCAAGGGCCCATCGGTCTTCCCCCTGGCACCCTCCTCCAAGAGCACCTCTGGGGGCAC
AGCGGCCCTGGGCTGCCTGGTCAAGGACTACTTCCCCGAACCGGTGACGGTGTCGTGGAACTCAGGCGCCCTGACCAG
CGGCGTGCACACCTTCCCGGCTGTCCTACAGTCCTCAGGACTCTACTCCCTCAGCAGCGTGGTGACCGTGCCCTCCAGC
AGCTTGGGCACCCAGACCTACATCTGCAACGTGAATCACAAGCCCAGCAACACCAAGGTGGACAAGAGAGTTGAGCCC
AAATCTTGTGACAAAACTCACACATGCCCACCGTGCCCAGCACCTGAACTCCTGGGGGGACCGTCAGTCTTCCTCTTCC
CCCCAAAACCCAAGGACACCCTCATGATCTCCCGGACCCCTGAGGTCACATGCGTGGTGGTGGACGTGAGCCACGAAG
ACCCTGAGGTCAAGTTCAACTGGTACGTGGACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGGAGCAG
TACGCCAGCACGTACCGTGTGGTCAGCGTCCTCACCGTCCTGCACCAGGACTGGCTGAATGGCAAGGAGTACAAGTGC
AAGGTCTCCAACAAAGCCCTCCCAGCCCCCATCGAGAAAACCATCTCCAAAGCCAAAGGGCAGCCCCGAGAACCACAG
GTGTACACCCTGCCCCCATCCCGGGAGGAGATGACCAAGAACCAGGTCAGCCTGACCTGCCTGGTCAAAGGCTTCTATC
CCAGCGACATCGCCGTGGAGTGGGAGAGCAATGGGCAGCCGGAGAACAACTACAAGACCACGCCTCCCGTGCTGGACT
CCGACGGCTCCTTCTTCCTCTACAGCAAGCTCACCGTGGACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTCATGCTC
CGTGATGCATGAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCTCCGGGTAAATGA (SEQ ID NO: 244)

Ab11 Light chain (chimera) Full length protein sequence.

QVLTQTASPVSPAVGSTVTINCRASQSVYYNNYLAWYQQKPGQPPKQLIYSTSTLASGVSSRFKGSGSGTQFTLTISDVQCDD
AATYYCLGSYDCSNGDCFVFGGGTEVVVKRTVAAPSVFIFPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNS
QESVTEQDSKDSTYSLSSTLTLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC (SEQ ID NO: 102)

Ab11 Variable region light chain (chimera) protein sequence.

QVLTQTASPVSPAVGSTVTINCRASQSVYYNNYLAWYQQKPGQPPKQLIYSTSTLASGVSSRFKGSGSGTQFTLTISDVQCDD
AATYYCLGSYDCSNGDCFVFGGGTEVVVKR (SEQ ID NO: 101)

Ab11 Variable region light chain (chimera) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

QVLTQTASPVSPAVGSTVTINC**RASQSVYYNNYLA**WYQQKPGQPPKQLIYSTSTLASGVSSRFKGSGSGTQFTLTISDVQCD
DAATYYC*CLGSYDCSNGDCFV*FGGGTEVVVKR (SEQ ID NOS: 105, 106, 107, respectively)

Ab11 Variable region light chain (chimera) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

CAGGTGCTGACCCAGACTGCATCCCCCGTGTCTCCAGCTGTGGGAAGCACAGTCACCATCAATTGC**CGGGCCAGTCAG**
AGTGTTTATTATAACAACTACCTAGCCTGGTATCAGCAGAAACCAGGGCAGCCTCCCAAGCAACTGATCTATTCTAC
ATCCACTCTGGCATCTGGGGTCTCATCGCGGTTCAAAGGCAGTGGATCTGGGACACAGTTCACTCTCACCATCAGCGAC
GTGCAGTGTGACGATGCTGCCACTTACTACTGT*CTAGGCAGTTATGATTGTAGTAATGGTGATTGTTTTGTT*TTCGGCGGAG
GGACCGAGGTGGTGGTCAAACGT (SEQ ID NO: 241)

Ab11 Light chain (chimera) Full length DNA sequence.

CAGGTGCTGACCCAGACTGCATCCCCCGTGTCTCCAGCTGTGGGAAGCACAGTCACCATCAATTGCCGGGCCAGTCAGA
GTGTTTATTATAACAACTACCTAGCCTGGTATCAGCAGAAACCAGGGCAGCCTCCCAAGCAACTGATCTATTCTACATC
CACTCTGGCATCTGGGGTCTCATCGCGGTTCAAAGGCAGTGGATCTGGGACACAGTTCACTCTCACCATCAGCGACGTG
CAGTGTGACGATGCTGCCACTTACTACTGTCTAGGCAGTTATGATTGTAGTAATGGTGATTGTTTTGTTTTCGGCGGAGG
GACCGAGGTGGTGGTCAAACGTACGGTGGCTGCACCATCTGTCTTCATCTTCCCGCCATCTGATGAGCAGTTGAAATCT
GGAACTGCCTCTGTTGTGTGCCTGCTGAATAACTTCTATCCCAGAGAGGCCAAAGTACAGTGGAAGGTGGATAACGCCC
TCCAATCGGGTAACTCCCAGGAGAGTGTCACAGAGCAGGACAGCAAGGACAGCACCTACAGCCTCAGCAGCACCCTGA
CGCTGAGCAAAGCAGACTACGAGAAACACAAAGTCTACGCCTGCGAAGTCACCCATCAGGGCCTGAGCTCGCCCGTCA
CAAAGAGCTTCAACAGGGGAGAGTGTTAG (SEQ ID NO: 242)

Figure 12

Ab12

Ab12 Heavy chain (humanized) Full length protein sequence.

EVQLVESGGGLVQPGGSLRLSCAVSGIDVTNYYMQWVRQAPGKGLEWVGVIGVNGKRYYASWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCARGDIWGQGTLVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGV
HTFPAVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKRVEPKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKDTL
MISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPA
PIEKTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVD
KSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK (SEQ ID NO: 114)

Ab12 Variable region heavy chain (humanized) protein sequence.

EVQLVESGGGLVQPGGSLRLSCAVSGIDVTNYYMQWVRQAPGKGLEWVGVIGVNGKRYYASWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCARGDIWGQGTLVTVSS (SEQ ID NO: 113)

Ab12 Variable region heavy chain (humanized) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

EVQLVESGGGLVQPGGSLRLSCAVSGIDVT**NYYMQ**WVRQAPGKGLEWVGVIGVNGKRYYASWAKGRFTISRDNSKTTVY
LQMNSLRAEDTAVYFCAR*GDI*WGQGTLVTVSS (SEQ ID NOS: 118, 119, 120, respectively)

Ab12 Variable region heavy chain (humanized) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

GAGGTGCAGCTTGTGGAGTCTGGGGGAGGCTTGGTCCAGCCTGGGGGGTCCCTGAGACTCTCCTGTGCAGTCTCTGGAA
TCGACGTCACT**AACTACTACATGCAA**TGGGTCCGTCAGGCTCCAGGGAAGGGGCTGGAGTGGGTCGGAGTCATTGGTG
TGAATGGTAAGAGATACTACGCGAGCTGGGCGAAAGGCCGATTCACCATCTCCAGAGACAATTCCAAGACCACGGTGT
ATCTTCAAATGAACAGCCTGAGAGCTGAGGACACTGCTGTGTATTTCTGTGCCAGA*GGGGACATC*TGGGGCCAAGGGAC
CCTCGTCACCGTCTCGAGC (SEQ ID NO: 253)

Ab12 Heavy chain (humanized) Full length DNA sequence.

GAGGTGCAGCTTGTGGAGTCTGGGGGAGGCTTGGTCCAGCCTGGGGGGTCCCTGAGACTCTCCTGTGCAGTCTCTGGAA
TCGACGTCACTAACTACTACATGCAATGGGTCCGTCAGGCTCCAGGGAAGGGGCTGGAGTGGGTCGGAGTCATTGGTG
TGAATGGTAAGAGATACTACGCGAGCTGGGCGAAAGGCCGATTCACCATCTCCAGAGACAATTCCAAGACCACGGTGT
ATCTTCAAATGAACAGCCTGAGAGCTGAGGACACTGCTGTGTATTTCTGTGCCAGAGGGGACATCTGGGGCCAAGGGA
CCCTCGTCACCGTCTCGAGCGCCTCCACCAAGGGCCCATCGGTCTTCCCCCTGGCACCCTCCTCCAAGAGCACCTCTGG
GGGCACAGCGGCCCTGGGCTGCCTGGTCAAGGACTACTTCCCCGAACCGGTGACGGTGTCGTGGAACTCAGGCGCCCT
GACCAGCGGCGTGCACACCTTCCCGGCTGTCCTACAGTCCTCAGGACTCTACTCCCTCAGCAGCGTGGTGACCGTGCCC
TCCAGCAGCTTGGGCACCCAGACCTACATCTGCAACGTGAATCACAAGCCCAGCAACACCAAGGTGGACAAGAGAGTT
GAGCCCAAATCTTGTGACAAAACTCACACATGCCCACCGTGCCCAGCACCTGAACTCCTGGGGGGACCGTCAGTCTTCC
TCTTCCCCCCAAAACCCAAGGACACCCTCATGATCTCCCGGACCCCTGAGGTCACATGCGTGGTGGTGGACGTGAGCCA
CGAAGACCCTGAGGTCAAGTTCAACTGGTACGTGGACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGG
AGCAGTACGCCAGCACGTACCGTGTGGTCAGCGTCCTCACCGTCCTGCACCAGGACTGGCTGAATGGCAAGGAGTACA
AGTGCAAGGTCTCCAACAAAGCCCTCCCAGCCCCCATCGAGAAAACCATCTCCAAAGCCAAAGGGCAGCCCCGAGAAC
CACAGGTGTACACCCTGCCCCCATCCCGGGAGGAGATGACCAAGAACCAGGTCAGCCTGACCTGCCTGGTCAAAGGCT
TCTATCCCAGCGACATCGCCGTGGAGTGGGAGAGCAATGGGCAGCCGGAGAACAACTACAAGACCACGCCTCCCGTGC
TGGACTCCGACGGCTCCTTCTTCCTCTACAGCAAGCTCACCGTGGACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTC
ATGCTCCGTGATGCATGAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCTCCGGGTAAATGA (SEQ ID
NO: 254)

Ab12 Light chain (humanized) Full length protein sequence.

QVLTQSPSSLSASVGDRVTINCRASQSVYYNNYLAWYQQKPGKVPKQLIYSTSTLASGVPSRFSGSGSGTDFTLTISSLQPEDV
ATYYCLGSYDCSNGDCFVFGGGTKVEIKRTVAAPSVFIFPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNSQ
ESVTEQDSKDSTYSLSSTLTLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC (SEQ ID NO: 112)

Ab12 Variable region Light chain (humanized) protein sequence.

QVLTQSPSSLSASVGDRVTINCRASQSVYYNNYLAWYQQKPGKVPKQLIYSTSTLASGVPSRFSGSGSGTDFTLTISSLQPEDV
ATYYCLGSYDCSNGDCFVFGGGTKVEIKR (SEQ ID NO: 111)

Ab12 Variable region Light chain (humanized) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

QVLTQSPSSLSASVGDRVTINC**RASQSVYYNNYLA**WYQQKPGKVPKQLIY**STSTLAS**GVPSRFSGSGSGTDFTLTISSLQPED
VATYYC*LGSYDCSNGDCFV*FGGGTKVEIKR (SEQ ID NOS: 115, 116, 117, respectively)

Ab12 Variable region Light chain (humanized) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

CAAGTGCTGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGGAGACAGAGTCACCATCAATTGC**CGGGCCAGTCAG**
AGTGTTTACTATAACAACTACCTAGCCTGGTATCAGCAGAAACCAGGGAAAGTTCCTAAGCAACTGATCTATT**CTAC**
ATCCACTCTGGCATCTGGGGTCCCATCTCGTTTCAGTGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGC
CTGCAGCCTGAAGATGTTGCAACTTATTACTGT*CTGGGCAGTTATAATGGTGATTTTGTTTCGGCGGAG*
GAACCAAGGTGGAAATCAAACGT (SEQ ID NO: 251)

Ab12 Light chain (humanized) Full length DNA sequence.

CAAGTGCTGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGGAGACAGAGTCACCATCAATTGCCGGGCCAGTCAGA
GTGTTTACTATAACAACTACCTAGCCTGGTATCAGCAGAAACCAGGGAAAGTTCCTAAGCTGATCTATTCTACATC
CACTCTGGCATCTGGGGTCCCATCTCGTTTCAGTGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTG
CAGCCTGAAGATGTTGCAACTTATTACTGTCTGGGCAGTTATAATGGTGATTTTGTTTCGGCGGAGGG
AACCAAGGTGGAAATCAAACGTACGGTGGCTGCACCATCTGTCTTCATCTTCCCGCCATCTGATGAGCAGTTGAAATCT
GGAACTGCCTCTGTTGTGTGCCTGCTGAATAACTTCTATCCCAGAGAGGCCAAAGTACAGTGGAAGGTGGATAACGCCC
TCCAATCGGGTAACTCCCAGGAGAGTGTCACAGAGCAGGACAGCAAGGACAGCACCTACAGCAGCACCCTGA
CGCTGAGCAAAGCAGACTACGAGAAACACAAAGTCTACGCCTGCGAAGTCACCCATCAGGGCCTGAGCTCGCCCGTCA
CAAAGAGCTTCAACAGGGGAGAGTGTTAG (SEQ ID NO: 252)

Figure 13

Ab13

Ab13 Heavy chain (chimera) Full length protein sequence.

QSVEESGGGLVQPEGSLTLTCTASGFDFSSNAMWWVRQAPGKGLEWIGCIYNGDGSTYYASWVNGRFSISKTSSTTVTLQL
NSLTVADTATYYCARDLDLWGPGTLVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHT
FPAVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKRVEPKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKDTLMI
SRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIE
KTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDKSR
WQQGNVFSCSVMHEALHNHYTQKSLSLSPGK (SEQ ID NO: 124)

Ab13 Variable region heavy chain (chimera) protein sequence.

QSVEESGGGLVQPEGSLTLTCTASGFDFSSNAMWWVRQAPGKGLEWIGCIYNGDGSTYYASWVNGRFSISKTSSTTVTLQL
NSLTVADTATYYCARDLDLWGPGTLVTVSS (SEQ ID NO: 123)

Ab13 Variable region heavy chain (chimera) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

QSVEESGGGLVQPEGSLTLTCTASGFDFS**SNAMW**WVRQAPGKGLEWIGCIYNGDGSTYYASWVNGRFSISKTSSTTVTLQL
NSLTVADTATYYCAR*DLDL*WGPGTLVTVSS (SEQ ID NOS: 128, 129, 130, respectively)

Ab13 Variable region heavy chain (chimera) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

CAGTCGGTGGAGGAGTCCGGGGGAGGCCTGGTCCAGCCTGAGGGATCCCTGACACTCACCTGCACAGCCTCTGGATTC
GACTTCAGT**AGCAATGCAATGTGG**TGGGTCCGCCAGGCTCCAGGGAAGGGGCTGGAGTGGATCGGATGCATTTACAA
TGGTGATGGCAGCACATACTACGCGAGCTGGGTGAATGGCCGATTCTCCATCTCCAAAACCTCGTCGACCACGGTGACT
CTGCAACTGAATAGTCTGACAGTCGCGGACACGGCCACGTATTATTGTGCGAGA*GATCTTGACTTGT*GGGGCCCGGGCA
CCCTCGTCACCGTCTCGAGC (SEQ ID NO: 263)

Ab13 Heavy chain (chimera) Full length DNA sequence.

CAGTCGGTGGAGGAGTCCGGGGGAGGCCTGGTCCAGCCTGAGGGATCCCTGACACTCACCTGCACAGCCTCTGGATTC
GACTTCAGTAGCAATGCAATGTGGTGGGTCCGCCAGGCTCCAGGGAAGGGGCTGGAGTGGATCGGATGCATTTACAAT
GGTGATGGCAGCACATACTACGCGAGCTGGGTGAATGGCCGATTCTCCATCTCCAAAACCTCGTCGACCACGGTGACTC
TGCAACTGAATAGTCTGACAGTCGCGGACACGGCCACGTATTATTGTGCGAGAGATCTTGACTTGTGGGGCCCGGGCAC
CCTCGTCACCGTCTCGAGCGCCTCCACCAAGGGCCCATCGGTCTTCCCCCTGGCACCCTCCTCCAAGAGCACCTCTGGG
GGCACAGCGGCCCTGGGCTGCCTGGTCAAGGACTACTTCCCCGAACCGGTGACGGTGTCGTGGAACTCAGGCGCCCTG
ACCAGCGGCGTGCACACCTTCCCGGCTGTCCTACAGTCCTCAGGACTCTACTCCCTCAGCAGCGTGGTGACCGTGCCCT
CCAGCAGCTTGGGCACCCAGACCTACATCTGCAACGTGAATCACAAGCCCAGCAACACCAAGGTGGACAAGAGAGTTG
AGCCCAAATCTTGTGACAAAACTCACACATGCCCACCGTGCCCAGCACCTGAACTCCTGGGGGGACCGTCAGTCTTCCT
CTTCCCCCCAAAACCCAAGGACACCCTCATGATCTCCCGGACCCCTGAGGTCACATGCGTGGTGGTGGACGTGAGCCAC
GAAGACCCTGAGGTCAAGTTCAACTGGTACGTGGACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGGA
GCAGTACGCCAGCACGTACCGTGTGGTCAGCGTCCTCACCGTCCTGCACCAGGACTGGCTGAATGGCAAGGAGTACAA
GTGCAAGGTCTCCAACAAAGCCCTCCCAGCCCCCATCGAGAAAACCATCTCCAAAGCCAAAGGGCAGCCCCGAGAACC
ACAGGTGTACACCCTGCCCCCATCCCGGGAGGAGATGACCAAGAACCAGGTCAGCCTGACCTGCCTGGTCAAAGGCTT
CTATCCCAGCGACATCGCCGTGGAGTGGGAGAGCAATGGGCAGCCGGAGAACAACTACAAGACCACGCCTCCCGTGCT
GGACTCCGACGGCTCCTTCTTCCTCTACAGCAAGCTCACCGTGGACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTCA
TGCTCCGTGATGCATGAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCTCCGGGTAAATGA (SEQ ID
NO: 264)

Ab13 Light chain (chimera) Full length protein sequence.

AIVMTQTPSSKSVPVGDTVTINCQASESLYNNNALAWFQQKPGQPPKRLIYDASKLASGVPSRFSGGGSGTQFTLTISGVQCD
DAATYYCGGYRSDSVDGVAFAGGTEVVVKRTVAAPSVFIFPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGN
SQESVTEQDSKDSTYSLSSTLTLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC (SEQ ID NO: 122)

Ab13 Variable region light chain (chimera) protein sequence.

AIVMTQTPSSKSVPVGDTVTINCQASESLYNNNALAWFQQKPGQPPKRLIYDASKLASGVPSRFSGGGSGTQFTLTISGVQCD
DAATYYCGGYRSDSVDGVAFAGGTEVVVKR (SEQ ID NO: 121)

Ab13 Variable region light chain (chimera) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

AIVMTQTPSSKSVPVGDTVTINC**QASESLYNNNALA**WFQQKPGQPPKRLIYDASKLASGVPSRFSGGGSGTQFTLTISGVQCD
DAATYYC*GGYRSDSVDGVA*FAGGTEVVVKR (SEQ ID NOS: 125, 126, 127, respectively)

Ab13 Variable region light chain (chimera) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

GCCATCGTGATGACCCAGACTCCATCTTCCAAGTCTGTCCCTGTGGGAGACACAGTCACCATCAATTGC**CAGGCCAGT**
GAGAGTCTTTATAATAACAACGCCTTGGCCTGGTTTCAGCAGAAACCAGGGCAGCCTCCCAAGCGCCTGATCTATGA
TGCATCCAAACTGGCATCTGGGGTCCCATCGCGGTTCAGTGGCGGTGGGTCTGGGACACAGTTCACTCTCACCATCAGT
GGCGTGCAGTGTGACGATGCTGCCACTTACTACTGT*GGAGGCTACAGAAGTGATAGTGTTGATGGTGTTGCT*TTCGCCGGA
GGGACCGAGGTGGTGGTCAAACGT (SEQ ID NO: 261)

Ab13 Light chain (chimera) Full length DNA sequence.

GCCATCGTGATGACCCAGACTCCATCTTCCAAGTCTGTCCCTGTGGGAGACACAGTCACCATCAATTGCCAGGCCAGTG
AGAGTCTTTATAATAACAACGCCTTGGCCTGGTTTCAGCAGAAACCAGGGCAGCCTCCCAAGCGCCTGATCTATGATGC
ATCCAAACTGGCATCTGGGGTCCCATCGCGGTTCAGTGGCGGTGGGTCTGGGACACAGTTCACTCTCACCATCAGTGGC
GTGCAGTGTGACGATGCTGCCACTTACTACTGTGGAGGCTACAGAAGTGATAGTGTTGATGGTGTTGCTTTCGCCGGAG
GGACCGAGGTGGTGGTCAAACGTACGGTGGCTGCACCATCTGTCTTCATCTTCCCGCCATCTGATGAGCAGTTGAAATC
TGGAACTGCCTCTGTTGTGTGCCTGCTGAATAACTTCTATCCCAGAGAGGCCAAAGTACAGTGGAAGGTGGATAACGCC
CTCCAATCGGGTAACTCCCAGGAGAGTGTCACAGAGCAGGACAGCAAGGACAGCACCTACAGCCTCAGCAGCACCCTG
ACGCTGAGCAAAGCAGACTACGAGAAACACAAAGTCTACGCCTGCGAAGTCACCCATCAGGGCCTGAGCTCGCCCGTC
ACAAAGAGCTTCAACAGGGGAGAGTGTTAG (SEQ ID NO: 262)

Figure 14

Ab14

Ab14 Heavy chain (humanized) Full length protein sequence.

EVQLVESGGGLVQPGGSLRLSCAVSGIGLSSYYMQWVRQAPGKGLEWVGVIGSDGKTYYATWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCTRGDIWGQGTLVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVH
TFPAVLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDARVEPKSCDKTHTCPPCPAPELLGGPSVFLFPPKPKDTLM
ISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQYASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPI
EKTISKAKGQPREPQVYTLPPSREEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDKS
RWQQGNVFSCSVMHEALHNHYTQKSLSLSPGK (SEQ ID NO: 134)

Ab14 Variable region heavy chain (humanized) protein sequence.

EVQLVESGGGLVQPGGSLRLSCAVSGIGLSSYYMQWVRQAPGKGLEWVGVIGSDGKTYYATWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCTRGDIWGQGTLVTVSS (SEQ ID NO: 133)

Ab14 Variable region heavy chain (humanized) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

EVQLVESGGGLVQPGGSLRLSCAVSGIGLS**SYYMQ**WVRQAPGKGLEWVGVIGSDGKTYYATWAKGRFTISRDNSKTTVYL
QMNSLRAEDTAVYFCTR*GDI*WGQGTLVTVSS (SEQ ID NOS: 138, 139, 140, respectively)

Ab14 Variable region heavy chain (humanized) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

GAGGTGCAGCTTGTGGAGTCTGGGGGAGGCTTGGTCCAGCCTGGGGGGTCCCTGAGACTCTCCTGTGCAGTCTCTGGAA
TCGGCCTCAGT**AGCTACTACATGCAA**TGGGTCCGTCAGGCTCCAGGGAAGGGGCTGGAGTGGGTCGGAGTCATTGGTA
GTGATGGTAAGACATACTACGCGACCTGGGCGAAAGGCCGATTCACCATCTCCAGAGACAATTCCAAGACCACGGTGT
ATCTTCAAATGAACAGCCTGAGAGCTGAGGACACTGCTGTGTATTTCTGTACCAGA*GGGGACATC*TGGGGCCAAGGGAC
CCTCGTCACCGTCTCGAGC (SEQ ID NO: 273)

Ab14 Heavy chain (humanized) Full length DNA sequence.

GAGGTGCAGCTTGTGGAGTCTGGGGGAGGCTTGGTCCAGCCTGGGGGGTCCCTGAGACTCTCCTGTGCAGTCTCTGGAA
TCGGCCTCAGTAGCTACTACATGCAATGGGTCCGTCAGGCTCCAGGGAAGGGGCTGGAGTGGGTCGGAGTCATTGGTA
GTGATGGTAAGACATACTACGCGACCTGGGCGAAAGGCCGATTCACCATCTCCAGAGACAATTCCAAGACCACGGTGT
ATCTTCAAATGAACAGCCTGAGAGCTGAGGACACTGCTGTGTATTTCTGTACCAGAGGGGACATCTGGGGCCAAGGGA
CCCTCGTCACCGTCTCGAGCGCCTCCACCAAGGGCCCATCGGTCTTCCCCCTGGCACCCTCCTCCAAGAGCACCTCTGG
GGGCACAGCGGCCCTGGGCTGCCTGGTCAAGGACTACTTCCCCGAACCGGTGACGGTGTCGTGGAACTCAGGCGCCCT
GACCAGCGGCGTGCACACCTTCCCGGCTGTCCTACAGTCCTCAGGACTCTACTCCCTCAGCAGCGTGGTGACCGTGCCC
TCCAGCAGCTTGGGCACCCAGACCTACATCTGCAACGTGAATCACAAGCCCAGCAACACCAAGGTGGACGCGAGAGTT
GAGCCCAAATCTTGTGACAAAACTCACACATGCCCACCGTGCCCAGCACCTGAACTCCTGGGGGGACCGTCAGTCTTCC
TCTTCCCCCCAAAACCCAAGGACACCCTCATGATCTCCCGGACCCCTGAGGTCACATGCGTGGTGGTGGACGTGAGCCA
CGAAGACCCTGAGGTCAAGTTCAACTGGTACGTGGACGGCGTGGAGGTGCATAATGCCAAGACAAAGCCGCGGGAGG
AGCAGTACGCCAGCACGTACCGTGTGGTCAGCGTCCTCACCGTCCTGCACCAGGACTGGCTGAATGGCAAGGAGTACA
AGTGCAAGGTCTCCAACAAAGCCCTCCCAGCCCCCATCGAGAAAACCATCTCCAAAGCCAAAGGGCAGCCCCGAGAAC
CACAGGTGTACACCCTGCCCCCATCCCGGGAGGAGATGACCAAGAACCAGGTCAGCCTGACCTGCCTGGTCAAAGGCT
TCTATCCCAGCGACATCGCCGTGGAGTGGGAGAGCAATGGGCAGCCGGAGAACAACTACAAGACCACGCCTCCCGTGC
TGGACTCCGACGGCTCCTTCTTCCTCTACAGCAAGCTCACCGTGGACAAGAGCAGGTGGCAGCAGGGGAACGTCTTCTC
ATGCTCCGTGATGCATGAGGCTCTGCACAACCACTACACGCAGAAGAGCCTCTCCCTGTCTCCGGGTAAATGA (SEQ ID
NO: 274)

Ab14 Light chain (humanized) Full length protein sequence.

QVLTQSPSSLSASVGDRVTINCQASQNVYNNNYLAWYQQKPGKVPKQLIYSTSTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYCLGSYDCSRGDCFVFGGGTKVEIKRTVAAPSVFIFPPSDEQLKSGTASVVCLLNNFYPREAKVQWKVDNALQSGNS
QESVTEQDSKDSTYSLSSTLTLSKADYEKHKVYACEVTHQGLSSPVTKSFNRGEC (SEQ ID NO: 132)

Ab14 Variable region Light chain (humanized) protein sequence.

QVLTQSPSSLSASVGDRVTINCQASQNVYNNNYLAWYQQKPGKVPKQLIYSTSTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYCLGSYDCSRGDCFVFGGGTKVEIKR (SEQ ID NO: 131)

Ab14 Variable region Light chain (humanized) protein sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

QVLTQSPSSLSASVGDRVTINC**QASQNVYNNNYLA**WYQQKPGKVPKQLIYSTSTLASGVPSRFSGSGSGTDFTLTISSLQPED
VATYYC*LGSYDCSRGDCFV*FGGGTKVEIKR (SEQ ID NOS: 135, 136, 137, respectively)

Ab14 Variable region Light chain (humanized) DNA sequence. CDR1: Bold; CDR2: Underlined; CDR3: Italics.

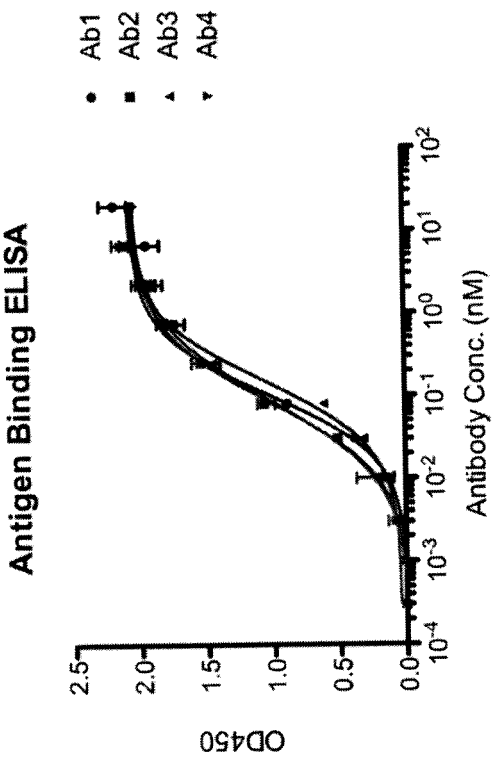
CAAGTGCTGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGGAGACAGAGTCACCATCAATTGC**CAGGCCAGTCAG**
AATGTTTACAATAACAACTACCTAGCCTGGTATCAGCAGAAACCAGGGAAAGTTCCTAAGCAACTGATCTATTCTAC
ATCCACTCTGGCATCTGGGGTCCCATCTCGTTTCAGTGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGC
CTGCAGCCTGAAGATGTTGCAACTTATTACTGT*CTGGGCAGTTATGATTGTAGTCGTGGTGATTGTTTTGTT*TTCGGCGGAG
GAACCAAGGTGGAAATCAAACGT (SEQ ID NO: 271)

Ab14 Light chain (humanized) Full length DNA sequence.

CAAGTGCTGACCCAGTCTCCATCCTCCCTGTCTGCATCTGTAGGAGACAGAGTCACCATCAATTGCCAGGCCAGTCAGA
ATGTTTACAATAACAACTACCTAGCCTGGTATCAGCAGAAACCAGGGAAAGTTCCTAAGCAACTGATCTATTCTACATC
CACTCTGGCATCTGGGGTCCCATCTCGTTTCAGTGGCAGTGGATCTGGGACAGATTTCACTCTCACCATCAGCAGCCTG
CAGCCTGAAGATGTTGCAACTTATTACTGTCTGGGCAGTTATGATTGTAGTCGTGGTGATTGTTTTGTTTTCGGCGGAGG
AACCAAGGTGGAAATCAAACGTACGGTGGCTGCACCATCTGTCTTCATCTTCCCGCCATCTGATGAGCAGTTGAAATCT
GGAACTGCCTCTGTTGTGTGCCTGCTGAATAACTTCTATCCCAGAGAGGCCAAAGTACAGTGGAAGGTGGATAACGCCC
TCCAATCGGGTAACTCCCAGGAGAGTGTCACAGAGCAGGACAGCAAGGACAGCACCTACAGCCTCAGCAGCACCCTGA
CGCTGAGCAAAGCAGACTACGAGAAACACAAAGTCTACGCCTGCGAAGTCACCCATCAGGGCCTGAGCTCGCCCGTCA
CAAAGAGCTTCAACAGGGGAGAGTGTTAG (SEQ ID NO: 272)

Figure 15

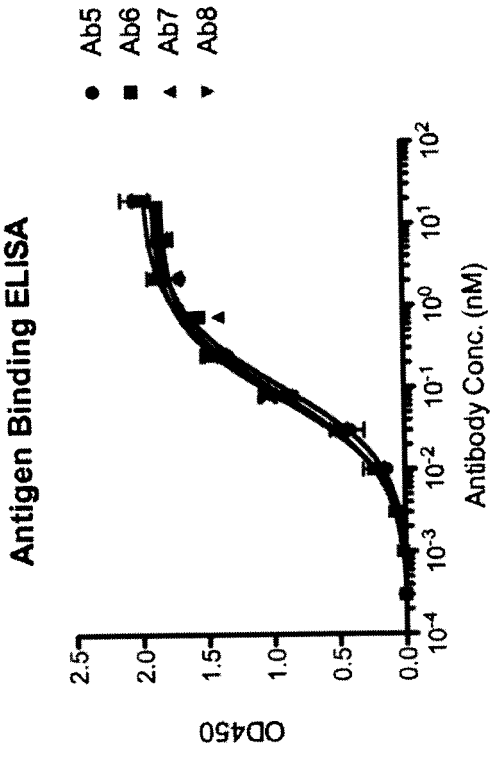
Human CGRPα ELISA



	EC50 (pM)
Ab1	103
Ab2	83
Ab3	154
Ab4	88

Figure 16

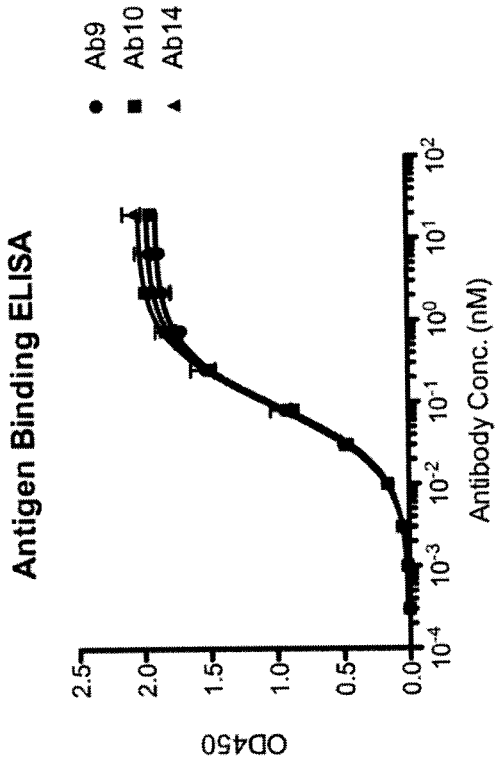
Human CGRPα ELISA



	EC50 (pM)
Ab5	103
Ab6	95
Ab7	70
Ab8	74

Figure 17

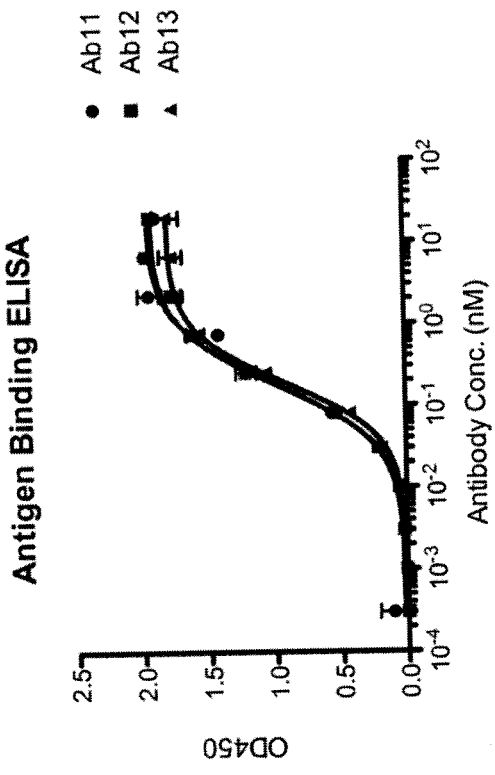
Human CGRPα ELISA



	EC50 (pM)
Ab9	79
Ab10	92
Ab14	89

Figure 18

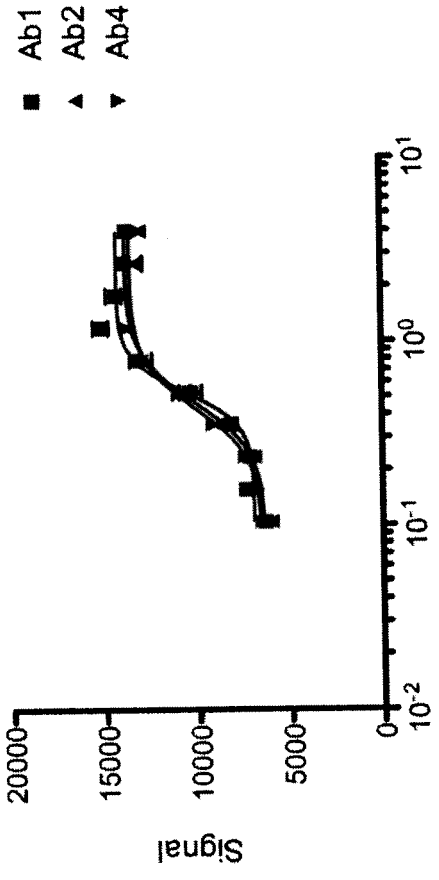
Human CGRPα ELISA



	EC50 (pM)
Ab11	184
Ab12	171
Ab13	188

Figure 19

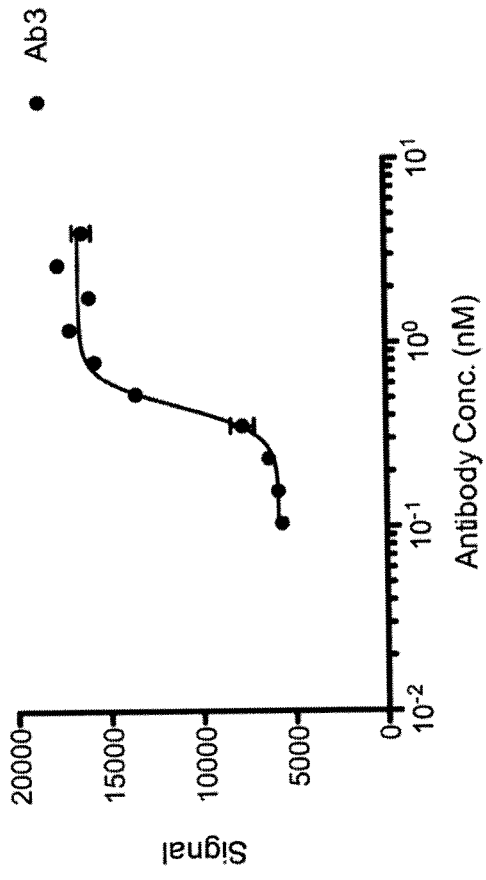
Human CGRPα cAMP



	IC50 (pM)
Ab1	531
Ab2	452
Ab4	429

Figure 20

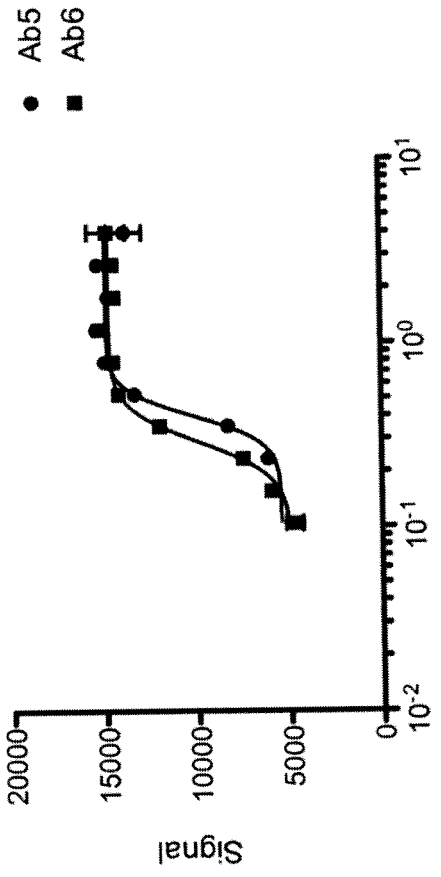
Human CGRPα cAMP



	IC50 (pM)
Ab3	452

Figure 21

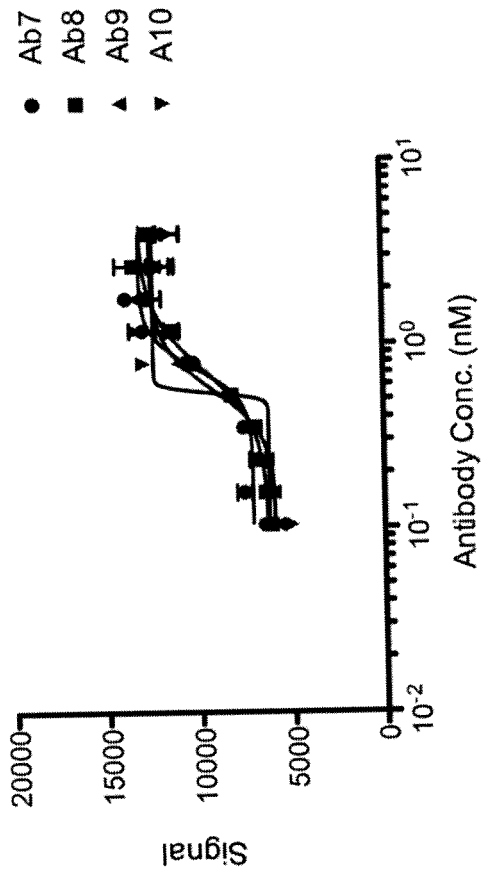
Human CGRPα cAMP



	IC50 (pM)
Ab5	400
Ab6	288

Figure 22

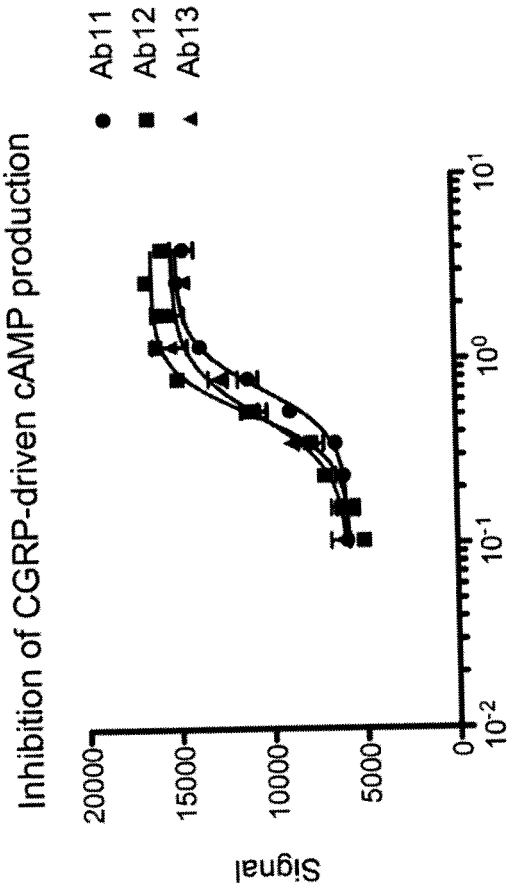
Human CGRPα cAMP



	IC50 (pM)
Ab7	743
Ab8	734
Ab9	568
A10	542

Figure 23

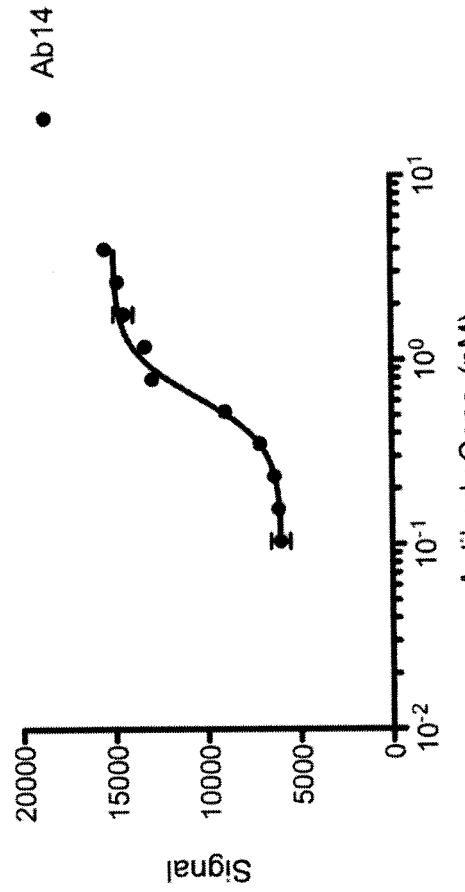
Human CGRPα cAMP



	IC50 (pM)
Ab11	698
Ab12	511
Ab13	498

Figure 24

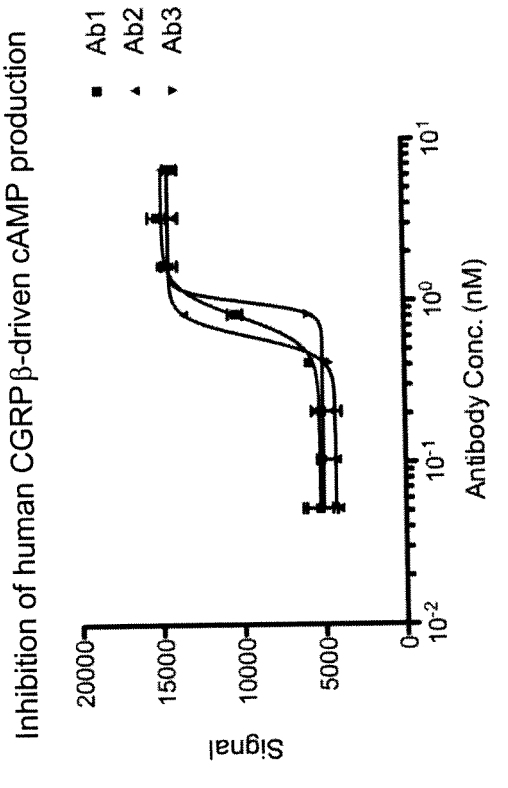
Human CGRPα cAMP



	IC50 (pM)
Ab14	631

Figure 25

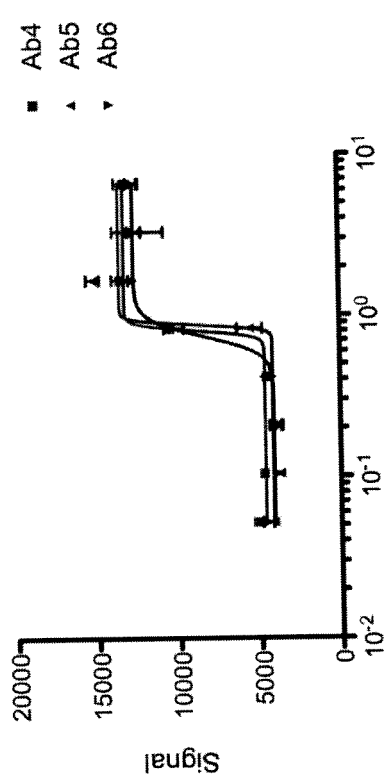
Human CGRPβ cAMP



	IC50 (pM)
Ab1	801
Ab2	601
Ab3	989

Figure 26

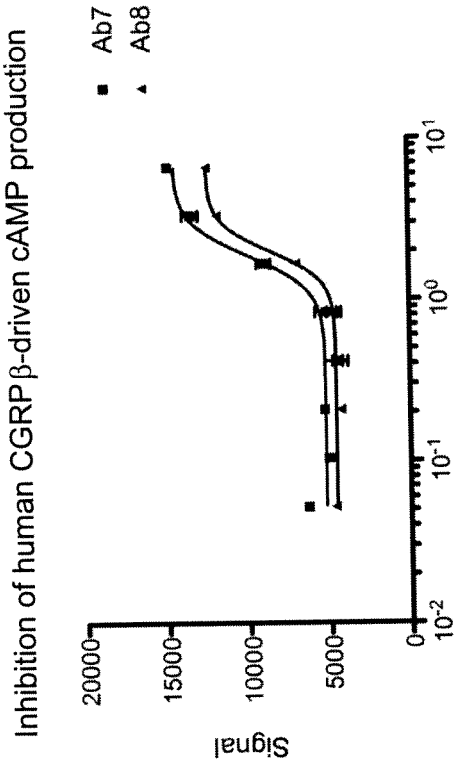
Human CGRPβ cAMP



	IC50 (pM)
Ab4	805
Ab5	875
Ab6	740

Figure 27

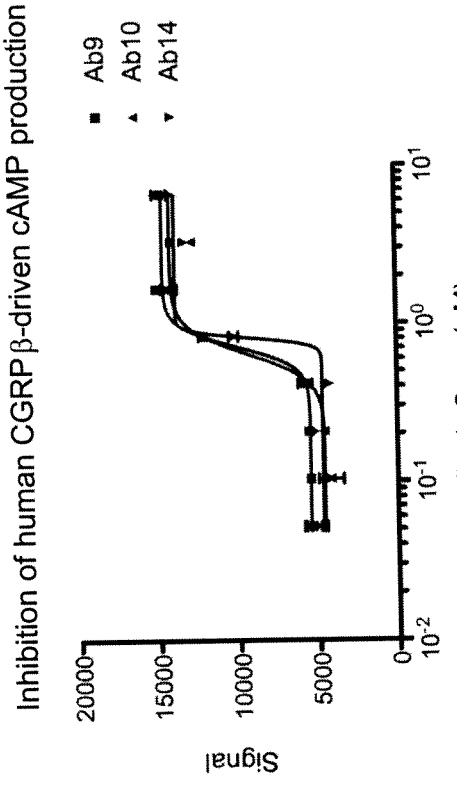
Human CGRPβ cAMP



	IC50 (pM)
Ab7	1858
Ab8	1981

Figure 28

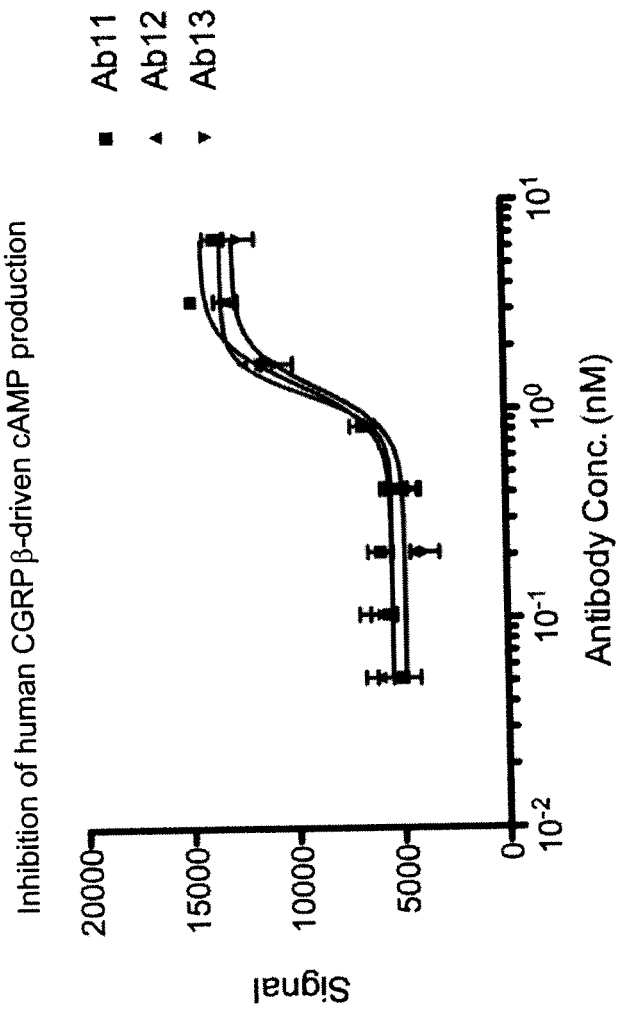
Human CGRPβ cAMP



	IC50 (pM)
Ab9	716
Ab10	641
Ab14	812

Figure 29

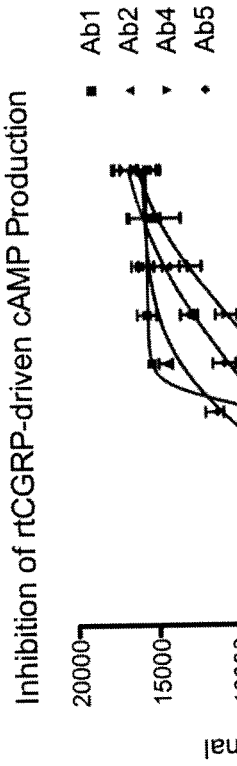
Human CGRPβ cAMP



	IC50 (pM)
Ab11	1344
Ab12	1181
Ab13	1276

Figure 30

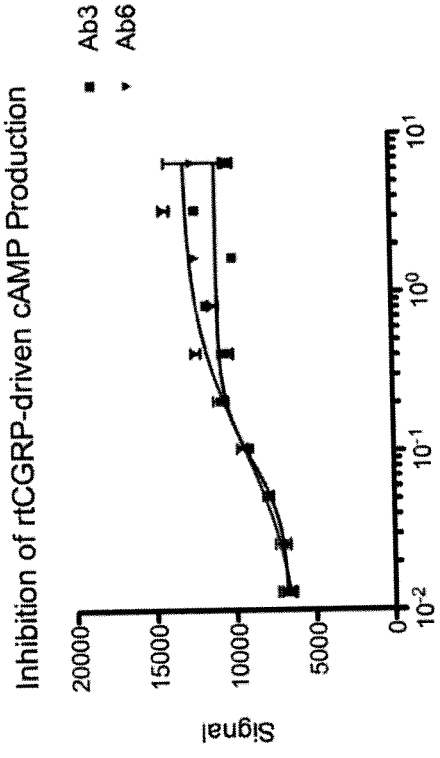
Rat CGRP cAMP



	IC50 (pM)
Ab1	239
Ab2	142
Ab4	868
Ab5	334

Figure 31

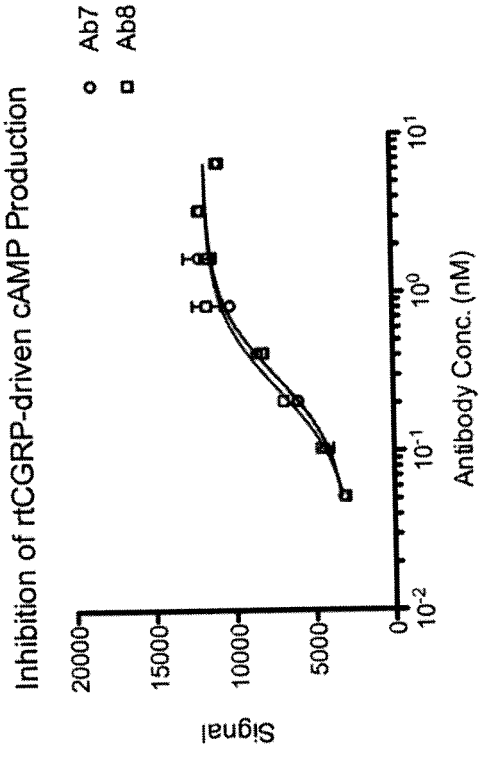
Rat CGRP cAMP



	IC50 (pM)
Ab3	85
Ab6	111

Figure 32

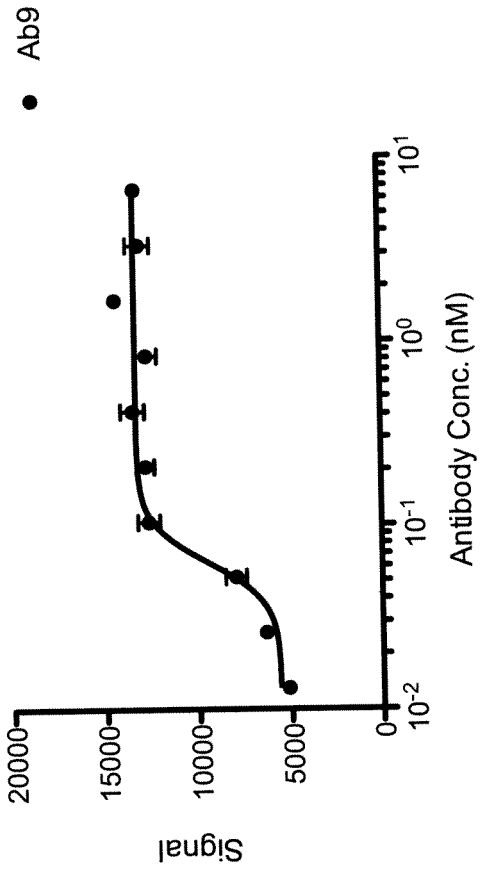
Rat CGRP cAMP



	IC50 (pM)
Ab7	297
Ab8	243

Figure 33

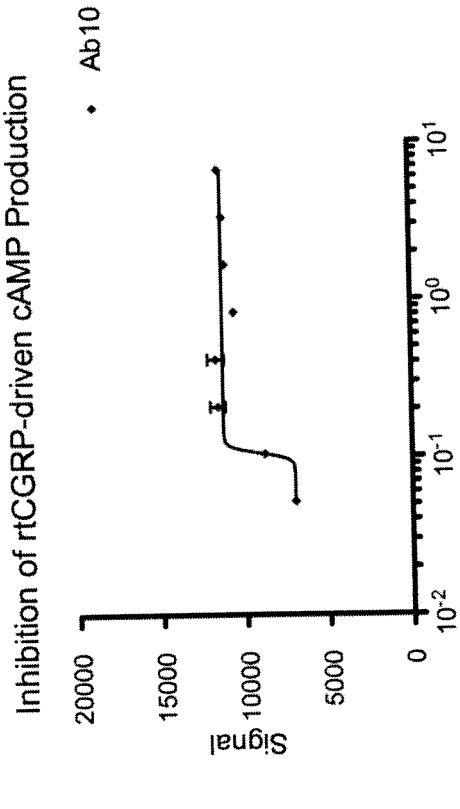
Rat CGRP cAMP



	IC50 (pM)
Ab9	62

Figure 34

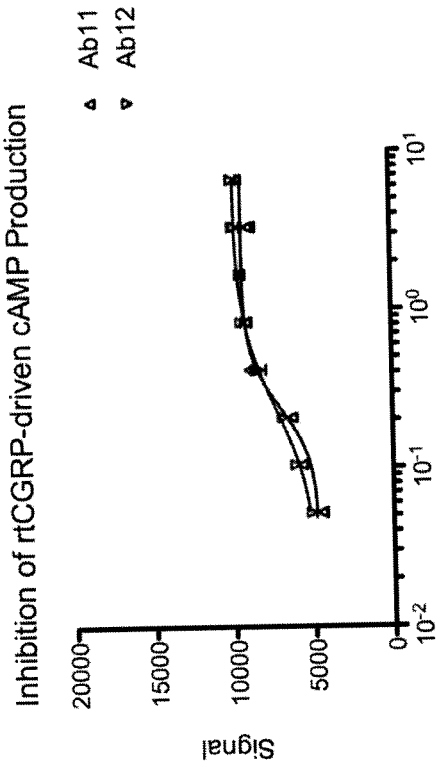
Rat CGRP cAMP



	IC50 (pM)
Ab10	105

Figure 35

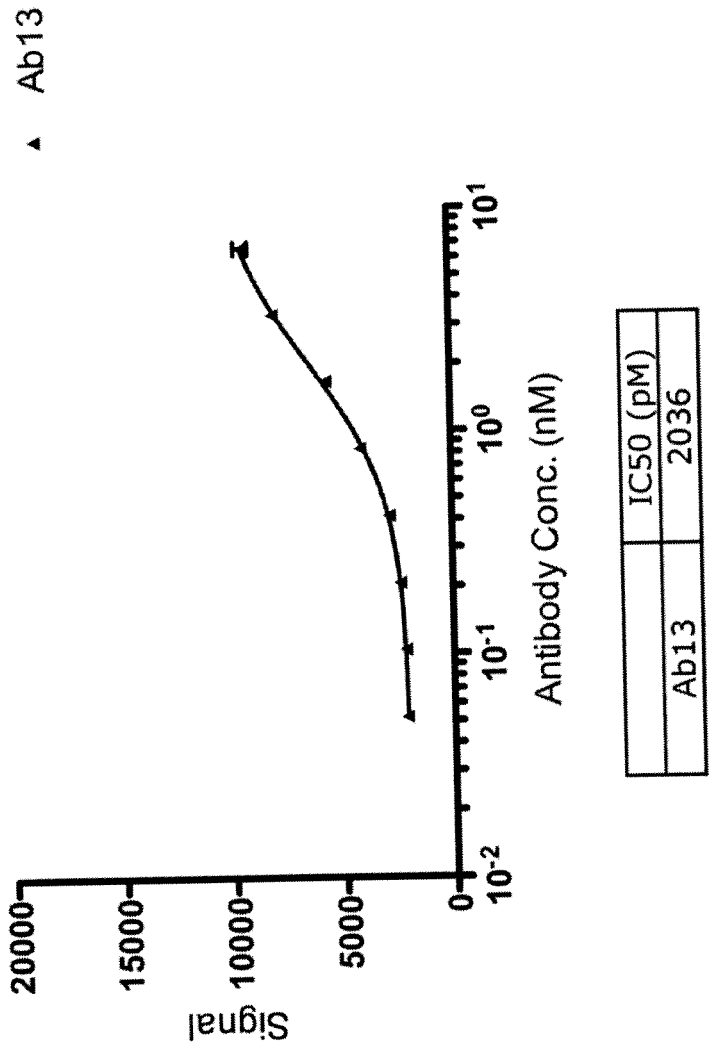
Rat CGRP cAMP



	IC50 (pM)
Ab11	239
Ab12	236

Figure 36

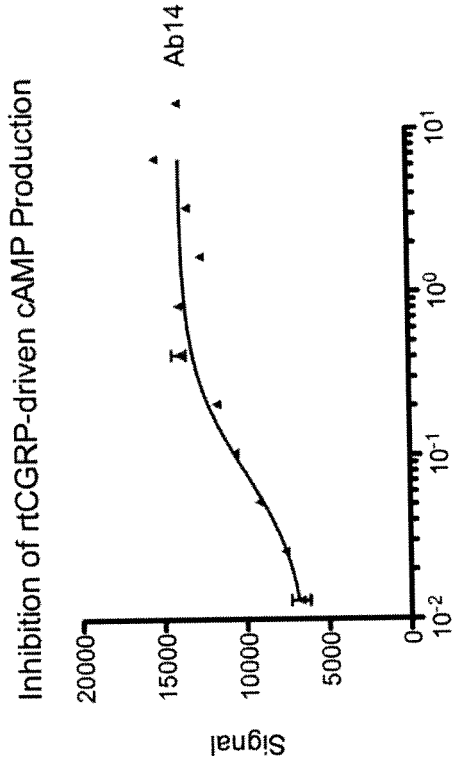
Rat CGRP cAMP



	IC50 (pM)
Ab13	2036

Figure 37

Rat CGRP cAMP



	IC50 (pM)
Ab14	81

Figure 38

Inhibition of Radioligand Binding

	IC_{50} (nM)	K_I (nM)
Ab1	0.585	0.46
Ab2	0.482	0.378
Ab3	2.49	10.96
Ab4	0.579	0.455
Ab5	0.586	0.461
Ab6	2.46	1.94
Ab7	4.53	3.56
Ab8	0.936	0.736
Ab9	2.03	1.6
Ab10	0.28	0.22
Ab11	2.26	1.78
Ab12	0.315	0.248
Ab13	0.335	0.264

Figure 39

Reduction in Vasodilatation Following Capsaicin Administration

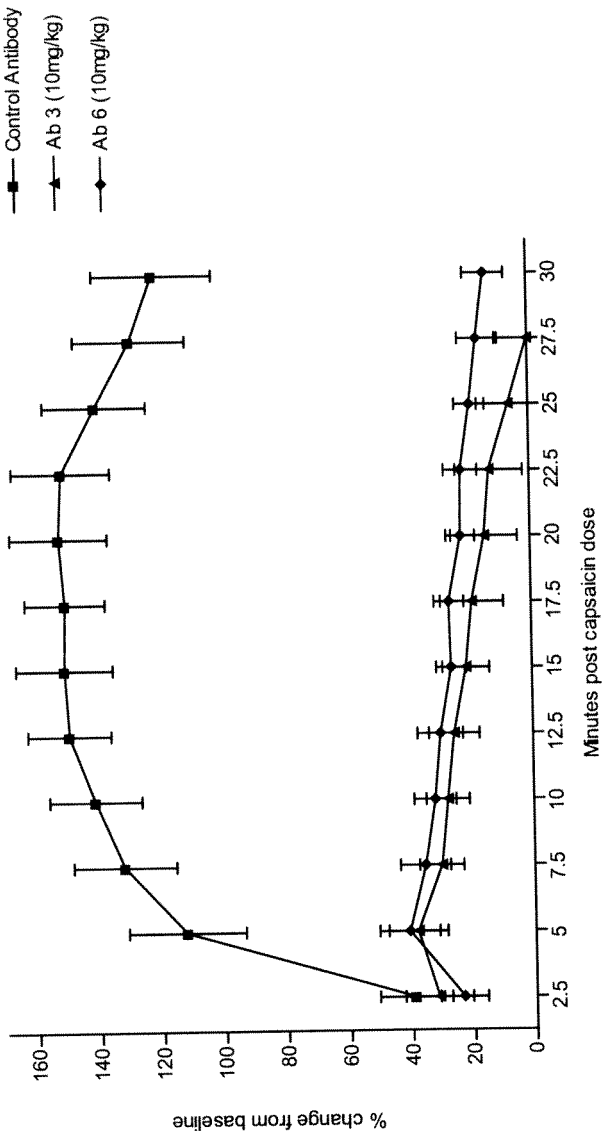


Figure 40

Reduction in Vasodilatation Following Capsaicin Administration

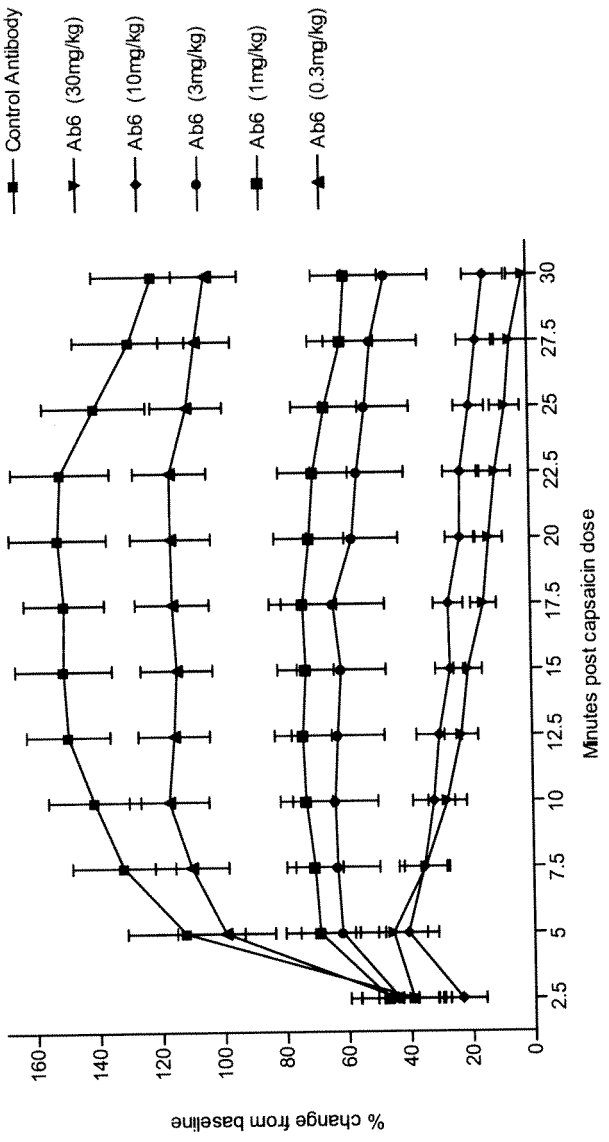
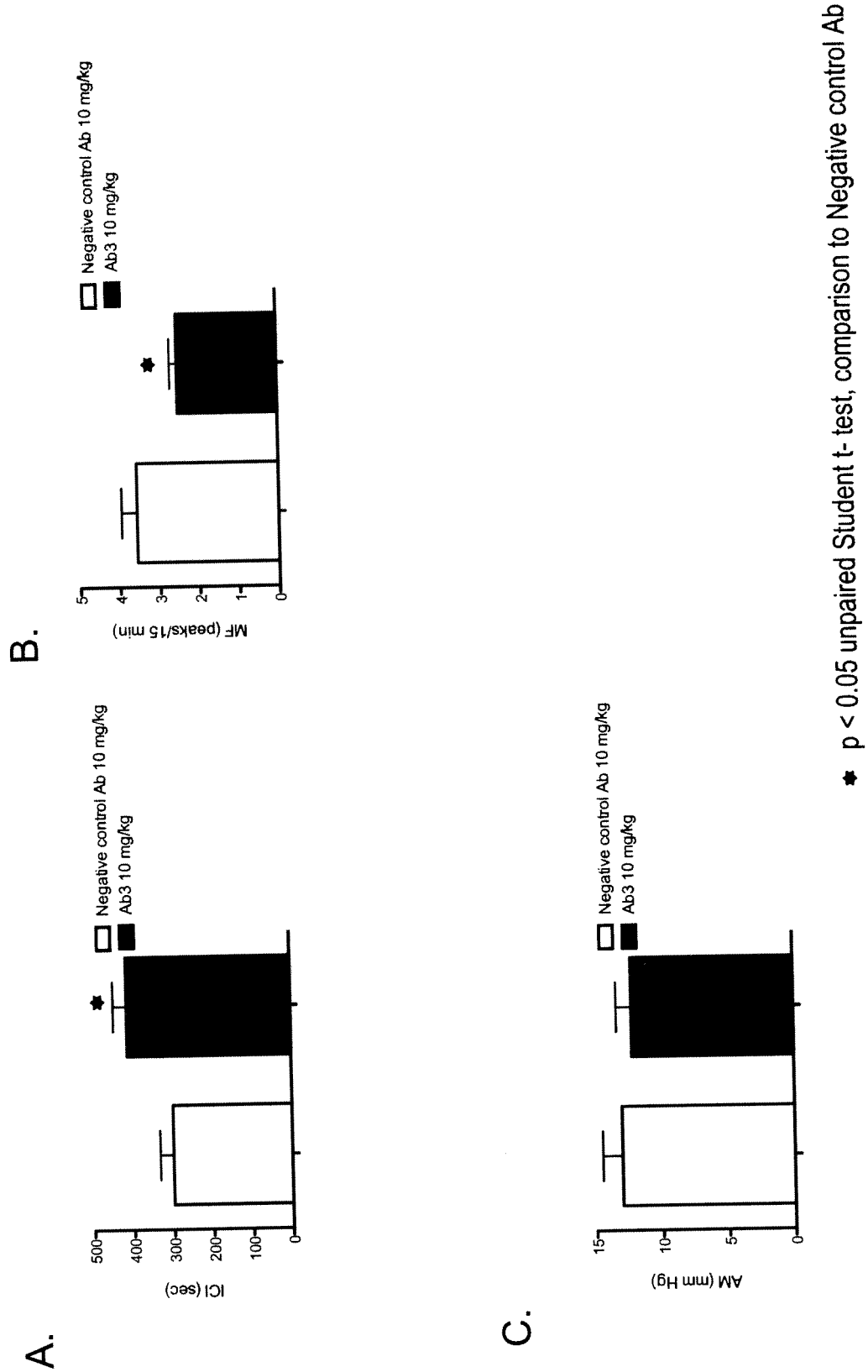


FIG. 41


A.
Negative control Ab 10 mg/kg
Ab3 10 mg/kg
ICI (sec)
500
400
300
200
100
0
B.
Negative control Ab 10 mg/kg
Ab3 10 mg/kg
MF (peaks/15 min)
5
4
3
2
1
0
C.
Negative control Ab 10 mg/kg
Ab3 10 mg/kg
AM (mm Hg)
15
10
5
0
* p < 0.05 unpaired Student t- test, comparison to Negative control Ab

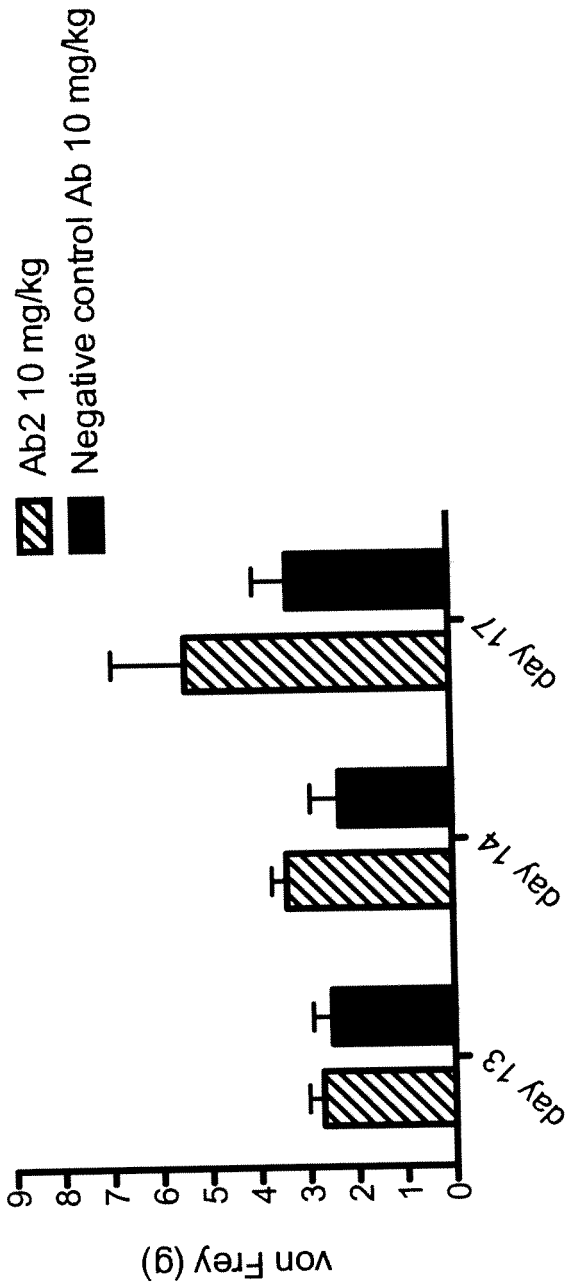

Ab2 10 mg/kg
Negative control Ab 10 mg/kg
day 17
day 14
day 13
0
1
2
3
4
5
6
7
8
9
von Frey (g)

FIG. 42

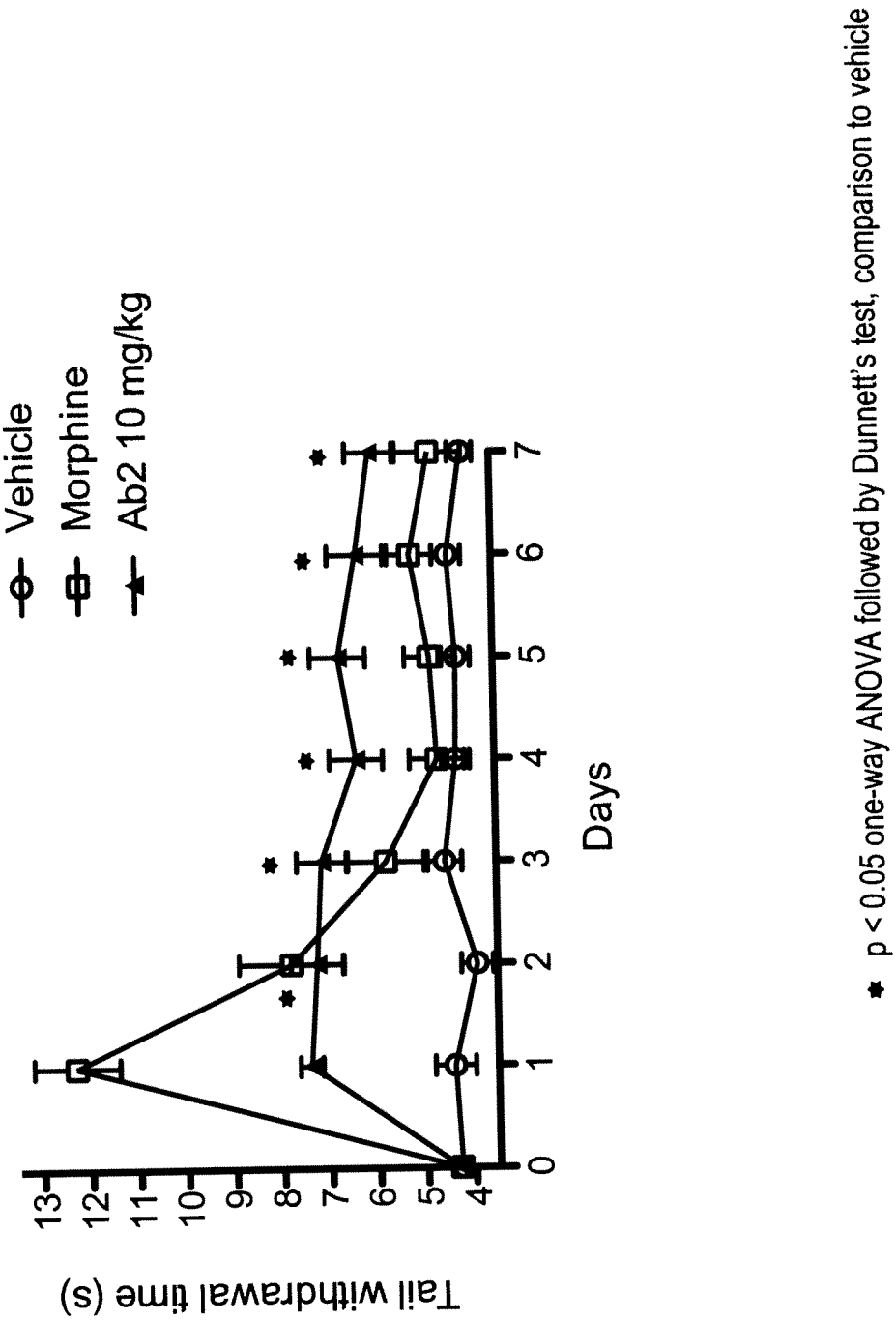
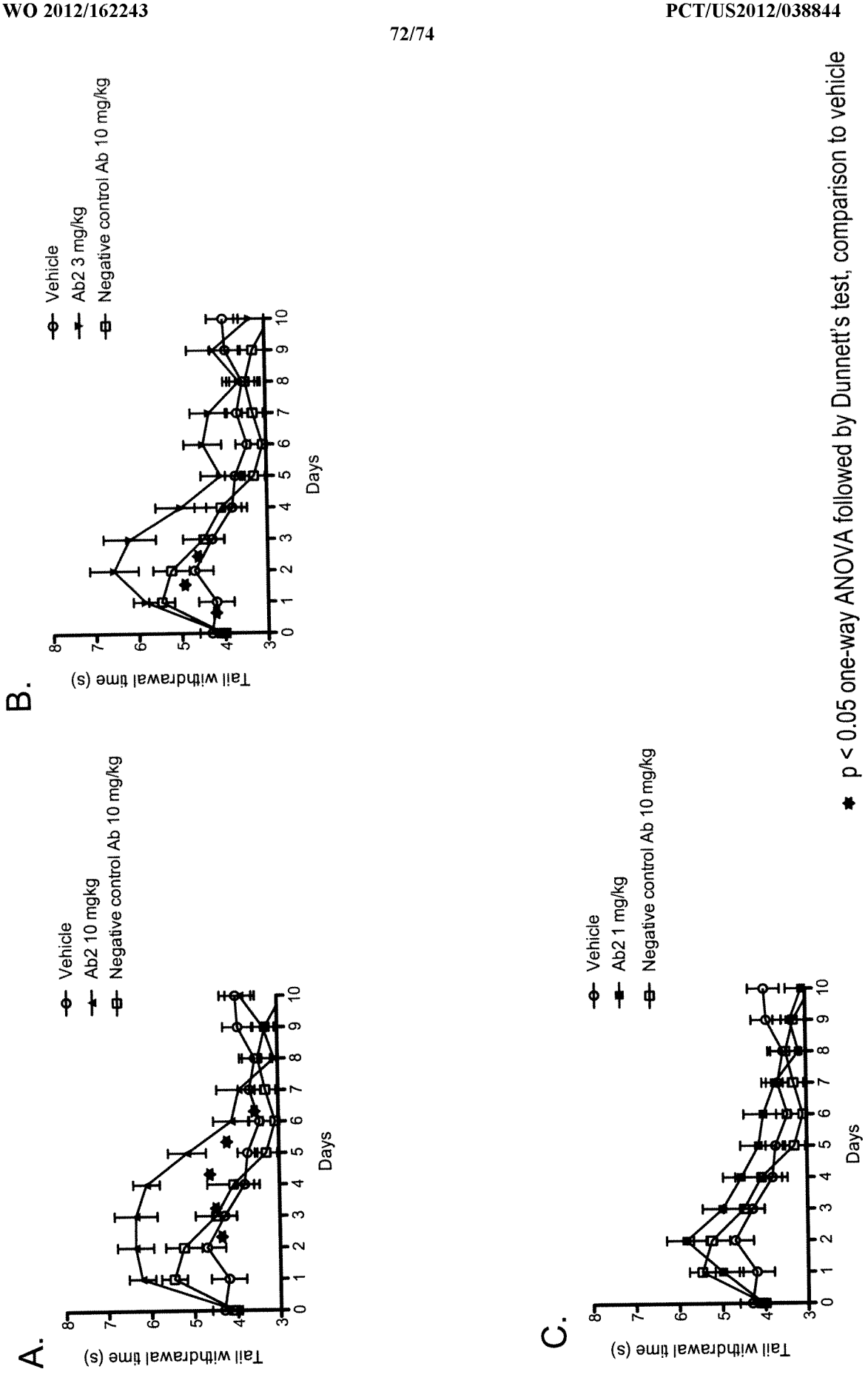

Vehicle
Morphine
Ab2 10 mg/kg
Tail withdrawal time (s)
13
12
11
10
9
8
7
6
5
4
0
1
2
3
4
5
6
7
Days
* p < 0.05 one-way ANOVA followed by Dunnett's test, comparison to vehicle

FIG. 43

FIG. 44


A.
Vehicle
Ab2 10 mgkg
Negative control Ab 10 mg/kg
Tail withdrawal time (s)
Days
B.
Vehicle
Ab2 3 mg/kg
Negative control Ab 10 mg/kg
Tail withdrawal time (s)
Days
C.
Vehicle
Ab2 1 mg/kg
Negative control Ab 10 mg/kg
Tail withdrawal time (s)
Days
* p < 0.05 one-way ANOVA followed by Dunnett's test, comparison to vehicle

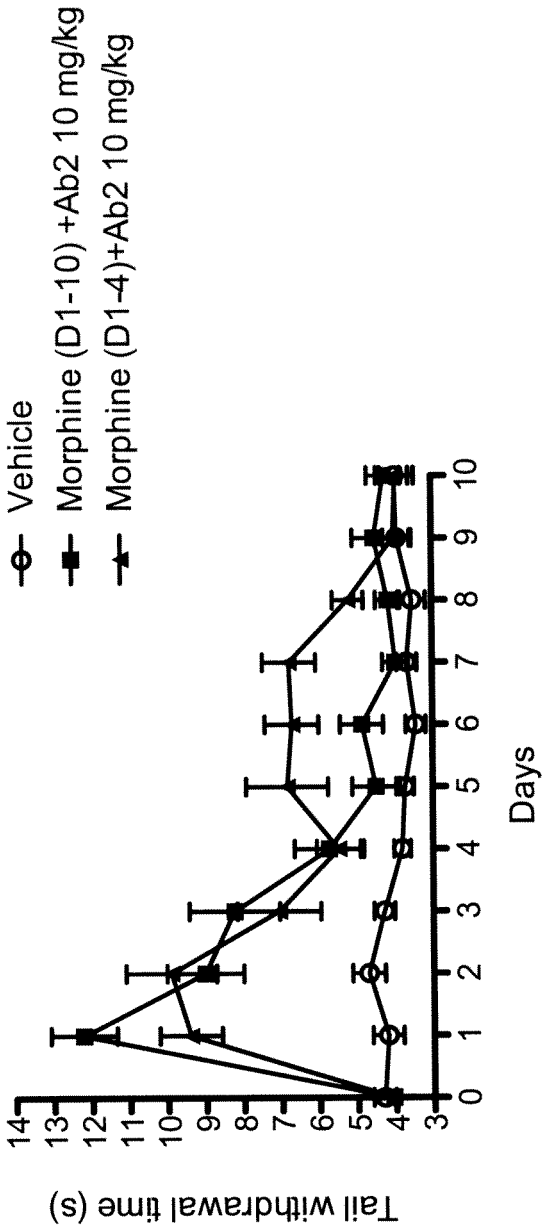

Vehicle
Morphine (D1-10) +Ab2 10 mg/kg
Morphine (D1-4)+Ab2 10 mg/kg
Tail withdrawal time (s)
Days
14
13
12
11
10
9
8
7
6
5
4
3
0
1
2
3
4
5
6
7
8
9
10

FIG. 45

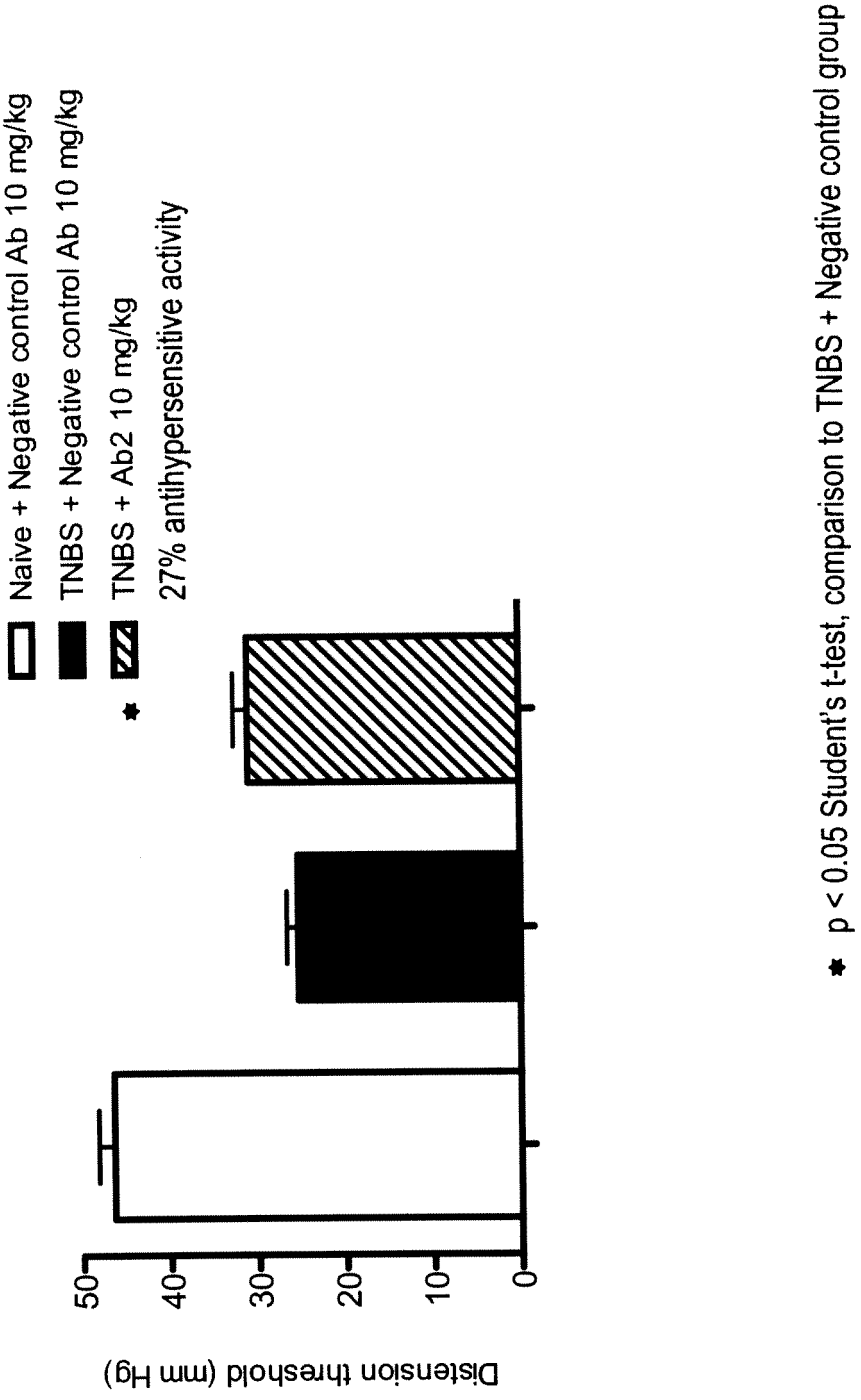

Naive + Negative control Ab 10 mg/kg
TNBS + Negative control Ab 10 mg/kg
TNBS + Ab2 10 mg/kg
27% antihypersensitive activity
Distension threshold (mm Hg)
50
40
30
20
10
0
* p < 0.05 Student's t-test, comparison to TNBS + Negative control group

FIG. 46