

<110> GENUV Inc.
 <120> Anti-PD-1 antibody and use thereof
 <130> GNUV201_P_0002
 <150> KR 10-2021-0015937
 <151> 2021-02-04
 <150> KR 10-2021-0070443
 <151> 2021-05-31
 <150> KR 10-2021-0139442
 <151> 2021-10-19
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 <223> HCDR1 aa
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 Gly Tyr Trp Met His
 1 5
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 <223> HCDR1 nucleotide
 <400> 2
 ggctactgga tgcac
 <210> 3
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<220>

<223> HCDR2 aa

<400> 3

Met Ile His Pro Asn Ser Asp Thr Thr Thr Tyr Asn Glu Lys Phe Lys
1 5 10 15

Asn

<210> 4

<211> 51

<212> DNA

<213> Artificial Sequence

<220>

<223> HCDR2 nucleotide

<400> 4

atgattcatc ctaacagtga tactactacc tacaatgaga agttcaaaaa c

51

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<211> 9

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<213> Artificial Sequence

<220>

<223> HCDR3 aa

<400> 5

Thr Asp Gln Ala Ala Trp Phe Ala Phe
1 5

<210> 6

<211> 27

<212> DNA

<213> Artificial Sequence

<220>

<223> HCDR3 nucleotide

<400> 6

acagatcagg ccgcctgggtt tgctttc

27

<210> 7
<211> 16
<212> PRT
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<220>
<223> LCDR1 aa

<400> 7
Arg Ser Ser Gln Asn Ile Val His Ser Asn Gly Asp Thr Tyr Leu Glu
1 5 10 15

<210> 8
<211> 48
<212> DNA
<213> Artificial Sequence

<220>
<223> LCDR1 nucleotide

<400> 8
agatctagtc agaacattgt acatagtaat ggagacacct atttagaa

48

<210> 9
<211> 7
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<213> Artificial Sequence

<220>
<223> LCDR2 aa

<400> 9
Lys Val Ser Lys Arg Phe Ser
1 5

<210> 10
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<212> DNA
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<220>
<223> LCDR2 nucleotide

<400> 10
aaagtttcca agcgattttc t 21

<210> 11
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> LCDR3 aa

<400> 11
Phe Gln Gly Ser His Val Pro Trp Thr
1 5

<210> 12
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> LCDR3 nucleotide

<400> 12
tttcaagggtt cacatgttcc gtggacg 27

<210> 13
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<213> Artificial Sequence

<220>
<223> HCVR aa

<400> 13
Glu Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Val Lys Pro Gly Ala
1 5 10 15

Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Gly Tyr

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Trp Met His Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile					
	35		40		45
Gly Met Ile His Pro Asn Ser Asp Thr Thr Thr Tyr Asn Glu Lys Phe					
	50		55		60
Lys Asn Arg Ala Thr Leu Thr Val Asp Lys Ser Ser Gly Thr Ala Tyr					
	65		70		75
Met Gln Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys					
		85		90	95
Thr Gly Thr Asp Gln Ala Ala Trp Phe Ala Phe Trp Gly Gln Gly Thr					
	100		105		110
Leu Val Thr Val Ser Ala					
	115				

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 <212> DNA
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<220>
 <223> HCVR nucleotide

<400> 14	
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tcctgcaagg cttctggcta cactttcacc ggctactgga tgcactgggt gaagcagagg	120
cctggacaag gccttgagtg gattggaatg attcatccta acagtgatac tactacctac	180
aatgagaagt tcaaaaacag ggccacactg actgtagaca aatcctccgg cacagcctac	240
atgcaactca gcagcctgac atctgaggac tctgcggtct attactgtac agggacagat	300
caggccgcct ggtttgcttt ctggggccaa gggactctgg tcactgtctc tgca	354

<210> 15
 <211> 112
 <212> PRT
 <213> Artificial Sequence

<220>

<223> LCVR aa

<400> 15

Asp Ile Val Leu Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Asn Ile Val His Ser
20 25 30

Asn Gly Asp Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Lys Leu Leu Ile Tyr Lys Val Ser Lys Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Tyr Cys Phe Gln Gly
85 90 95

Ser His Val Pro Trp Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105 110

<210> 16

<211> 336

<212> DNA

<213> Artificial Sequence

<220>

<223> LCVR nucleotide

<400> 16

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atctcttgca gatctagtca gaacattgta catagtaatg gagacaccta tttagaatgg	120
tacctgcaga aaccaggcca gtctccaaag ctctgatct acaaagtttc caagcgattt	180
tctgggggtcc cagacagggt cagtggcagt ggatcaggga cagatttcac actcaagatc	240
agcagagtgg aggctgagga tctgggagtt tattactgct ttcaaggttc acatgttccg	300
tggacgttcg gtggaggcac caagctggaa atcaaa	336

<210> 17
 <211> 30
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> HFR1 aa

<400> 17
 Glu Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Val Lys Pro Gly Ala
 1 5 10 15
 Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr
 20 25 30

<210> 18
 <211> 90
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> HFR1 nucleotide

<400> 18
 gaggtccagc tgcagcagtc tggggctgag ctgggtaagc ctggggccttc agtgaagctg 60
 tcctgcaagg cttctggcta cactttcacc 90

<210> 19
 <211> 14
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> HFR2 aa

<400> 19
 Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile Gly
 1 5 10

<210> 20
 <211> 42
 <212> DNA

<213> Artificial Sequence

<220>

<223> HFR2 nucleotide

<400> 20

tgggtgaagc agaggcctgg acaaggcctt gagggttg ga

42

<210> 21

<211> 32

<212> PRT

<213> Artificial Sequence

<220>

<223> HFR3 aa

<400> 21

Arg Ala Thr Leu Thr Val Asp Lys Ser Ser Gly Thr Ala Tyr Met Gln
1 5 10 15

Leu Ser Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys Thr Gly
20 25 30

<210> 22

<211> 96

<212> DNA

<213> Artificial Sequence

<220>

<223> HFR3 nucleotide

<400> 22

agggccacac tgactgtaga caaatcctcc ggcacagcct acatgcaact cagcagcctg

60

acatctgagg actctgcggt ctattactgt acaggg

96

<210> 23

<211> 11

<212> PRT

<213> Artificial Sequence

<220>

<223> HFR4 aa

<400> 23
Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ala
1 5 10

<210> 24
<211> 33
<212> DNA
<213> Artificial Sequence

<220>
<223> HFR4 nucleotide

<400> 24
tggggccaag ggactctggg cactgtctct gca 33

<210> 25
<211> 23
<212> PRT
<213> Artificial Sequence

<220>
<223> LFR1 aa

<400> 25
Asp Ile Val Leu Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys
20

<210> 26
<211> 69
<212> DNA
<213> Artificial Sequence

<220>
<223> LFR1 nucleotide

<400> 26
gatattgtgc tgacacaaac tccactctcc ctgcctgtca gtcttggaga tcaagcctcc 60

atctcttgc

69

<210> 27
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<223> LFR2 aa

<400> 27
Trp Tyr Leu Gln Lys Pro Gly Gln Ser Pro Lys Leu Leu Ile Tyr
1 5 10 15

<210> 28
<211> 45
<212> DNA
<213> Artificial Sequence

<220>
<223> LFR2 nucleotide

<400> 28
tgggtacctgc agaaaccagg ccagtctcca aagctcctga tctac

45

<210> 29
<211> 32
<212> PRT
<213> Artificial Sequence

<220>
<223> LFR3 aa

<400> 29
Gly Val Pro Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr
1 5 10 15
Leu Lys Ile Ser Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Tyr Cys
20 25 30

<210> 30

<211> 96
<212> DNA
<213> Artificial Sequence

<220>
<223> LFR3 nucleotide

<400> 30
ggggtcccag acaggttcag tggcagtgga tcagggacag atttcacact caagatcagc 60
agagtggagg ctgaggatct gggagtttat tactgc 96

<210> 31
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> LFR4 aa

<400> 31
Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys
1 5 10

<210> 32
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> LFR4 nucleotide

<400> 32
ttcgggtggag gcaccaagct ggaaatcaaa 30

<210> 33
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> MH1 primer

<400> 33
aatttgctag csargtnmag ctgsagsagt c 31

<210> 34
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> MH2 primer

<400> 34
aatttgctag csargtnmag ctgsagsagt cwgg 34

<210> 35
<211> 38
<212> DNA
<213> Artificial Sequence

<220>
<223> IgG1 primer

<400> 35
aatttggatc catagacaga tgggggtgtc gttttggc 38

<210> 36
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> MK primer

<400> 36
aattggatcc aggggccagt ggatagactg atgg 34

<210> 37
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> CK primer

<400> 37
aatttgcggc cgcggataca gttggtgcag catc 34

<210> 38
<211> 981
<212> DNA
<213> Artificial Sequence

<220>
<223> Human IgG4 CH

<400> 38
gctagcacca agggcccatc ggtcttcccc ctggcgccct gctccaggag cacctccgag 60
agcacagccg ccctgggctg cctggtcaag gactacttcc ccgaaccctg gacggtgtcg 120
tggaactcag gcgccctgac cagcggcgtg cacaccttcc cggctgtcct acagtcctca 180
ggactctact ccctcagcag cgtggtgacc gtgccctcca gcagcttggg cacgaagacc 240
tacacctgca acgtagatca caagcccagc aacaccaagg tggacaagag agttgagtcc 300
aaatatggtc ccccatgccc accatgcccga gcacctgagt tcctgggggg accatcagtc 360
ttcctgttcc ccccaaaacc caaggacact ctcatgatct cccggacccc tgaggtcacg 420
tgcgtggtgg tggacgtgag ccaggaagac cccgaggtcc agttcaactg gtacgtggat 480
ggcgtggagg tgcataatgc caagacaaag ccgcgggagg agcagttcaa cagcacgtac 540
cgtgtggtca gcgtcctcac cgtcctgcac caggactggc tgaacggcaa ggagtacaag 600
tgcaaggctc ccaacaaagg cctcccgtcc tccatcgaga aaaccatctc caaagccaaa 660
gggcagcccc gagagccaca ggtgtacacc ctgcccccat cccaggagga gatgaccaag 720
aaccaggctc gcctgacctg cctggtcaaa ggcttctacc ccagcgacat cgccgtggag 780
tgggagagca atgggcagcc ggagaacaac tacaagacca cgctcccgt gctggactcc 840
gacggctcct tcttcctcta cagcaggcta accgtggaca agagcaggtg gcaggagggg 900
aatgtcttct catgctccgt gatgcatgag gctctgcaca accactacac acagaagagc 960
ctctccctgt ctccgggtaa a 981

<210> 39
 <211> 327
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Human IgG4 CH

<400> 39
 Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Cys Ser Arg
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 Ser Thr Ser Glu Ser Thr Ala Ala Leu Gly Cys Leu Val Lys Asp Tyr
 20 25 30
 Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly Ala Leu Thr Ser
 35 40 45
 Gly Val His Thr Phe Pro Ala Val Leu Gln Ser Ser Gly Leu Tyr Ser
 50 55 60
 Leu Ser Ser Val Val Thr Val Pro Ser Ser Ser Leu Gly Thr Lys Thr
 65 70 75 80
 Tyr Thr Cys Asn Val Asp His Lys Pro Ser Asn Thr Lys Val Asp Lys
 85 90 95
 Arg Val Glu Ser Lys Tyr Gly Pro Pro Cys Pro Pro Cys Pro Ala Pro
 100 105 110
 Glu Phe Leu Gly Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro Lys
 115 120 125
 Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val
 130 135 140
 Asp Val Ser Gln Glu Asp Pro Glu Val Gln Phe Asn Trp Tyr Val Asp
 145 150 155 160
 Gly Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Phe
 165 170 175
 Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln Asp
 180 185 190
 Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys Gly Leu
 195 200 205

Pro Ser Ser Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg
 210 215 220
 Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Gln Glu Glu Met Thr Lys
 225 230 235 240
 Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp
 245 250 255
 Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys
 260 265 270
 Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser
 275 280 285
 Arg Leu Thr Val Asp Lys Ser Arg Trp Gln Glu Gly Asn Val Phe Ser
 290 295 300
 Cys Ser Val Met His Glu Ala Leu His Asn His Tyr Thr Gln Lys Ser
 305 310 315 320
 Leu Ser Leu Ser Pro Gly Lys
 325

<210> 40
 <211> 321
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Human IgG4 Ckappa

<400> 40
 cgtacggtgg ctgcaccatc tgtcttcac ttcccgccat ctgatgagca gttgaaatct 60
 ggaactgcct ctgttgtgtg cctgctgaat aacttctatc ccagagaggc caaagtacag 120
 tggaaggtgg ataacgccct ccaatcgggt aactcccagg agagtgtcac agagcaggac 180
 agcaaggaca gcacctacag cctcagcagc accctgacgc tgagcaaagc agactacgag 240
 aaacacaaaag tctacgcctg cgaagtcacc catcagggcc tgagctcgcc cgtcacaaag 300
 agcttcaaca ggggagagtg t 321

<210> 41
 <211> 107

<212> PRT
<213> Artificial Sequence

<220>
<223> Human IgG4 Ckappa

<400> 41
Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro Pro Ser Asp Glu
1 5 10 15
Gln Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn Asn Phe
20 25 30
Tyr Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala Leu Gln
35 40 45
Ser Gly Asn Ser Gln Glu Ser Val Thr Glu Gln Asp Ser Lys Asp Ser
50 55 60
Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu
65 70 75 80
Lys His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser
85 90 95
Pro Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
100 105

<210> 42
<211> 1341
<212> DNA
<213> Artificial Sequence

<220>
<223> Humanized antibody, 1G1-h61 heavy chain nucleotides

<400> 42
caagttcagc tgggtgcagag cggcgccgag gtgaagaagc ctggagccag cgtgaaagtg 60
tcctgcaagg cctctggcta cacctttaca ggctactgga tgcactgggt gcggcaggcc 120
cctggacagg gcctggaatg gatgggcatg atccacccca acagcgacac cacaacctac 180
aacgagaagt tcaagaatag agtgaccatg acaagagata ccagcatcag caccgcctac 240
atggaactga gcagactgcg gtccgatgac acagctgtgt actattgtgc cggcaccgac 300

caggccgctt ggttcgcctt ctgggggcag ggcaccacag tcaccgtgag ctctgccagc	360
accaagggcc cttccgtggt tcccctggcc ctttgctccc ggtccacatc tgagagcacc	420
gccgccctgg gctgtctggt gaaggactac ttcccagagc ccgtgaccgt gagctggaac	480
agcggcgccc tgacaagcgg cgtgcacaca tttcccgccg tgctgcagag ctccggcctg	540
tactccctgt ctagcgtggt gacagtgcct tcctctagcc tgggcaccaa gacatatacc	600
tgtaacgtgg accacaagcc aagcaatacc aaggtggata agcgggtgga gtctaagtac	660
ggccctcctt gccctagctg tcctgctcca gagtttctgg gcggcccttc cgtgttcctg	720
tttccacca aaccaaagga cacactgatg atctctagaa caccagaggt gacctgcgtg	780
gtggtggacg tgagccagga ggatcccgag gtgcagttca actggtacgt ggatggcgtg	840
gaggtgcaca atgccaagac caagccaaga gaggagcagt ttaactctac atacagggtg	900
gtgagcgtgc tgaccgtgct gcaccaggat tggctcaacg gcaaggagta taagtgaag	960
gtgtccaata agggcctgcc ctctctatc gagaagacaa tctctaaggc taagggccag	1020
ccaagagagc ctcaggtgta caccctgcct ccaagccagg aggagatgac aaagaaccag	1080
gtgtccctga catgtctggt gaagggttc tatccctccg acatcgccgt ggagtgggag	1140
tctaattggcc agcctgagaa caattacaag accacacccc ctgtgctgga ctctgatggc	1200
agcttctttc tgtattccag gctgaccgtg gataagtctc ggtggcagga gggcaacgtg	1260
ttcagctgct ctgtgatgca cgaagccctg cataatcact atactcagaa aagtctgtca	1320
ctgtcactgg gaaagtgata a	1341

<210> 43
 <211> 445
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Humanized antibody, 1G1-h61 heavy chain amino acids

<400> 43
 Gln Val Gln Leu Val Gln Ser Gly Ala Glu Val Lys Lys Pro Gly Ala
 1 5 10 15

Ser Val Lys Val Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Gly Tyr
 20 25 30
 Trp Met His Trp Val Arg Gln Ala Pro Gly Gln Gly Leu Glu Trp Met
 35 40 45
 Gly Met Ile His Pro Asn Ser Asp Thr Thr Thr Tyr Asn Glu Lys Phe
 50 55 60
 Lys Asn Arg Val Thr Met Thr Arg Asp Thr Ser Ile Ser Thr Ala Tyr
 65 70 75 80
 Met Glu Leu Ser Arg Leu Arg Ser Asp Asp Thr Ala Val Tyr Tyr Cys
 85 90 95
 Ala Gly Thr Asp Gln Ala Ala Trp Phe Ala Phe Trp Gly Gln Gly Thr
 100 105 110
 Thr Val Thr Val Ser Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro
 115 120 125
 Leu Ala Pro Cys Ser Arg Ser Thr Ser Glu Ser Thr Ala Ala Leu Gly
 130 135 140
 Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn
 145 150 155 160
 Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln
 165 170 175
 Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
 180 185 190
 Ser Leu Gly Thr Lys Thr Tyr Thr Cys Asn Val Asp His Lys Pro Ser
 195 200 205
 Asn Thr Lys Val Asp Lys Arg Val Glu Ser Lys Tyr Gly Pro Pro Cys
 210 215 220
 Pro Ser Cys Pro Ala Pro Glu Phe Leu Gly Gly Pro Ser Val Phe Leu
 225 230 235 240
 Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro Glu
 245 250 255
 Val Thr Cys Val Val Val Asp Val Ser Gln Glu Asp Pro Glu Val Gln
 260 265 270
 Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala Lys Thr Lys
 275 280 285

Pro Arg Glu Glu Gln Phe Asn Ser Thr Tyr Arg Val Val Ser Val Leu
 290 295 300
 Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys
 305 310 315 320
 Val Ser Asn Lys Gly Leu Pro Ser Ser Ile Glu Lys Thr Ile Ser Lys
 325 330 335
 Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser
 340 345 350
 Gln Glu Glu Met Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys
 355 360 365
 Gly Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln
 370 375 380
 Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly
 385 390 395 400
 Ser Phe Phe Leu Tyr Ser Arg Leu Thr Val Asp Lys Ser Arg Trp Gln
 405 410 415
 Glu Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn
 420 425 430
 His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Leu Gly Lys
 435 440 445

<210> 44
 <211> 1341
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Humanized antibody, 1G1-h68 heavy chain nucleotides

<400> 44
 caagttcagc tggtgcagag cggcgccgag gtgaagaagc ctggagccag cgtgaaagtg 60
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 cctggacagg gcctggaatg gatcggcatg atccaccca acagcgacac cacaacctac 180
 aacgagaagt tcaagaatag agtgaccatg acaagagata ccagcatcag caccgcctac 240

atggaactga gcagactgcg gtccgatgac acagctgtgt actattgtac cggcaccgac	300
caggccgctt ggttcgcctt ctgggggcag ggcaccacag tcaccgtgag ctctgccagc	360
accaagggcc cttccgtggt tcccctggcc ctttgctccc ggtccacatc tgagagcacc	420
gccgccctgg gctgtctggt gaaggactac ttcccagagc ccgtgaccgt gagctggaac	480
agcggcgccc tgacaagcgg cgtgcacaca tttcccgccg tgctgcagag ctccggcctg	540
tactccctgt ctagcgtggt gacagtgcct tcctctagcc tgggcaccaa gacatatacc	600
tgtaacgtgg accacaagcc aagcaatacc aaggtggata agcgggtgga gtctaagtac	660
ggccctcctt gccctagctg tcctgctcca gagtttctgg gcggcccttc cgtgttcctg	720
tttccaccca aaccaaagga cacactgatg atctctagaa caccagaggt gacctgcgtg	780
gtggtggacg tgagccagga ggatcccgag gtgcagttca actggtacgt ggatggcgtg	840
gaggtgcaca atgccaagac caagccaaga gaggagcagt ttaactctac atacagggtg	900
gtgagcgtgc tgaccgtgct gcaccaggat tggctcaacg gcaaggagta taagtgaag	960
gtgtccaata agggcctgcc ctcctctatc gagaagacaa tctctaaggc taagggccag	1020
ccaagagagc ctcaggtgta caccctgcct ccaagccagg aggagatgac aaagaaccag	1080
gtgtccctga catgtctggt gaagggttc tatccctccg acatcgccgt ggagtgggag	1140
tctaattggcc agcctgagaa caattacaag accacacccc ctgtgctgga ctctgatggc	1200
agcttctttc tgtattccag gctgaccgtg gataagtctc ggtggcagga gggcaacgtg	1260
ttcagctgct ctgtgatgca cgaagccctg cataatcact atactcagaa aagtctgtca	1320
ctgtcactgg gaaagtgata a	1341

<210> 45
 <211> 445
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Humanized antibody, 1G1-h68 heavy chain amino acids

<400> 45
 Gln Val Gln Leu Val Gln Ser Gly Ala Glu Val Lys Lys Pro Gly Ala

1		5		10		15													
Ser	Val	Lys	Val	Ser	Cys	Lys	Ala	Ser	Gly	Tyr	Thr	Phe	Thr	Gly	Tyr				
		20						25					30						
Trp	Met	His	Trp	Val	Arg	Gln	Ala	Pro	Gly	Gln	Gly	Leu	Glu	Trp	Ile				
		35					40					45							
Gly	Met	Ile	His	Pro	Asn	Ser	Asp	Thr	Thr	Thr	Tyr	Asn	Glu	Lys	Phe				
	50					55					60								
Lys	Asn	Arg	Val	Thr	Met	Thr	Arg	Asp	Thr	Ser	Ile	Ser	Thr	Ala	Tyr				
	65				70					75					80				
Met	Glu	Leu	Ser	Arg	Leu	Arg	Ser	Asp	Asp	Thr	Ala	Val	Tyr	Tyr	Cys				
				85					90					95					
Thr	Gly	Thr	Asp	Gln	Ala	Ala	Trp	Phe	Ala	Phe	Trp	Gly	Gln	Gly	Thr				
			100					105					110						
Thr	Val	Thr	Val	Ser	Ser	Ala	Ser	Thr	Lys	Gly	Pro	Ser	Val	Phe	Pro				
		115					120					125							
Leu	Ala	Pro	Cys	Ser	Arg	Ser	Thr	Ser	Glu	Ser	Thr	Ala	Ala	Leu	Gly				
	130					135					140								
Cys	Leu	Val	Lys	Asp	Tyr	Phe	Pro	Glu	Pro	Val	Thr	Val	Ser	Trp	Asn				
	145				150					155					160				
Ser	Gly	Ala	Leu	Thr	Ser	Gly	Val	His	Thr	Phe	Pro	Ala	Val	Leu	Gln				
				165				170						175					
Ser	Ser	Gly	Leu	Tyr	Ser	Leu	Ser	Ser	Val	Val	Thr	Val	Pro	Ser	Ser				
			180					185					190						
Ser	Leu	Gly	Thr	Lys	Thr	Tyr	Thr	Cys	Asn	Val	Asp	His	Lys	Pro	Ser				
		195					200					205							
Asn	Thr	Lys	Val	Asp	Lys	Arg	Val	Glu	Ser	Lys	Tyr	Gly	Pro	Pro	Cys				
	210					215					220								
Pro	Ser	Cys	Pro	Ala	Pro	Glu	Phe	Leu	Gly	Gly	Pro	Ser	Val	Phe	Leu				
	225				230					235					240				
Phe	Pro	Pro	Lys	Pro	Lys	Asp	Thr	Leu	Met	Ile	Ser	Arg	Thr	Pro	Glu				
				245					250					255					
Val	Thr	Cys	Val	Val	Val	Asp	Val	Ser	Gln	Glu	Asp	Pro	Glu	Val	Gln				
			260					265					270						

Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala Lys Thr Lys
 275 280 285
 Pro Arg Glu Glu Gln Phe Asn Ser Thr Tyr Arg Val Val Ser Val Leu
 290 295 300
 Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys
 305 310 315 320
 Val Ser Asn Lys Gly Leu Pro Ser Ser Ile Glu Lys Thr Ile Ser Lys
 325 330 335
 Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser
 340 345 350
 Gln Glu Glu Met Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys
 355 360 365
 Gly Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln
 370 375 380
 Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly
 385 390 395 400
 Ser Phe Phe Leu Tyr Ser Arg Leu Thr Val Asp Lys Ser Arg Trp Gln
 405 410 415
 Glu Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn
 420 425 430
 His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Leu Gly Lys
 435 440 445

<210> 46
 <211> 1341
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Humanized antibody, 1G1-h70 heavy chain nucleotides

<400> 46
 caagttcagc tggtgcagag cggcgccgag gtgaagaagc ctggagccag cgtgaaagtg 60
 tcctgcaagg cctctggcta cacctttaca ggctactgga tgcactgggt gcggcaggcc 120
 cctggacagg gcctggaatg gatcggcatg atccaccca acagcgacac cacaacctac 180

aacgagaagt tcaagaatag agtgaccatg acaagagata ccagcatcag caccgcctac	240
atggaactga gcagactgcg gtccgatgac acagctgtgt actattgtgc cggcaccgac	300
caggccgctt ggttcgcctt ctggggggcag ggcaccacag tcaccgtgag ctctgccagc	360
accaagggcc cttccgtgtt tcccctggcc ctttgctccc ggtccacatc tgagagcacc	420
gccgccctgg gctgtctggt gaaggactac ttcccagagc ccgtgaccgt gagctggaac	480
agcggcgccc tgacaagcgg cgtgcacaca tttcccgccg tgctgcagag ctccggcctg	540
tactccctgt ctagcgtggt gacagtgctt tcctctagcc tgggcaccaa gacatatacc	600
tgtaacgtgg accacaagcc aagcaatacc aaggtggata agcgggtgga gtctaagtac	660
ggccctcctt gccctagctg tcctgctcca gagtttctgg gcggcccttc cgtgttcctg	720
tttccaccca aaccaaagga cacactgatg atctctagaa caccagaggt gacctgcgtg	780
gtggtggacg tgagccagga ggatcccgag gtgcagttca actggtacgt ggatggcgtg	840
gaggtgcaca atgccaagac caagccaaga gaggagcagt ttaactctac atacagggtg	900
gtgagcgtgc tgaccgtgct gcaccaggat tggctcaacg gcaaggagta taagtgcaag	960
gtgtccaata agggcctgcc ctctctatc gagaagacaa tctctaaggc taagggccag	1020
ccaagagagc ctgaggtgta caccctgcct ccaagccagg aggagatgac aaagaaccag	1080
gtgtccctga catgtctggt gaagggcttc tatccctccg acatcgccgt ggagtgggag	1140
tctaattggcc agcctgagaa caattacaag accacacccc ctgtgctgga ctctgatggc	1200
agcttctttc tgtattccag gctgaccgtg gataagtctc ggtggcagga gggcaacgtg	1260
ttcagctgct ctgtgatgca cgaagccctg cataatcact atactcagaa aagtctgtca	1320
ctgtcactgg gaaagtgata a	1341

<210> 47
 <211> 445
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Humanized antibody, 1G1-h70 heavy chain amino acids

<400> 47
 Gln Val Gln Leu Val Gln Ser Gly Ala Glu Val Lys Lys Pro Gly Ala
 1 5 10 15
 Ser Val Lys Val Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Gly Tyr
 20 25 30
 Trp Met His Trp Val Arg Gln Ala Pro Gly Gln Gly Leu Glu Trp Ile
 35 40 45
 Gly Met Ile His Pro Asn Ser Asp Thr Thr Thr Tyr Asn Glu Lys Phe
 50 55 60
 Lys Asn Arg Val Thr Met Thr Arg Asp Thr Ser Ile Ser Thr Ala Tyr
 65 70 75 80
 Met Glu Leu Ser Arg Leu Arg Ser Asp Asp Thr Ala Val Tyr Tyr Cys
 85 90 95
 Ala Gly Thr Asp Gln Ala Ala Trp Phe Ala Phe Trp Gly Gln Gly Thr
 100 105 110
 Thr Val Thr Val Ser Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro
 115 120 125
 Leu Ala Pro Cys Ser Arg Ser Thr Ser Glu Ser Thr Ala Ala Leu Gly
 130 135 140
 Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn
 145 150 155 160
 Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln
 165 170 175
 Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
 180 185 190
 Ser Leu Gly Thr Lys Thr Tyr Thr Cys Asn Val Asp His Lys Pro Ser
 195 200 205
 Asn Thr Lys Val Asp Lys Arg Val Glu Ser Lys Tyr Gly Pro Pro Cys
 210 215 220
 Pro Ser Cys Pro Ala Pro Glu Phe Leu Gly Gly Pro Ser Val Phe Leu
 225 230 235 240
 Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro Glu
 245 250 255
 Val Thr Cys Val Val Val Asp Val Ser Gln Glu Asp Pro Glu Val Gln

	260		265		270										
Phe	Asn	Trp	Tyr	Val	Asp	Gly	Val	Glu	Val	His	Asn	Ala	Lys	Thr	Lys
	275						280					285			
Pro	Arg	Glu	Glu	Gln	Phe	Asn	Ser	Thr	Tyr	Arg	Val	Val	Ser	Val	Leu
	290					295					300				
Thr	Val	Leu	His	Gln	Asp	Trp	Leu	Asn	Gly	Lys	Glu	Tyr	Lys	Cys	Lys
305					310					315					320
Val	Ser	Asn	Lys	Gly	Leu	Pro	Ser	Ser	Ile	Glu	Lys	Thr	Ile	Ser	Lys
				325					330					335	
Ala	Lys	Gly	Gln	Pro	Arg	Glu	Pro	Gln	Val	Tyr	Thr	Leu	Pro	Pro	Ser
			340					345					350		
Gln	Glu	Glu	Met	Thr	Lys	Asn	Gln	Val	Ser	Leu	Thr	Cys	Leu	Val	Lys
		355					360					365			
Gly	Phe	Tyr	Pro	Ser	Asp	Ile	Ala	Val	Glu	Trp	Glu	Ser	Asn	Gly	Gln
	370					375					380				
Pro	Glu	Asn	Asn	Tyr	Lys	Thr	Thr	Pro	Pro	Val	Leu	Asp	Ser	Asp	Gly
385					390					395					400
Ser	Phe	Phe	Leu	Tyr	Ser	Arg	Leu	Thr	Val	Asp	Lys	Ser	Arg	Trp	Gln
				405					410					415	
Glu	Gly	Asn	Val	Phe	Ser	Cys	Ser	Val	Met	His	Glu	Ala	Leu	His	Asn
			420					425					430		
His	Tyr	Thr	Gln	Lys	Ser	Leu	Ser	Leu	Ser	Leu	Gly	Lys			
	435						440					445			

<210> 48
 <211> 663
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Humanized antibody, 1G1-h61 light chain nucleotides

<400> 48	
gatatcggtta tgaccagac ccctctgagc ctgtccgtga cccagggcca acctgcctct	60
atcagctgta gaagcagcca gaacatcgtg cacagcaacg gcgacaccta cctggaatgg	120

tatctgcaga aacctggaca gagccccaag ctgctgatct acaaggtgtc caagcggttt	180
tccggcgtgc ctgatagatt cagcggatct ggcagcggca cagacttcac cctgaagatt	240
tctagagtgg aggccgagga cgtgggcgtc tactactgct tccagggcag ccacgtgccc	300
tggacattcg gcggcggaac aaaggtggaa atcaagagga cagtggccgc cccaagcgtg	360
ttcatctttc ccccttccga cgagcagctg aagtctggca cgcagcgt ggtgtgcctg	420
ctgaacaact tctaccctcg ggaggccaag gtccagtggga aggtggataa cgccctgcag	480
tctggcaata gccaggagtc cgtgaccgag caggactcta aggatagcac atattccctg	540
tctagcacc tgacactgag caaggccgat tacgagaagc acaaggtgta tgcctgtgaa	600
gtcacccatc aggggctgtc atcacccgtc actaagtcac tcaatcgagg agaattgtga	660
taa	663

<210> 49
 <211> 219
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Humanized antibody, 1G1-h61 light chain amino acids

<400> 49
 Asp Ile Val Met Thr Gln Thr Pro Leu Ser Leu Ser Val Thr Pro Gly
 1 5 10 15
 Gln Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Asn Ile Val His Ser
 20 25 30
 Asn Gly Asp Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
 35 40 45
 Pro Lys Leu Leu Ile Tyr Lys Val Ser Lys Arg Phe Ser Gly Val Pro
 50 55 60
 Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
 65 70 75 80
 Ser Arg Val Glu Ala Glu Asp Val Gly Val Tyr Tyr Cys Phe Gln Gly
 85 90 95
 Ser His Val Pro Trp Thr Phe Gly Gly Gly Thr Lys Val Glu Ile Lys

	100		105		110
Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro Pro Ser Asp Glu					
	115		120		125
Gln Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn Asn Phe					
	130		135		140
Tyr Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala Leu Gln					
	145		150		155
Ser Gly Asn Ser Gln Glu Ser Val Thr Glu Gln Asp Ser Lys Asp Ser					
	165		170		175
Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu					
	180		185		190
Lys His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser					
	195		200		205
Pro Val Thr Lys Ser Phe Asn Arg Gly Glu Cys					
	210		215		

<210> 50
 <211> 663
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Humanized antibody, 1G1-h68 light chain nucleotides

<400> 50	
gatatcggtta tgaccagac ccctctgagc ctgtccgtga cccagggcca acctgcctct	60
atcagctgta gaagcagcca gaacatcgtg cacagcaacg gcgacaccta cctggaatgg	120
tatctgcaga aacctggaca gagccccag ctgctgatct acaaggtgtc caagcggttt	180
tccggcgtgc ctgatagatt cagcggatct ggcagcggca cagacttcac cctgaagatt	240
tctagagtgg aggccgagga cgtgggcgtc tactactgct tccagggcag ccacgtgccc	300
tggacattcg gcggcggaac aaaggtggaa atcaagagga cagtggccgc cccaagcgtg	360
ttcatctttc ccccttccga cgagcagctg aagtctggca ccgccagcgt ggtgtgcctg	420
ctgaacaact tctaccctcg ggaggccaag gtccagtgga aggtggataa cgccctgcag	480

tctggcaata gccaggagtc cgtgaccgag caggactcta aggatagcac atattccctg 540
tctagcaccc tgacactgag caaggccgat tacgagaagc acaaggtgta tgcctgtgaa 600
gtcacccatc aggggctgtc atcacccgtc actaagtcac tcaatcgcgg agaatgctga 660
taa 663

<210> 51
<211> 219
<212> PRT
<213> Artificial Sequence

<220>
<223> Humanized antibody, 1G1-h68 light chain amino acids

<400> 51
Asp Ile Val Met Thr Gln Thr Pro Leu Ser Leu Ser Val Thr Pro Gly
1 5 10 15
Gln Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Asn Ile Val His Ser
20 25 30
Asn Gly Asp Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45
Pro Gln Leu Leu Ile Tyr Lys Val Ser Lys Arg Phe Ser Gly Val Pro
50 55 60
Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80
Ser Arg Val Glu Ala Glu Asp Val Gly Val Tyr Tyr Cys Phe Gln Gly
85 90 95
Ser His Val Pro Trp Thr Phe Gly Gly Gly Thr Lys Val Glu Ile Lys
100 105 110
Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro Pro Ser Asp Glu
115 120 125
Gln Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn Asn Phe
130 135 140
Tyr Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala Leu Gln
145 150 155 160
Ser Gly Asn Ser Gln Glu Ser Val Thr Glu Gln Asp Ser Lys Asp Ser

	165		170		175										
Thr	Tyr	Ser	Leu	Ser	Ser	Thr	Leu	Thr	Leu	Ser	Lys	Ala	Asp	Tyr	Glu
			180						185					190	
Lys	His	Lys	Val	Tyr	Ala	Cys	Glu	Val	Thr	His	Gln	Gly	Leu	Ser	Ser
			195						200				205		
Pro	Val	Thr	Lys	Ser	Phe	Asn	Arg	Gly	Glu	Cys					
			210				215								

<210> 52
 <211> 663
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Humanized antibody, 1G1-h70 light chain nucleotides

<400> 52
 gatatcgtta tgaccagac ccctctgagc ctgtccgtga cccagggcca acctgcctct 60
 atcagctgta gaagcagcca gaacatcgtg cacagccagg gcgacaccta cctggaatgg 120
 tatctgcaga aacctggaca gagccccag ctgctgatct acaaggtgtc caagcggttt 180
 tccggcgtgc ctgatagatt cagcggatct ggcagcggca cagacttcac cctgaagatt 240
 tctagagtgg aggccgagga cgtgggctgc tactactgct tccagggcag ccacgtgccc 300
 tggacattcg gcggcggaac aaaggtggaa atcaagagga cagtggccgc cccaagcgtg 360
 ttcatctttc ccccttccga cgagcagctg aagtctggca ccgccagcgt ggtgtgcctg 420
 ctgaacaact tctaccctcg ggaggccaag gtccagtgga aggtggataa cgccctgcag 480
 tctggcaata gccaggagtc cgtgaccgag caggactcta aggatagcac atattccctg 540
 tctagcacc tgacactgag caaggccgat tacgagaagc acaaggtgta tgcctgtgaa 600
 gtcacccatc aggggctgtc atcaccgctc actaagtcac tcaatcgagg agaattgctga 660
 taa 663

<210> 53
 <211> 219
 <212> PRT

<213> Artificial Sequence

<220>

<223> Humanized antibody, 1G1-h70 light chain amino acids

<400> 53

Asp Ile Val Met Thr Gln Thr Pro Leu Ser Leu Ser Val Thr Pro Gly
1 5 10 15

Gln Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Asn Ile Val His Ser
20 25 30

Gln Gly Asp Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Gln Leu Leu Ile Tyr Lys Val Ser Lys Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Val Gly Val Tyr Tyr Cys Phe Gln Gly
85 90 95

Ser His Val Pro Trp Thr Phe Gly Gly Gly Thr Lys Val Glu Ile Lys
100 105 110

Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro Pro Ser Asp Glu
115 120 125

Gln Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn Asn Phe
130 135 140

Tyr Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala Leu Gln
145 150 155 160

Ser Gly Asn Ser Gln Glu Ser Val Thr Glu Gln Asp Ser Lys Asp Ser
165 170 175

Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu
180 185 190

Lys His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser
195 200 205

Pro Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
210 215

<210> 54
 <211> 118
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Humanized antibody, 1G1-h61 VH amino acids

<400> 54
 Gln Val Gln Leu Val Gln Ser Gly Ala Glu Val Lys Lys Pro Gly Ala
 1 5 10 15
 Ser Val Lys Val Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Gly Tyr
 20 25 30
 Trp Met His Trp Val Arg Gln Ala Pro Gly Gln Gly Leu Glu Trp Met
 35 40 45
 Gly Met Ile His Pro Asn Ser Asp Thr Thr Thr Tyr Asn Glu Lys Phe
 50 55 60
 Lys Asn Arg Val Thr Met Thr Arg Asp Thr Ser Ile Ser Thr Ala Tyr
 65 70 75 80
 Met Glu Leu Ser Arg Leu Arg Ser Asp Asp Thr Ala Val Tyr Tyr Cys
 85 90 95
 Ala Gly Thr Asp Gln Ala Ala Trp Phe Ala Phe Trp Gly Gln Gly Thr
 100 105 110
 Thr Val Thr Val Ser Ser
 115

<210> 55
 <211> 112
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Humanized antibody, 1G1-h61 VL amino acids

<400> 55
 Asp Ile Val Met Thr Gln Thr Pro Leu Ser Leu Ser Val Thr Pro Gly
 1 5 10 15
 Gln Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Asn Ile Val His Ser
 20 25 30

Asn Gly Asp Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
 35 40 45
 Pro Lys Leu Leu Ile Tyr Lys Val Ser Lys Arg Phe Ser Gly Val Pro
 50 55 60
 Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
 65 70 75 80
 Ser Arg Val Glu Ala Glu Asp Val Gly Val Tyr Tyr Cys Phe Gln Gly
 85 90 95
 Ser His Val Pro Trp Thr Phe Gly Gly Gly Thr Lys Val Glu Ile Lys
 100 105 110

<210> 56
 <211> 118
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Humanized antibody, 1G1-h68 VH amino acids

<400> 56
 Gln Val Gln Leu Val Gln Ser Gly Ala Glu Val Lys Lys Pro Gly Ala
 1 5 10 15
 Ser Val Lys Val Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Gly Tyr
 20 25 30
 Trp Met His Trp Val Arg Gln Ala Pro Gly Gln Gly Leu Glu Trp Ile
 35 40 45
 Gly Met Ile His Pro Asn Ser Asp Thr Thr Thr Tyr Asn Glu Lys Phe
 50 55 60
 Lys Asn Arg Val Thr Met Thr Arg Asp Thr Ser Ile Ser Thr Ala Tyr
 65 70 75 80
 Met Glu Leu Ser Arg Leu Arg Ser Asp Asp Thr Ala Val Tyr Tyr Cys
 85 90 95
 Thr Gly Thr Asp Gln Ala Ala Trp Phe Ala Phe Trp Gly Gln Gly Thr
 100 105 110

Thr Val Thr Val Ser Ser
115

<210> 57
<211> 112
<212> PRT
<213> Artificial Sequence

<220>
<223> Humanized antibody, 1G1-h68 VL amino acids

<400> 57
Asp Ile Val Met Thr Gln Thr Pro Leu Ser Leu Ser Val Thr Pro Gly
1 5 10 15
Gln Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Asn Ile Val His Ser
20 25 30
Asn Gly Asp Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45
Pro Gln Leu Leu Ile Tyr Lys Val Ser Lys Arg Phe Ser Gly Val Pro
50 55 60
Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80
Ser Arg Val Glu Ala Glu Asp Val Gly Val Tyr Tyr Cys Phe Gln Gly
85 90 95
Ser His Val Pro Trp Thr Phe Gly Gly Gly Thr Lys Val Glu Ile Lys
100 105 110

<210> 58
<211> 118
<212> PRT
<213> Artificial Sequence

<220>
<223> Humanized antibody, 1G1-h70 VH amino acids

<400> 58
Gln Val Gln Leu Val Gln Ser Gly Ala Glu Val Lys Lys Pro Gly Ala
1 5 10 15

Ser Val Lys Val Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Gly Tyr
 20 25 30
 Trp Met His Trp Val Arg Gln Ala Pro Gly Gln Gly Leu Glu Trp Ile
 35 40 45
 Gly Met Ile His Pro Asn Ser Asp Thr Thr Thr Tyr Asn Glu Lys Phe
 50 55 60
 Lys Asn Arg Val Thr Met Thr Arg Asp Thr Ser Ile Ser Thr Ala Tyr
 65 70 75 80
 Met Glu Leu Ser Arg Leu Arg Ser Asp Asp Thr Ala Val Tyr Tyr Cys
 85 90 95
 Ala Gly Thr Asp Gln Ala Ala Trp Phe Ala Phe Trp Gly Gln Gly Thr
 100 105 110
 Thr Val Thr Val Ser Ser
 115

<210> 59
 <211> 112
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Humanized antibody, 1G1-h70 VL amino acids

<400> 59
 Asp Ile Val Met Thr Gln Thr Pro Leu Ser Leu Ser Val Thr Pro Gly
 1 5 10 15
 Gln Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Asn Ile Val His Ser
 20 25 30
 Gln Gly Asp Thr Tyr Leu Glu Trp Tyr Leu Gln Lys Pro Gly Gln Ser
 35 40 45
 Pro Gln Leu Leu Ile Tyr Lys Val Ser Lys Arg Phe Ser Gly Val Pro
 50 55 60
 Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
 65 70 75 80
 Ser Arg Val Glu Ala Glu Asp Val Gly Val Tyr Tyr Cys Phe Gln Gly
 85 90 95

Ser His Val Pro Trp Thr Phe Gly Gly Gly Thr Lys Val Glu Ile Lys
100 105 110

<210> 60
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> LCDR1 amino acids

<400> 60
Arg Ser Ser Gln Asn Ile Val His Ser Gln Gly Asp Thr Tyr Leu Glu
1 5 10 15

<210> 61
<211> 48
<212> DNA
<213> Artificial Sequence

<220>
<223> LCDR1 nucleotides

<400> 61
agaagcagcc agaacatcgt gcacagccag ggcgacacct acctggaa 48

<210> 62
<211> 288
<212> PRT
<213> Artificial Sequence

<220>
<223> Human PD-1 protein, full amino acids

<400> 62
Met Gln Ile Pro Gln Ala Pro Trp Pro Val Val Trp Ala Val Leu Gln
1 5 10 15

Leu Gly Trp Arg Pro Gly Trp Phe Leu Asp Ser Pro Asp Arg Pro Trp

20					25					30					
Asn	Pro	Pro	Thr	Phe	Ser	Pro	Ala	Leu	Leu	Val	Val	Thr	Glu	Gly	Asp
		35					40					45			
Asn	Ala	Thr	Phe	Thr	Cys	Ser	Phe	Ser	Asn	Thr	Ser	Glu	Ser	Phe	Val
	50					55					60				
Leu	Asn	Trp	Tyr	Arg	Met	Ser	Pro	Ser	Asn	Gln	Thr	Asp	Lys	Leu	Ala
	65					70					75				80
Ala	Phe	Pro	Glu	Asp	Arg	Ser	Gln	Pro	Gly	Gln	Asp	Cys	Arg	Phe	Arg
				85					90					95	
Val	Thr	Gln	Leu	Pro	Asn	Gly	Arg	Asp	Phe	His	Met	Ser	Val	Val	Arg
			100					105					110		
Ala	Arg	Arg	Asn	Asp	Ser	Gly	Thr	Tyr	Leu	Cys	Gly	Ala	Ile	Ser	Leu
			115				120					125			
Ala	Pro	Lys	Ala	Gln	Ile	Lys	Glu	Ser	Leu	Arg	Ala	Glu	Leu	Arg	Val
	130					135					140				
Thr	Glu	Arg	Arg	Ala	Glu	Val	Pro	Thr	Ala	His	Pro	Ser	Pro	Ser	Pro
	145					150					155				160
Arg	Pro	Ala	Gly	Gln	Phe	Gln	Thr	Leu	Val	Val	Gly	Val	Val	Gly	Gly
				165					170					175	
Leu	Leu	Gly	Ser	Leu	Val	Leu	Leu	Val	Trp	Val	Leu	Ala	Val	Ile	Cys
			180					185					190		
Ser	Arg	Ala	Ala	Arg	Gly	Thr	Ile	Gly	Ala	Arg	Arg	Thr	Gly	Gln	Pro
		195					200					205			
Leu	Lys	Glu	Asp	Pro	Ser	Ala	Val	Pro	Val	Phe	Ser	Val	Asp	Tyr	Gly
	210					215					220				
Glu	Leu	Asp	Phe	Gln	Trp	Arg	Glu	Lys	Thr	Pro	Glu	Pro	Pro	Val	Pro
	225					230					235				240
Cys	Val	Pro	Glu	Gln	Thr	Glu	Tyr	Ala	Thr	Ile	Val	Phe	Pro	Ser	Gly
				245					250					255	
Met	Gly	Thr	Ser	Ser	Pro	Ala	Arg	Arg	Gly	Ser	Ala	Asp	Gly	Pro	Arg
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