

SEQUENCE LISTING

<110> FRED HUTCHINSON CANCER RESEARCH CENTER

<120> COMPOSITIONS AND METHODS TO PROGRAM THERAPEUTIC CELLS

<130> F053-0046PCT

<150> US 62/442,890

<151> 2017-01-05

<150> US 62/322,581

<151> 2016-04-14

<160> 57

<170> PatentIn version 3.5

<210> 1

<211> 887

<212> PRT

<213> Artificial Sequence

<220>

<223> megaTAL protein specific for TCRalpha

<400> 1

Met Gly Ser Cys Arg Tyr Pro Tyr Asp Val Pro Asp Tyr Ala Pro Pro
1 5 10 15

Lys Lys Lys Arg Lys Val Val Asp Leu Arg Thr Leu Gly Tyr Ser Gln
20 25 30

Gln Gln Gln Glu Lys Ile Lys Pro Lys Val Arg Ser Thr Val Ala Gln
35 40 45

His His Glu Ala Leu Val Gly His Gly Phe Thr His Ala His Ile Val
50 55 60

Ala Leu Ser Gln His Pro Ala Ala Leu Gly Thr Val Ala Val Thr Tyr
65 70 75 80

Gln His Ile Ile Thr Ala Leu Pro Glu Ala Thr His Glu Asp Ile Val
85 90 95

Gly Val Gly Lys Gln Trp Ser Gly Ala Arg Ala Leu Glu Ala Leu Leu
100 105 110

Thr Asp Ala Gly Glu Leu Arg Gly Pro Pro Leu Gln Leu Asp Thr Gly
115 120 125

Gln Leu Val Lys Ile Ala Lys Arg Gly Gly Val Thr Ala Met Glu Ala
130 135 140

Val His Ala Ser Arg Asn Ala Leu Thr Gly Ala Pro Leu Asn Leu Thr
145 150 155 160

Pro Asp Gln Val Val Ala Ile Ala Ser Asn Ile Gly Gly Lys Gln Ala
165 170 175

Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Asp His Gly
180 185 190

Leu Thr Pro Asp Gln Val Val Ala Ile Ala Ser Asn Ile Gly Gly Lys
195 200 205

Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Asp
210 215 220

His Gly Leu Thr Pro Asp Gln Val Val Ala Ile Ala Ser Asn Ile Gly
225 230 235 240

Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys
245 250 255

Gln Asp His Gly Leu Thr Pro Asp Gln Val Val Ala Ile Ala Ser Asn
260 265 270

Gly Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val
275 280 285

Leu Cys Gln Asp His Gly Leu Thr Pro Asp Gln Val Val Ala Ile Ala
290 295 300

Ser His Asp Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg Leu Leu
305 310 315 320

Pro Val Leu Cys Gln Asp His Gly Leu Thr Pro Asp Gln Val Val Ala
325 330 335

Ile Ala Ser His Asp Gly Gly Lys Gln Ala Leu Glu Thr Val Gln Arg
340 345 350

Leu Leu Pro Val Leu Cys Gln Asp His Gly Leu Thr Pro Asp Gln Val
355 360 365

Val Ala Ile Ala Ser Asn Ile Gly Gly Lys Gln Ala Leu Glu Thr Val
370 375 380

Gln Arg Leu Leu Pro Val Leu Cys Gln Asp His Gly Leu Thr Pro Asp
385 390 395 400

Gln Val Val Ala Ile Ala Ser Asn Asn Gly Gly Lys Gln Ala Leu Glu
405 410 415

Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Asp His Gly Leu Thr
420 425 430

Pro Asp Gln Val Val Ala Ile Ala Ser Asn Gly Gly Gly Lys Gln Ala
435 440 445

Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Asp His Gly
450 455 460

Leu Thr Pro Asp Gln Val Val Ala Ile Ala Ser Asn Asn Gly Gly Lys
465 470 475 480

Gln Ala Leu Glu Thr Val Gln Arg Leu Leu Pro Val Leu Cys Gln Asp
485 490 495

His Gly Leu Thr Pro Asp Gln Val Val Ala Ile Ala Ser Asn Ile Gly
500 505 510

Gly Lys Gln Ala Leu Glu Ser Ile Val Ala Gln Leu Ser Arg Pro Asp
515 520 525

Pro Ala Leu Ala Ala Leu Thr Asn Asp His Leu Val Ala Leu Ala Cys
530 535 540

Leu Gly Gly Arg Pro Ala Met Asp Ala Val Lys Lys Gly Leu Pro His

545 550 555 560

Ala Pro Glu Leu Ile Arg Arg Val Asn Arg Arg Ile Gly Glu Arg Thr
 565 570 575

Ser His Arg Val Ala Ile Ser Arg Val Gly Gly Ser Ser Arg Arg Glu
 580 585 590

Ser Ile Asn Pro Trp Ile Leu Thr Gly Phe Ala Asp Ala Glu Gly Ser
 595 600 605

Phe Ile Leu Asp Ile Arg Asn Arg Asn Asn Glu Ser Asn Arg Tyr Arg
 610 615 620

Thr Ser Leu Arg Phe Gln Ile Thr Leu His Asn Lys Asp Lys Ser Ile
625 630 635 640

Leu Glu Asn Ile Gln Ser Thr Trp Lys Val Gly Lys Ile Thr Asn Ser
 645 650 655

Gly Asp Arg Ala Val Met Leu Arg Val Thr Arg Phe Glu Asp Leu Lys
 660 665 670

Val Ile Ile Asp His Phe Glu Lys Tyr Pro Leu Ile Thr Gln Lys Leu
 675 680 685

Gly Asp Tyr Lys Leu Phe Lys Gln Ala Phe Ser Val Met Glu Asn Lys
 690 695 700

Glu His Leu Lys Glu Asn Gly Ile Lys Glu Leu Val Arg Ile Lys Ala
705 710 715 720

Lys Met Asn Trp Gly Leu Thr Asp Glu Leu Lys Lys Ala Phe Pro Glu
 725 730 735

Asn Ile Ser Lys Glu Arg Pro Leu Ile Asn Lys Asn Ile Pro Asn Phe
 740 745 750

Lys Trp Leu Ala Gly Phe Thr Ser Gly Asp Gly Tyr Phe Gly Val Asn
 755 760 765

Leu Lys Lys Val Lys Gly Asn Ala Lys Val Tyr Val Gly Leu Arg Phe
770 775 780

Ser Ile Ser Gln His Ile Arg Asp Lys Asn Leu Met Asn Ser Leu Ile
785 790 795 800

Thr Tyr Leu Gly Cys Gly Ser Ile Trp Glu Lys Asn Lys Ser Glu Phe
805 810 815

Ser Trp Leu Glu Phe Val Val Thr Lys Phe Ser Asp Ile Asn Asp Lys
820 825 830

Ile Ile Pro Val Phe Gln Glu Asn Thr Leu Ile Gly Val Lys Leu Glu
835 840 845

Asp Phe Glu Asp Trp Cys Lys Val Ala Lys Leu Ile Glu Glu Lys Lys
850 855 860

His Leu Thr Glu Ser Gly Leu Asp Glu Ile Lys Lys Ile Lys Leu Asn
865 870 875 880

Met Asn Lys Gly Arg Val Phe
885

<210> 2
<211> 2464
<212> DNA
<213> Homo sapiens

<400> 2
actctaaaac gagaagtaca agtgagtcc cccaaggggt cggccgcgcc tcttctgtc 60
cccgccctgc cggctgcccc aggccagtgg agtggcagcc ccagaactgg gaccaccggg 120
ggtggtgagg cggcccggca ctgggagctg catctgaggc ttagtcctg agctctctgc 180
ctgcccagac tagctgcacc tctcattcc ctgcgcccc tctctctcg gaagcccca 240
ggatggtgag gtggtttcac cgagacctca gtgggctgga tgcagagacc ctgctcaagg 300
gccgaggtgt ccacggtagc ttcctggctc ggcccagtcg caagaaccag ggtgactct 360
cgctctccgt cagggtgggg gatcaggtga cccatattcg gatccagaac tcaggggatt 420
tctatgacct gtatggaggg gagaagttg cgactctgac agagctggtg gagtactaca 480
ctcagcagca ggggtgtcctg caggaccgcg acggcaccat catccacctc aagtaccgc 540

tgaactgctc cgatcccact agtgagaggt ggtaccatgg ccacatgtct ggccgggcagg 600
 cagagacgct gctgcaggcc aagggcgagc cctggacgtt tcttgctcgt gagagcctca 660
 gccagcctgg agacttcgtg cttctgtgc tcagtgaacca gccaaggct ggcccaggct 720
 ccccgctcag ggtcacccac atcaaggta tgtgcgaggg tggacgtac acagtgggtg 780
 gtttgagac cttcgacagc ctcacggacc tggaggagca tttcaagaag acggggattg 840
 aggaggcctc agggccttt gtctacctgc ggcagccgta ctatgccacg agggatgaatg 900
 cggtgacat tgagaaccga gtgttgaac tgaacaaga gcaggagtcc gaggatacag 960
 ccaaggctgg cttctgggag gagtttga gttgcagaa gcaggaggtg aagaactgc 1020
 accagcgtct ggaagggcag cggccagaga acaagggcaa gaaccgtac aagaacattc 1080
 tccccttga ccacagccga gtgacctgc agggacggga cagtaacatc cccgggtccg 1140
 actacatcaa tgccaactac atcaagaacc agctgctagg ccctgatgag aacgctaaga 1200
 cctacatgc cagccagggc tgtctggagg ccacggtaa tgacttctgg cagatggcgt 1260
 ggcaggagaa cagccgtgc atcgtcatga ccaccgaga ggtggagaaa ggccggaaca 1320
 aatgcgtccc atactggccc gaggtgggca tgcagcgtgc ttatgggccc tactctgtga 1380
 ccaactgcgg ggagcatgac acaaccgaat acaaactccg taccttacag gtctccccgc 1440
 tggacaatgg agacctgatt cgggagatct ggcattacca gtacctgagc tggcccgacc 1500
 atggggctcc cagtgagcct ggggggtgcc tcagcttct ggaccagatc aaccagcggc 1560
 aggaaagtct gcctcacga gggcccatca tcgtgcaactg cagcgccggc atcgcccgca 1620
 caggcaccat cattgtcatc gacatgtca tggagaacat ctccaccaag ggcctggact 1680
 gtgacattga catccagaag accatccaga tggcggggc gcagcgctcg ggcattggtc 1740
 agacggaggc gcagtacaag ttcatctacg tggccatgc ccagttcatt gaaaccacta 1800
 agaagaagct ggaggtcctg cagtcgcaga agggccagga gtcggagtac gggaacatca 1860
 cctatcccc agccatgaag aatgcccatg ccaaggcctc ccgcacctcg tccaagagct 1920
 tggagtctag tgcagggacc gtggctcgt cacctgtgag acgggggtggc cagaggggac 1980
 tgccagtgcc ggggtcccct gtgctgtctc ctgacctga ccaactgcct gtacttcccc 2040
 ccctgcaccc ggctgcagac acaaggagga tgtgtatgag aacctgcaca ctaagaacaa 2100
 gagggaggag aaagtgaaga agcagcggtc agcagacaag gagaagagca agggttccct 2160

caagaggaag tgagcgggtgc tgcctcagg tggccatgcc tcagccctga ccctgtggaa 2220
 gcatttcgcg atggacagac tcacaacctg aacctaggag tgccccattc ttttgaatt 2280
 taaatggctg catccccccc acctctcct gacctgtat atagcccagc caggccccag 2340
 gcagggccaa cccttctct cttgtaaata aagccctggg atcactgtga aaaaaaaaaa 2400
 aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 2460
 aaaa 2464

<210> 3
 <211> 867
 <212> DNA
 <213> Homo sapiens

<400> 3
 atgcagatcc cacaggcgcc ctggccagtc gtctgggcgg tgctacaact gggctggcgg 60
 ccaggatggg tcttagactc cccagacagg ccctggaacc cccccacctt ctccccagcc 120
 ctgctcgtgg tgaccgaagg ggacaacgcc accttcacct gcagcttctc caacacatcg 180
 gagagcttcg tgctaaactg gtaccgatg agccccagca accagacgga caagctggcc 240
 gccttccccg aggaccgcag ccagcccggc caggactgcc gcttcctgtg cacacaactg 300
 cccaacgggc gtgacttcca catgagcgtg gtcagggccc ggcgcaatga cagcggcacc 360
 tacctctgtg gggccatctc cctggcccc aaggcgaga tcaaagagag cctgcgggca 420
 gagctcaggg tgacagagag aagggcagaa gtgccacag cccaccccag ccctcacc 480
 aggccagccg gccagttcca aacctggtg gttggtgtcg tggcggcct gctgggcagc 540
 ctggtgctgc tagtctgggt cctggccgtc atctgctccc gggccgcacg agggacaata 600
 ggagccaggc gcaccggcca gccctgaag gaggaccct cagccgtgcc tgtgttctct 660
 gtggactatg gggagctgga ttccagtgg cgagagaaga ccccgagcc cccgtgccc 720
 tgtgtccctg agcagacgga gtatgccacc attgtcttc ctacggaat gggcacctca 780
 tccccgcc gcaggggctc agctgacggc cctcgagtg cccagccact gaggcctgag 840
 gatggacact gctcttgcc cctctga 867

<210> 4
 <211> 420
 <212> DNA
 <213> Homo sapiens

<400> 4

atgacatcca ttcgagctgt atttatattc ctgtggctgc agctggactt ggtgaatgga 60
gagaatgtgg agcagcatcc ttcaaccctg agtgtccagg agggagacag cgctgttatac 120
aagtgtactt attcagacag tgcctcaaac tacttccctt ggtataagca agaacttgga 180
aaaagacctc agcttattat agacattcgt tcaaatgtgg gcgaaaagaa agaccaacga 240
attgctgtta cattgaacaa gacagccaaa catttctccc tgcacatcac agagacccaa 300
cctgaagact cggctgtcta cttctgtgca gcaagtagga aggactctgg ggggtaccag 360
aaagttacct ttggaactgg aacaaagctc caagtcaccc caaatatcca gaaccctgac 420

<210> 5

<211> 1027

<212> DNA

<213> Homo sapiens

<400> 5

ttggattatc aagtgtcaag tccaatctat gacatcaatt attatacatc ggagccctgc 60
caaaaaatca atgtgaagca aatcgagacc cgctcctgc ctccgctcta ctactgggtg 120
ttcatctttg gttttgtggg caacatgctg gtcactctca tcctgataaa ctgcaaaagg 180
ctgaagagca tgactgacat ctacctgctc aacctggcca tctctgacct gttttcctt 240
cttactgtcc cttctgggc tcatatgct gccgccagc gggactttgg aaatacaatg 300
tgtcaactct tgacagggtc ctattttata ggcttctct ctggaatctt cttcatcatc 360
ctctgacaa tcgataggtg cctggctgct gtccatgctg tgtttgcttt aaaagccagg 420
acggtcacct ttgggggtgt gacaagtgtg atcactggg tggtggctgt gtttgcgtct 480
ctcccaggaa tcacttttac cagatctcaa aaagaaggc tcattacac ctgcagctct 540
catttccat acattaaaga tagtcatctt ggggctggc ctgccgctgc ttgtcatggt 600
catctgctac tcgggaatcc taaaaactct gcttcggtgt cgaaatgaga agaagaggca 660
cagggtgtg aggcttatct tcaccatcat gattgtttat ttctcttct gggctcccta 720
caacattgtc cttctcctga acacctcca ggaattctt ggctgaata attgcagtag 780
cttaacagg ttggaccaag ctatgcagg gacagagact cttgggatga cgactgctg 840
catcaacccc atcatctatg ctttgcgg ggagaagtc agaaactacc tcttagtctt 900
ctccaaaag cacattgcca aacgttctg caaatgctgt tctatttcc agcaagaggc 960
tcccagcga gcaagctcag ttacacccg atccactggg gagcaggaaa tatctgtggg 1020

<210> 6

<211> 1912

<212> DNA

<213> Homo sapiens

<400> 6

tttttttct tccctctagt gggcggggca gaggagttag ccaagatgtg actttgaaac 60
cctcagcgtc tcagtgccct tttgttctaa acaaagaatt ttgtaattgg ttctaccaa 120
gaaggatata atgaagtcac tatgggaaaa gatggggagg agagtgtag gattctacat 180
taattctctt gtgcccttag ccactactt cagaatttc tgaagaaagc aagcctgaat 240
tggttttta aattgctta aaaattttt ttaactgggt taatgctgc tgaattggaa 300
gtgaatgtcc attcctttgc ctcttttga gatatact tcagataact acaccgagga 360
aatgggctca ggggactatg actccatgaa ggaaccctgt ttccgtgaag aaaatgctaa 420
tttaataaa atcttctgc ccaccatcta ctccatcatc ttcttaactg gcattgtggg 480
caatggattg gtcacctgg tcattgggta ccagaagaaa ctgagaagca tgacggacaa 540
gtacaggctg cacctgtcag tggccgacct cctctttgc atcacgctc ccttctgggc 600
agttgatgcc gtggcaaact ggtactttgg gaacttcta tgcaaggcag tccatgtcat 660
ctacacagtc aacctctaca gcagtgtcct catcctggcc tcatcagtc tggaccgcta 720
cctggccatc gtccacgcca ccaacagtca gaggccaagg aagctgttgg ctgaaaagg 780
ggcttatgtt ggcgtctgga tccctgccct cctgctgact attcccgaact tcattcttgc 840
caacgtcagt gaggcagatg acagatatat ctgtgaccgc ttctaccca atgacttgtg 900
gggtggtgtg ttccagttc agcacatcat ggttggcctt atcctgcctg gtattgtcat 960
cctgtcctgc tattgcatta tcattccaa gctgtcacac tccaagggcc accagaagcg 1020
caaggccctc aagaccacag tcattctcat cctggcttgc ttgcctgtt ggctgcctta 1080
ctacattggg atcagcatcg actcctcat cctcctggaa atcatcaagc aagggtgtga 1140
gtttgagaac actgtgcaca agtggattc catcaccgag gccctagctt tctccactg 1200
ttgtctgaac cccatcctct atgcttctt tggagccaaa tttaaacct ctgccagca 1260
cgcactcacc tctgtgagca gagggtccag cctcaagatc ctctcaaag gaaagcgagg 1320
tggaattca tctgttcca ctgagtctga gtcttcaagt ttactcca gctaacacag 1380

atgtaaaaga cttttttta tacgataaat aactttttt taagttacac atttttcaga 1440
 tataaaagac tgaccaatat tgtacagttt ttattgcttg ttggattttt gtcttgtgtt 1500
 tcttttagttt ttgtgaagtt taattgactt atttatataa atttttttg ttcatattg 1560
 atgtgtgtct aggaggacc tgggccaag ttcttagtg ctgtatgtct cgtgtagga 1620
 ctgtagaaaa gggaactgaa cattccagag cgtgtagtga atcacgtaa gctagaaatg 1680
 atccccagct gtttatgcat agataatctc tccattcccg tggaacgttt ttcctgttct 1740
 taagacgtga ttttctgta gaagatggca cttataacca aagcccaaag tggtatagaa 1800
 atgctgggtt ttcagttttc aggagtgggt tgatttcagc acctacagtg tacagtcttg 1860
 tattaagttg ttaataaaag tacatgttaa acttaaaaaa aaaaaaaaaa aa 1912

<210> 7
 <211> 2413
 <212> DNA
 <213> Homo sapiens

<400> 7
 ttccgtcctt ccgtccgcgg ccctgtcagc tggagcgcgg cgcaggctct gccccggccc 60
 ggcggtcttg gccggccgtc cagtccgtgc ggcggaaccc gaggagcctc gatgtggatg 120
 gccccgcgaa gttaagtctt gggtctgcgc ttccactccg ccgcgccttc ctcccagttt 180
 ccgtccgtc gccgcaccgg ctctgttccc ccaaattctg gaccgtccct tcgcgcccc 240
 tcccgtccg cccccagtgc tgcgttctcc cctcttggc tctctgcgg ctgggggagg 300
 ggcgggggtc accatggccg aggcgctca ggtggtggag atcgaccgg acttcgagcc 360
 gctgccccgg ccgcgtcgt gcacctggcc gctgcccagg ccggagtta gccagtcaa 420
 ctcgccacc tccagcccgg cgcgtcggg cagcgcggct gccaaacccg acgccgcggc 480
 gggcctgcc tcggcctcgg ctgccgtgt cagcgccgac ttcatgagca acctgagctt 540
 gctggaggag agcgaggact tccgcaggc gcccggtcc gtggcgcgcg cgtggcggc 600
 ggcgccgcc gcggccgcca ccgggggggt gtgcggggac ttccagggcc cggaggcggg 660
 ctgctgcac ccagcgccac cgcagcccc gccgcccggg ccgtgtcgc agcaccgcc 720
 ggtgcccc gccgcgctg ggccgtcgc ggggcagccg cgcaagagca gctcgtccg 780
 ccgcaacgc tggggcaacc tgtctacgc cgacctatc accaaggcca tcgagagctc 840
 ggcggagaag cggtcacgc gtctgcagat ctacagtgg atggtcaaga gcgtgccta 900

ctcaaggat aagggtgaca gcaacagctc ggccggctgg aagaattcaa ttcgtcataa 960
 tctgtcccta cacagcaagt tcattcgtgt gcagaatgaa ggaactggaa aaagtcttg 1020
 gtggatgctc aatccagagg gtggcaagag cgggaaatct cctaggagaa gagctgcatc 1080
 catggacaac aacagtaaat ttgctaagag ccgaagccga gctgccaaga agaaagcatc 1140
 tctccagtct ggccaggagg gtgctgggga cagccctgga tcacagtttt ccaaatggcc 1200
 tgcaagccct ggctctcaca gcaatgatga ctttgataac tggagtacat ttcgccctcg 1260
 aactagctca aatgctagta ctattagtg gagactctca cccattatga ccgaacagga 1320
 tgatcttga gaaggggatg tgcattctat ggtgtaccg ccatctgccg caaagatggc 1380
 ctctacttta cccagtctgt ctgagataag caatcccgaa aacatggaaa atcttttga 1440
 taatctcaac cttctctcat caccaacatc attaatgtt tcgaccagt cctcacctgg 1500
 caccatgatg cagcagacgc cgtgctactc gtttgcgcca ccaaacacca gttgaattc 1560
 acccagccca aactacaaa aatatacata tggccaatcc agcatgagcc ctttgcccca 1620
 gatgcctata caaacacttc aggacaataa gtcgagttat ggaggtatga gtcagtataa 1680
 ctgtgcgcct ggactcttga aggagttgct gacttctgac tctctcccc ataatgacat 1740
 tatgacacca gttgatcctg gggtagccca gcccaacagc cgggttctgg gccagaacgt 1800
 catgatgggc cctaattcgg tcattgcaac ctatggcagc caggcatctc ataacaaaat 1860
 gatgaatccc agctcccata cccacctgg acatgctcag cagacatctg cagttaacgg 1920
 gcgtccctg cccacacagg taagcaccat gcccacacc tcgggtatga accgcctgac 1980
 ccaagtgaag acacctgtac aagtgcctct gccccacccc atgcagatga gtgccctggg 2040
 gggctactcc tccgtgagca gctgcaatgg ctatggcaga atgggccttc tccaccagga 2100
 gaagctccca agtgacttg atggcatgtt cattgagcgc ttagactgtg acatggaatc 2160
 catcattcgg aatgacctca tggatggaga tacattggat tttaacttg acaatgtgtt 2220
 gcccaaccaa agctcccac acagtgtcaa gacaacgaca catagctggg tgcaggctg 2280
 agggtagtg agcaggttac acttaaaagt acttcagatt gtctgacagc aggaactgag 2340
 agaagcagtc caaagatgtc ttccaccaac tcccttttag tttctcggt taaaaaaaaa 2400
 aaaaaaaaaaaa aaa 2413

<211> 3286
<212> DNA
<213> Homo sapiens

<400> 8

```
gcgtgtcggg cgcggaaggg ggaggcggcc gggggcgccc gcgagtgagg cgcggggcgg    60
cgaagggagc gcgggtggcg gcacttctg ccgcggcctt ggatgggctg ggccccctc    120
gccgtccgc ctctccaca cgcgcgcgcg ccgcggcgag ggggacgcgc cgccggggc    180
ccggcacctt cgggaacccc ccggcccgga gcctgcggcc tgcgccctt cggccgccgg    240
gagccccgtg gagccccgc cgccgcggc ccccgcgac cggacgtga gggcactcgg    300
ggcggggcgc gcctcgggc agacgttgc ggggaggggg gcgcctgccg ggccccggcg    360
accaccttg gggtcgcggg ccggctcggg gggcgcccag tcggggcctt cgcgggcgcc    420
gggcagcgac cagccctgag cggagctgtt ggccgcggcg ggaggcctcc cggaccccc    480
cagcccccg aacgctcgc cgggccggcg ggagtcggcg cccccggga ggtccgctcg    540
gtcgtccgc gcggagcgtt tgctcctggg acaggcggtg ggaccggggc gtcgccggag    600
acgccccag cgaagtggg ctctccaggt gtgggggtcc ggggggtag cgacgtcgcg    660
gacccggcct gtgggatggg cggcccggag aagactgcgc tcggccgtgt tcatactgt    720
ccgtgggcct gaggtccccg gaggatgacc tagcactgaa aagccccggc cggcctcccc    780
agggtccccg aggacgaagt tgacctgac cgggccgtct ccagttctg aggcccgggt    840
cccactggaa ctgcgtctg agccgccgc ccggaccccc ggtgcccgc ggtccgcaga    900
ccctgcaccg ggcttgact cgcagccggg actgacgtgt agaacaatcg tttctgttg    960
aagaagggtt ttcccttcc tttgggggtt tttgtgcct tttttttc tttttctt    1020
gtaaaattt ggagaaggga agtcggaaca caaggaagga ccgctcacc gcggactcag    1080
ggctggcggc gggactccag gacctgggt ccagcatgga ggtgggtggac ccgcagcagc    1140
tgggcatgtt cacggagggc gagctgatgt cggtaggtat ggacacgtt atccaccgca    1200
tcgactccac cgaggtcacc taccagccgc gccgcaagcg ggccaagctc atcggaagt    1260
acctgatggg ggacctgctg ggggaaggct cttacggcaa ggtgaaggag gtgctggact    1320
cggagacgct gtgcaggagg gccgtcaaga tcctcaaga gaagaagtg cgaaggatcc    1380
ccaacgggga ggccaacgtg aagaaggaaa ttcaactact gaggaggta cggcacaaaa    1440
atgtcatcca gctggtggat gtgtataca acgaagagaa gcagaaaatg tatatgtga    1500
```

tggagtactg cgtgtgtggc atgcaggaaa tgctggacag cgtgccggag aagcgtttcc 1560
 cagtgtgcca ggcccacggg tacttctgtc agctgattga cggcctggag tacctgcata 1620
 gccagggcat tgtgcacaag gacatcaagc cggggaacct gctgctcacc accggtggca 1680
 ccctcaaat ctccgacctg ggcgtggccg aggcactgca cccgttcgcg gcggacgaca 1740
 cctgccggac cagccagggc tccccggctt tccagccgcc cgagattgcc aacggcctgg 1800
 acaccttctc cggttcaag gtggacatct ggtcggctgg ggtcacctc tacaacatca 1860
 ccacgggtct gtacccctc gaaggggaca acatctaaa gttgtttgag aacatcggga 1920
 aggggagcta cgccatccc ggcgactgtg gcccccgct ctctgacctg ctgaaaggga 1980
 tgcttgagta cgaaccggcc aagaggttct ccatccggca gatccggcag cacagctggt 2040
 tccggaagaa acatctccg gctgaagcac cagtgccat cccaccgagc ccagacacca 2100
 aggaccggtg gcgcagcatg actgtggtgc cgtacttga ggacctgcac ggcgcgacg 2160
 aggacgagga cctcttcgac atcgaggatg acatcatcta cactcaggac ttcacggtgc 2220
 ccggacaggt ccagaagag gaggccagtc acaatggaca gcgccggggc ctcccaagg 2280
 ccgtgtgtat gaacggcaca gaggcggcgc agctgagcac caaatccagg gcggagggcc 2340
 gggccccc aa cctgcccgc aaggcctgct ccgccagcag caagatccgc cgctgtcgg 2400
 cctgcaagca gcagtgaggc tggccgctg cagcccgtgt ccaggagccc cgccaggtgc 2460
 ccgcgccagg ccctcagtct tctgcccgt tcccccgcc ctccggaga ggtggccgc 2520
 atgtttctgt gccgaccaag ccccaggacc tccggagcgc cctgcagggc cgggcagggg 2580
 gacagcaggg accgggcgca gccctcccc ctcggccgcc cggcagtga cgcggttgt 2640
 tgacttcga gccccgggcg gagccttccc gggcgggcgt gggaggaggg aggcggcctc 2700
 catgcacttt atgtggagac tactggcccc gcccgtggcc tcgtgctccg cagggcgccc 2760
 agcgccgtcc ggcgccccg ccgcagacca gctggcgggt gtggagacca ggctcctgac 2820
 cccccatgc atgcagcgc acctggaagc cgcgcggccg ctttggttt ttgtttggtt 2880
 ggttccattt tcttttttc tttttttt taagaaaaa taaaagggtg atttgagctg 2940
 tggctgtgag ggggttttg gagctgtggt gtggcagggg ggctgtgggg tcgggctcac 3000
 gtcgcggccg ctttgcgct ctcgggtcac cctgctttg cgccccgcc ggagggcagg 3060
 accctacct ctccccaag gccactgcgc tcttgggacc ccagagaaaa cccggagcaa 3120
 gcaggagtgt gcggtcaata tttatatcat ccagaaaaga aaaacacgag aaacgccatc 3180

gcgggatggt gcagacgcgg cggggactcg gagggcgccg tgcgggcgag gccgccc aaa 3240

tttggcaata aataaagctt gggaagcttg gacctgaaaa aaaaaa 3286

<210> 9

<211> 6767

<212> DNA

<213> Homo sapiens

<400> 9

aagtttcaa gtggtcaact tgaccgatgc tttggcaatt gaaaaagggc agaaaggcgc 60

gggctagtgg gtggatgggg acaaagatct aagtcacctt cttccagcgt gtgagcctgg 120

gaggaggggtg ggggtcctga ggagcaagag gtacgaggaa ggaaaaggag agggcttctg 180

ggttagtttc cacctctgc ttccaactc acggcgcttt cttccggaa aggacgtgg 240

attcagggcg cgccagtacg cgcagtagcg gcccgcgagt cggcaggtgg gtagccccgg 300

cgcgggagga aggggaagtt accttcccct cggaagaggg cgctggctcc cccatctgc 360

ctttataata aggccaccgg aggagaggaa gcagccagct gccgtctgcg ctttgcaaag 420

catgcagtta ggggagcagc tcttggtgag ctcaagtgaac ctgcctggcg cgacttcta 480

cccgtggag agtgcgcgag gcggcagcgg cgggagcgct ggccacctcc ccagcgcggc 540

cccctctct cagaagtgg acttagacaa agcgtccaag aagttttccg gcagtctctc 600

ctgcgaggcg gtgagcgggg agcccgcagc cgccagcgca ggggccccg cgccatgct 660

tagtgacacc gacgccgggg acgcatttgc cagcgctgcg gcagtggcca agccggggcc 720

cccggacggc cgcaagggt cccctgcgg ggaggaggag ctgccctccg ccgctgcagc 780

cgccgccgcc gccgccgcc cggtgcggc cactgcgcgc tactcatgg acagcctgag 840

ctccgagcgg tactacctcc agtcccccg tctcagggg tcggagctgg ctgcgcctg 900

ctcactcttc ccgtaccagg cggcggtgg ggcgccccac ggacctgtgt acccggtcc 960

taacggggcg cgctaccct acggctccat gctgcccccc ggcggttcc ccgcggtgt 1020

gtgcccaccc gggagggcgc agttcgcccc aggagccggt gcgggcagtg gcgcgggcgg 1080

tagcagcggc gggggcggcg gcccgggcac ctatcagtac agccaggggg ctccgtcta 1140

cgggccgtac cctggagccg cagcggcggg atcttgcgga ggactggggg gcctgggggt 1200

tccaggttct ggcttccgtg cccacgtcta cctgtgcaac cggcctctgt ggctcaaatt 1260

ccaccgccac caaactgaga tgatcattac gaaacagggc aggtgagcgc agcgtggagg 1320

ggcccctggg ttcggggata aagggtgacg tgtgtcctg gggaaagtcc gggatgaggg 1380
agctgaaccc agttgttccg cgcgggtgctt agagtgttc accgcgcgca ataaatctcc 1440
gtagacaccg catctccaat gcggtgtccc tctgtgtcag tgccccggcg gctcttgag 1500
ggtgccaatg ttacggctgt acaccgctt tcctcccat catctcacc tgaacagacc 1560
tggaggaggc ggaaatggaa attagggcat gtccacaagc tggattcgtt agatcctct 1620
gctcggcggg atgcttgtgc atgctgcat gccggcaagg agccacggat agggaaggct 1680
caagagctgg ccacctgagc gcagtagatg ggctcccga gttttaggcg ccagggtctc 1740
cacggggcgt ctccgggagg tgggcatgaa ggctagagcg ccggcctcgg aagctcggtc 1800
ggagtaggtg gttagatctg ccctggagcc agacctggct cgggttcggt gcgcgagaaa 1860
gttctgatat acatccaact gtaacactg gctactctg gggaaaggga ggggtgggtg 1920
ctgagagagg ggcactcaaa ggggactttt agcctaaagt tttaatatat attttaaca 1980
agaataacct aatattgttc tctggtactt ttcaaatgg tgcatttaa aattagtagt 2040
ttttaacatt ctaggagaaa aattttaaga gcgtctgaaa gggccgagaa tatgagcctt 2100
cggaagcacg cgcgaatttg gaatataccg atgtggggc aagcttttt tttttttt 2160
tttttttt tttttttt tttgaaaag acggaaagg tccaagagt gccaaactca 2220
aaatatatta catagtttca gaccactga tctaccagca ttctgtcac tgcaaacttt 2280
taaattgttt ccgacctat cccaggtgtc tggggaaccc gctggggcct gggcctgttc 2340
taggacatcc caattaaat cgattttct gattctatt cctgcacag gcgcatgttt 2400
cctttctga gcttcaacat aaacggactc aatccactg cccactaca tggttcgta 2460
gaggtgtgtc tggcggaccc caaccactgg cgctccagg ggggcaaag ggtgacctgt 2520
ggcaaagccg acaataacat gcagggtgag cagagaagag gctcgggccg gggaggaacg 2580
ggcgggaaga aatcgtaacc ctcgactcac acaactcaca tttaaatga gcacttttt 2640
ttccccttc cattctgagg cctagagggtg ttagtatgag tgtctttgag ttgctgttt 2700
gacggagagg agagtttct aagtcagatt tctgtctgc caatatgtag atatttagaa 2760
ccttaacta agacatcacc ccaccccca atccctacgt ttaacaaatc agtagcata 2820
agctctccag gtgggaaggc ctctgggat tctaattgtc acttgagaaa gccagccaa 2880
agtttagttc acccataaat atccaactgt ctccatcgg atgtgcctt tacagcttta 2940

gaaggcccca aattgacctt caagagtcac ctctgttag ctccgtttct aaattctgaa 3000
atgccattca ggggagtccc tagtgcaagg aaggttggaa gcacaggggc ctgggaggga 3060
tatggatgta gtcctgctgg tctccactgg cctctttaag caacttttac tgggagacca 3120
actgtaagtc tagctcttat atcttgctca tagctaagag acatccctcc gctttctcca 3180
ttgtaaaca gccctatatg ctgggtttt gtgtttgtt tcattttctc ttaggcaaca 3240
aaatgtatgt tcaccagag tctcctaata ctggttccca ctggatgaga caggagattt 3300
cattcgggaa attaaaactc accaataaca aaggcgcaaa taacaacaac acccaggtag 3360
agtgacagag caggagggga tatcttctgg ctttgactat aaggctttt tctaataaga 3420
gtccctactc ttttactgt atttataata ttgcatttg tgacctgtt gctcgcctat 3480
ttctaaccat tttgttctt ttgaccttc tcattctcac ttcttattg gatttcgata 3540
acagtgagtt gactattaag aacagaaata gcgaagtatt ttgggaattt aggaaaccaa 3600
gaggaaagca tatctatcac aaccacatac ccagctatga tttaaatttc aaaaaaaaag 3660
tgggggggca ataatgagac ctttaaactt gcaataaaca aagctgttag tgaggagcat 3720
ttagaagtcc aatacaaaaa tacataattt gtcaaaatct aattttgtg aaccactaag 3780
aggctttta gatttagcaa tttttctg tactcttcc agatgatagt cttacaatcc 3840
ttacacaaat accaaccctg actgcatatt gttgaagta cagaggatgg cgtggaggac 3900
ttgaatgagc cctcaaagac ccagactttt acctctcag aaacgcaatt cattgcagtg 3960
actgcctacc aaaacaccga tgtgagtgtc ccagacatct caagaatctc taaagctaag 4020
gtccagcatg ataaatcact caatgactgt ttttctccc tatctagatt actcaactaa 4080
agattgatca taacccttt gcaaaaggct tcagagacaa ctatgattcg taagtgcagc 4140
tttatccac acttgctga tcattctga gcaggacata catcaacagg cactttgctg 4200
ataatgtatt ttaggaagag cttttacctt tgggatttt acatatttt cttttccaa 4260
aatttttcc ttactaatc ttgctttaga ttttctcag aaagggttg ttaatttctg 4320
aagaaatgtt aaggacttaa aaatgaagag gtttttttag catttgagtg aagatttgaa 4380
attttaagaa tctgcattta tatatacctt tcttttcatt tgatccattt tttatcctc 4440
ccaagagcag atattattac tctccccac cccactttt tttttaaca taagaaaaaa 4500
ctgaaactaa gaggatgtaa tttcacaaca cgaaatagca aggcctgct cttttaaaa 4560
tctgagttt ctaccgccac agccagtgtt tttccatca cattgacaaa ggaggttga 4620

tctgagtttt tcgtgttcta ggactagtaa aggtagattt tctatagttt aaatacttga 4680
tgcctaggag gaaacttttt ctgcatggg gggaaatttt tccaataag ccaagagtc 4740
agctaaaaatg ggccagtga tctcctgcct ctgttcttc agcccaacag accagcactt 4800
tcggtgtaga taaccaacac aagccttttt catttctggg aggtgggttg ttggggaca 4860
acattagggt tttttttt tttaagtgt ttctcttat attgtagcat gtacaccgct 4920
tcagaaaatg acaggttaac tccatctccc acggattctc ctatgccca tcagattgtc 4980
cctggagggtc ggtacggcgt tcaatccttc ttcccgagc ctttgtcaa cactttacct 5040
caagcccgt attataatgg cgagagaacc gtgccacaga ccaacggcct ctttcaccc 5100
caacagagcg aagaggtggc caaccctccc cagcgtggc ttgtcacgcc tgtccagcaa 5160
cctgggacca acaaactaga catcagttcc tatgaatctg aatatacttc tagcacattg 5220
ctcccatatg gcattaaatc ctgcccctt cagacatccc atgccctggg gtattacca 5280
gaccaacct ttctgcaat ggcagggtgg ggaggtcgag gttctacca gaggaagatg 5340
gcagctggac taccatggac ctccagaaca agccccactg tgttctctga agatcagctc 5400
tccaaggaga aagtgaaga ggaaattggc tcttcttga tagagacacc ccctccatc 5460
aaatctctag attccaatga ttcaggagta tacaccagtg ctgtaaagcg aaggcggctg 5520
tctcctagca actccagtaa tgaattca ccctccataa agtgtgagga cattaatgct 5580
gaagagtata gtaaagacac ctcaaaggc atgggagggt attatgctt ttacacaact 5640
ccctaaagag ttattttaac ctcaaaaatt agctaactt ttgcagatgg acttggtggt 5700
gtttttgtt gtcttcttg ctaggttc caaaaagatg ttgccttc acctgatgc 5760
atcctgttt gtgcaattct ctaaaagaag gtgccaaagc ttttgattg ctgcaggtaa 5820
ctgaaacaaa ctagcattt taaaaaata agattaatgg aagactttaa ggtatttta 5880
aattcgaagg gtatccaagg ttctgtattt atttattggg gagacactaa ccctcaaag 5940
aagcaggctg tgaacattgg gtgccagtg ctatcagatg agttaaacc ttgattctc 6000
atttctattt gtaaattctt aagcaaatag aagccgagt ttaagggtt ttgcttctga 6060
aagagggtg tgccttcgt ttcagaagga gacatttgc tgttacattc tgccaggggc 6120
aaaagatact aggccagga gtcaagaaaa gctttgtga aagtgatagt ttacctgac 6180
ttgattcct taacccccg cttttggaac aagccatgtt tgcctagtc caggattgcc 6240

tcacttgaga cttgctaggc ctctgctgtg tgctggggtg gccagtggga ctcaggagag 6300
 agcaagctaa ggagtcacca aaaaaaaaaa aaaaaaaaag ggagaattta aaagtgtaca 6360
 gttgtgtgtt tagatacact atagaataat gtggtatata ttgtacaaat agtctacata 6420
 ggtgtctggg ataattgaaa actggtgctt tggctttgta aagaatttgc aaatcactta 6480
 acagctgcag gggcaagggg agagtttcat catcccatg atatttggga atattctgtt 6540
 tacttcttag atagttaaga atgtattcag ctactatgta ctaacttgaa ccgtgtttaa 6600
 ggaaaactcc tatttcatcc tcttcttgcg ccacccctc tccctaactt ggtaatgtga 6660
 agaaactaaa acctgatacc acagctccta taggcatttt agagatcttg gatttttatg 6720
 tacagtctta gtcattttta ataaatgtgg ttcagtaagg gaacgga 6767

<210> 10
 <211> 2471
 <212> DNA
 <213> Homo sapiens

<400> 10
 ggggacgaag ggaagctcca gcgtgtggcc ccggcgagtg cggataaaag ccgccccgcc 60
 gggctcgggc ttattctga gccgagcccc gtgccaagcg cagctagctc agcaggcggc 120
 agcggcggcc tgagcttcag ggcagccagc tcctcccg tctcgcttc cctcgcggtc 180
 agcatgaaag cttcagtc cgtgaggcc gttaggaaaa acagcctgtc ggaccacagc 240
 ctgggcatct cccggagcaa aacctctgtg gacgaccga tgagcctgct atacaacatg 300
 aacgactgct actccaagct caaggagctg gtgcccagca tccccagaa caagaagggtg 360
 agcaagatgg aaatcctgca gcacgtcatc gactacatct tggacctgca gatcgccctg 420
 gactcgcatc ccactattgt cagcctgcat caccagagac ccgggcagaa ccaggcgtcc 480
 aggacgccgc tgaccacct caacacggat atcagcatcc tgccttgca ggtaagacct 540
 gctccggggt cccgccccg ccgcccaca ctcccgggt cgtctgggct gtcactagga 600
 gatccgtagc ccagacgggt actttcgat gagctattta actttatctt cttcagaatc 660
 tgctgtagat tgagctgtgc gtgaaattgc tagtaagttc tgacatgtta atgcgtctgt 720
 ctftaaatct gaattgttac cataaacgtg ttaaatggaa cttgctggtc tgtggactac 780
 aaaaaaaaaa aaaaaaaaaa aaaaaccctt tctacttaac attgtcttaa cctcgactc 840
 ttatcctct ttcttccag gcttctgaat tcccttctga gttaatgtca aatgacagca 900

aagcactgtg tggctgaata agcggtagt gtttgcctgt gccacccgtg ggtaaactgc 960
ccctcgggtg gtgtgcgcgc gcgcgcatgt gttttgctt gtgtatctat aaaatgtctg 1020
atttggtaaa tgcattgcta cttcgcgggtg ttacccgtac tacattgtct cactagacat 1080
gaaggagctt gtagcttgg gtgctcgaga tcacagaaca tttccttta aaaggaaatg 1140
atgccaataa cttactacga aggcggccga ggaacgtgtg tattggcttt gtagcaaatg 1200
taatgccctg gatcttcta cgagtcctct ggtactatga ggtactaacc tccactgtaa 1260
ttaatcttac cgccacaaat tccatagta tctccttcc ctaaaactat agtcctctgg 1320
gattctctgg gctagttag gattgctacc ctgtgccttc aaccctgtga tgtgggatcc 1380
cagacttccc tatctgttaa ctaaagggtt gtttcaatc aaataattgt tacgagaagc 1440
agactggcgc ctgtagcact gctgttgag atccaaatag gagattgggt tgggaagttt 1500
ttcccttgag tctctgctat ttaatgttt aatttgcgt gtcgaggcga gtgtgtgtgt 1560
tgcatttga cgccagggtt tgcccaatct ttgagtgtt ggtaaagt tcaactgtg 1620
gcttctccc ggcgcagtc gccgcctct gcccttaggt tacattctct taaacatgcc 1680
tttccccc actcttgc aggtgttcat gatttcttt attctttgca caacaacaac 1740
aacaacaaat tcacggaatc ttttaagtgc tgaactatt ttcaacat tcacaagga 1800
ggacaagtg aatggacctt tttaaaaa aaaaaaaaaat ggaaggaaaa ctaagaatga 1860
tcatttccc aggtgttct cttacttga ctgtgatatt cgtatttat gaaaaagact 1920
tttaaatgcc cttctgcag ttggaaggtt ttctttatat actattcca ccatggggag 1980
cgaaaacgtt aaaatcacia ggaattgcc aatctaagca gactttgcct ttttcaaag 2040
gtggagcgtg aataccagaa ggatccagta ttcagtcact taaatgaagt ctttgggtca 2100
gaaattacct tttgacaca agcctactga atgctgtga tatattata tataaatata 2160
tctattttag tgaaccttg tgaactctt aattagatt ttctgtata gtggcagaga 2220
tgtctattc tgcattcaa agtgtaatga tgtactatt catgctaaac ttttataaa 2280
agtttagtg taaactaac cttttatac aaaataaatc aagtgtgtt attgaatgtt 2340
gattgcctgc tttattcag aggaccagt ctttgattt tattatgcta tgtataact 2400
gaacccaaat aaatacaagt tcaaattat gtagactga taagattata ataaaacatg 2460
tctgaagtca a

<210> 11
<211> 4018
<212> DNA
<213> Homo sapiens

<400> 11

```
caggcagcgc tgcgtcctgc tgcgcacgtg ggaagccctg gccccggcca cccccgcgat    60
gccgcgcgct ccccgctgcc gagccgtgcg ctccttctg cgcagccact accgcgaggt    120
gctgccgtg gccacgttcg tgcggcgcct ggggccccag ggctggcggc tggcgcagcg    180
cggggacccg gcggctttcc gcgcgtggt ggcccagtgc ctggtgtgcg tcccctggga    240
cgcacggccg cccccgcg cccctctt cggccagggt tctgcctga aggagctggt    300
ggcccagatg ctgcagaggc tgtcgcagcg cggcgcgaag aacgtgctgg ccttcggctt    360
cgcgtgctg gacggggccc gcgggggccc ccccaggcc ttcaccacca gcgtgcgcag    420
ctacctgcc aacacggtga ccgacgcact gcgggggagc ggggcgtggg ggctgctgct    480
gcgccgcgtg ggcgacgacg tgctggttca cctgctggca cgctgcgcgc tctttgtgct    540
ggtggctccc agctgcgcct accaggtgtg cgggccgcg ctgtaccagc tcggcgtgctc    600
cactcaggcc cggccccgc cacacgctag tggacccga aggcgtctgg gatgcgaacg    660
ggcctggaac catagcgtca gggaggccgg ggtccccctg ggctgccag ccccggtgc    720
gaggaggcgc gggggcagtg ccagccgaag tctgccgtt cccaagaggc ccaggcgtgg    780
cgctgccct gagccggagc ggacgcccgt tggcagggg tctggggccc acccgggcag    840
gacgcgtgga ccgagtacc gtggtttctg tgtggtgtca cctgccagac ccgccgaaga    900
agccacctt ttggagggtg cgctctctgg cacgcgccac tcccacccat ccgtgggccg    960
ccagcaccac gcgggcccc catccacatc gcggccacca cgtccctggg acagccttg    1020
tccccggtg tacgccgaga ccaagcactt ccttactcc tcaggcgaca aggagcagct    1080
gcggccctcc ttctactca gctctctgag gccagcctg actggcgctc ggaggctcgt    1140
ggagaccatc ttctgggtt ccaggccctg gatgccaggg actccccga ggttgccccg    1200
cctgccccag cgctactggc aaatgcggcc cctgtttctg gagctgcttg ggaaccacgc    1260
gcagtgcccc tacggggtgc tctcaagac gactgcccg ctgcgagctg cggtcacccc    1320
agcagccggt gtctgtgccc gggagaagcc ccagggtct gtggcggccc ccgaggagga    1380
ggacacagac cccgctgcc tggcgcagct gtcgccag cacagcagcc cctggcaggt    1440
gtacggcttc gtgcgggct gcctgcgcc gctggtgccc ccaggcctt ggggtccag    1500
```

gcacaacgaa cgccgcttcc tcaggaacac caagaagttc atctccctgg ggaagcatgc 1560
caagctctcg ctgcaggagc tgacgtggaa gatgagcgtg cgggactgcg cttggctgcg 1620
caggagccca ggggttggct gtgtccggc cgcagagcac cgtctgctg aggagatcct 1680
ggccaagttc ctgcactggc tgatgagtgt gtacgtcgtc gagctgctca ggtctttctt 1740
ttatgtcacg gagaccacgt tcaaaagaa caggctcttt ttctaccgga agagtgtctg 1800
gagcaagttg caaagcattg gaatcagaca gcacttgaag aggggtgcagc tgcgggagct 1860
gtcggaaagca gaggtcaggc agcatcgga agccaggccc gccctgctga cgtccagact 1920
ccgcttcac cccaagcctg acgggctgcg gccgatttg aacatggact acgtcgtggg 1980
agccagaacg ttccgagag aaaagagggc cgagcgtctc acctcagagg tgaaggcact 2040
gttcagcgtg ctcaactacg agcgggcgcg gcgccccggc ctctggggcg cctctgtgct 2100
gggcctggac gatatccaca gggcctggcg caccttcgtg ctgcgtgtgc gggcccagga 2160
cccggcgct gagctgtact ttgtcaaggt ggatgtgacg ggcgcgtacg acaccatccc 2220
ccaggacagg ctcacggagg tcatcgccag catcatcaaa cccagaaca cgtactcgt 2280
gcgtcggat gccgtggcc agaaggccgc ccatgggcac gtccgcaagg cttcaagag 2340
ccacgtctct acctgacag acctccagcc gtacatgca cagttcgtgg ctcacctga 2400
ggagaccagc ccgtgaggg atgccgtcgt catcgagcag agctcctccc tgaataggc 2460
cagcagtggc ctcttcgacg tcttctacg ctcatgtgc caccacgccg tgcgcatcag 2520
gggcaagtcc tacgtccagt gccaggggat cccgcagggc tccatcctct ccacgtgct 2580
ctgcagcctg tgctacggcg acatggagaa caagctgttt gcggggattc ggcgggacgg 2640
gctgtcctg cgtttgggtg atgatttctt gttggtgaca cctcacctca cccacgcgaa 2700
aaccttctc aggacctgg tccgaggtgt ccctgagtat ggctgcgtgg tgaactgcg 2760
gaagacagtg gtgaactcc ctgtagaaga cgaggccctg ggtggcacgg cttttgtca 2820
gatgccggc cacggcctat tcccctgggt cggcctgctg ctggataccc ggacctgga 2880
ggtgcagagc gactactcca gctatgccc gacctcatc agagccagtc tcacctcaa 2940
ccgcggctc aaggctggga ggaacatgcg tcgcaaactc ttgggggtct tgcggctgaa 3000
gtgtcacagc ctgtttctgg atttgaggt gaacagcctc cagacggtgt gcaccaacat 3060
ctacaagatc ctctgctgc aggcgtacag gtttcacgca tgtgtgctgc agtcccatt 3120

tcatacgaac gtttgaaga accccacatt ttctctgcgc gtcattcttg acacggcctc 3180
 cctctgctac tccatctga aagccaagaa cgcagggatg tcgctggggg ccaagggcgc 3240
 cgccggccct ctgccctccg aggccgtgca gtggctgtgc caccaagcat tctgtctaa 3300
 gctgactga caccgtgtca cctacgtgcc actctggggg tctactagga cagcccagac 3360
 gcagctgagt cggaagctcc cggggacgac gctgactgcc ctggaggccg cagccaaccc 3420
 ggcaactgcc tcagacttca agaccatctt ggactgatgg ccacccgcc acagccaggc 3480
 cgagagcaga caccagcagc cctgtcacgc cgggctctac gtcccaggga gggaggggcg 3540
 gccacaccc agggccgcac cgctgggagt ctgaggcctg agtgagtgtt tggccaggc 3600
 ctgcatgtcc ggctgaaggc tgagtgtccg gctgaggcct gagcgagtgt ccagccaagg 3660
 gctgagtgtc cagcacacct gccgtcttca ctccccaca ggctggcgct cggtccacc 3720
 ccagggccag ctttcttca ccaggagccc ggcttccact cccacatag gaatagtcca 3780
 tcccagatt cgccattgtt caccctcgc cctgccctcc ttgccttc accccacca 3840
 tccagggtga gacctgaga aggaccctgg gagctctggg aatttgagtg gaccaaagg 3900
 gtgccctgta cacaggcgag gacctgcac ctggatgggg gtcctgtgg gtcaaattgg 3960
 ggggaggtgc tgtgggagta aaatactgaa tatatgagtt tttagttt gaaaaaaa 4018

<210> 12

<211> 2335

<212> DNA

<213> Homo sapiens

<400> 12

gttattctct ggaacatgaa acattctgtt gtgctcatat catgcaaatt atcactagta 60

ggagagcaga gagtggaaat gttccaggta taaagacca caagataaag aagctcagag 120

tcgttagaaa caggagcaga tgtacagggt ttgctgact cacactcaag gttgcataag 180

caagatttca aaattaatcc tattctggag acctcaaccc aatgtacaat gttctgact 240

ggaaaagaag aactatatct ttctgatttt tttttcaaa tctttacat tagttgccct 300

gtatctccgc cttcacttgc tcagaggaaac tttatttct acttctgcat gccaaagttc 360

taccttga tctgtttggg tcagttgctg agaagcctga cataccagga ctgcctgaga 420

caagccacaa gctgaacaga gaaagtggat tgaacaagga cgcatttccc cagtacatcc 480

acaacatgct gtccacatct cgttctcggt ttatcagaaa taccaacgag agcgggtgaag 540

aagtcaccac ctttttgat tatgattacg gtgctcctg tcataaatTT gacgtgaagc 600
aaattggggc ccaactcctg cctccgctct actcgtggt gttcatcttt ggttttgg 660
gcaacatgct ggctgctc atcttaataa actgcaaaaa gctgaagtgc ttgactgaca 720
tttacctgct caacctggcc atctctgac tgcttttct tattactctc ccattgtggg 780
ctcactctgc tgcaaatgag tgggtctttg ggaatgcaat gtgcaaatta ttcacagggc 840
tgtatcacat cggttatttt ggcggaatct tcttcatcat cctcctgaca atcgatagat 900
acctggctat tgtccatgct gtgtttgctt taaaagccag gacggtcacc tttgggtgg 960
tgacaagtgt gatcacctgg ttggtggctg tgtttgcttc tgcccagga atcatcttta 1020
ctaaatgcc aagaagaat tctgttatg tctgtggccc ttattttcca cgaggatgga 1080
ataatttcca cacaataatg aggaacattt tggggctggt cctgccgctg ctcatcatgg 1140
tcactgcta ctcgggaatc ctgaaaacc tgcttcggtg tcgaaacgag aagaagaggc 1200
atagggcagt gagatcatc ttcaccatca tgattgttta ctttcttctc tggactcct 1260
ataatattgt cattctcctg aacaccttcc aggaattctt cggcctgagt aactgtgaaa 1320
gcaccagtca actggaccaa gccacgcagg tgacagagac tcttgggatg actcactgct 1380
gcatcaatcc catcatctat gccttcgtt gggagaagt cagaaggat ctctcggtgt 1440
tcttcgaaa gcacatcacc aagcgcttct gcaaacaatg tccagtttc tacagggaga 1500
cagtggatgg agtgactca acaaacacgc ctccactgg ggagcaggaa gtctcggtg 1560
gtttataaaa cgaggagcag ttgattgtt gttataaag ggagataaca atctgtatat 1620
aacaacaaac ttcaagggtt tgtgaacaa tagaaacctg taaagcaggt gcccaggaac 1680
ctcagggtg tgtgtactaa tacagactat gtcaccaat gcatatcaa catgtgtca 1740
gggaataatc cagaaaaact gtgggtagag actttgactc tccagaaagc tcactcagc 1800
tcctgaaaaa tgcctatta cttgtgcta atcctcttt tctagtcttc ataatttctt 1860
cactcaatct ctgattctgt caatgtctt aaatcaaggg ccagctggag gtgaagaaga 1920
gaatgtgaca ggcacagatg aatgggagt agggatagt gggtcagggc tgagaggaga 1980
aggagggaga catgagcatg gctgagcctg gacaaagaca aaggtgagca aagggtcac 2040
gcattcagcc aggagatgat actggctctt agccccatct gccacgtgta tttaaccttg 2100
aagggtcac caggtcagg agagtggg aactgcaata acctgggagt tttgtggag 2160
tccgatgatt ctctttgca taagtcatg acatatttt gcttattac agtttatcta 2220

tggcacccat gcaccttaca ttgaaatct atgaaatatt atgctccatt gttcagatgc 2280

ttcttaggcc acatccccct gtctaaaaat tcagaaaatt ttgtttata aaaga 2335

<210> 13

<211> 1657

<212> DNA

<213> Homo sapiens

<400> 13

tctcacagga agccacgcac ccttgaaagg caccgggtcc ttcttagcat cgtgcttct 60

gagcaagcct ggcatcgct cacagacctt cctcagagcc gctttcagaa aagcaagctg 120

ctctgggtg ggcccagacc tgccttgagg agcctgtaga gttaaaaaat gaacccacg 180

gatatagcag acaccacct cgtatgaaagc atatacagca attactatct gtatgaaagt 240

atccccaagc cttgcaccaa agaaggcatc aaggcatttg gggagctctt cctgccccca 300

ctgtattctt tggttttgt atttggtctg cttggaaatt ctgtggtggt tctggtcctg 360

ttcaaataca agcggctcag gtccatgact gatgtgtacc tgctcaacct tgccatctcg 420

gatctgctct tcgtgttttc cctccctttt tggggctact atgcagcaga ccagtgggtt 480

ttgggctag gtctgtgcaa gatgattcc tggatgtact tgggtgggtt ttacagtggc 540

atattctttg tcatgctcat gagcattgat agatacctgg caattgtgca cgcggtgtt 600

tccttgaggg caaggacctt gacttatggg gtcatcacca gtttggctac atggtcagt 660

gctgtgttcg cctcccttcc tggctttctg ttcagcactt gttatactga gcgcaacct 720

acctactgca aaaccaagta ctctctcaac tccacgacgt ggaaggttct cagctccctg 780

gaaatcaaca ttctcggaatt ggtgatcccc ttagggatca tgctgtttg ctactccatg 840

atcatcagga cctgcagca ttgtaaaaat gagaagaaga acaaggcggg gaagatgatc 900

tttgccgtgg tggctctctt ccttgggttc tggacacctt acaacatagt gctcttccta 960

gagaccctgg tggagctaga agtccttcag gactgcacct ttgaaagata cttggactat 1020

gccatccagg ccacagaaac tctggctttt gttcactgct gccttaatcc catcatctac 1080

tttttctgg gggagaaatt tcgcaagtac atcctacagc tcttcaaac ctgcaggggc 1140

cttttctgc tctgccaata ctgtgggtc ctccaaattt actctgtga cccccagc 1200

tcactttaca cgcagtccac catggatcat gatctccatg atgctctga gaaaaatgaa 1260

atggtgaaat gcagagtcaa tgaactttcc acattcagag cttacttaaa attgtattt 1320

agtaagagat tcctgagcca gtgtcaggag gaaggcttac acccacagtg gaaagacagc 1380
 ttctcatcct gcaggcagct tttctctcc cactagacaa gtccagcctg gcaagggttc 1440
 acctgggctg aggcatcctt cctcacacca ggcttgctg caggcatgag tcagtctgat 1500
 gagaactctg agcagtgcct gaatgaagtt gtaggtaata ttgcaaggca aagactattc 1560
 ccttctaacc tgaactgatg gggttctcca gagggaattg cagagtactg gctgatggag 1620
 taaatcgcta ccttttgctg tggcaaattg gccctct 1657

<210> 14
 <211> 750
 <212> PRT
 <213> Homo sapiens

<400> 14

Met Trp Asn Leu Leu His Glu Thr Asp Ser Ala Val Ala Thr Ala Arg
 1 5 10 15

Arg Pro Arg Trp Leu Cys Ala Gly Ala Leu Val Leu Ala Gly Gly Phe
 20 25 30

Phe Leu Leu Gly Phe Leu Phe Gly Trp Phe Ile Lys Ser Ser Asn Glu
 35 40 45

Ala Thr Asn Ile Thr Pro Lys His Asn Met Lys Ala Phe Leu Asp Glu
 50 55 60

Leu Lys Ala Glu Asn Ile Lys Lys Phe Leu Tyr Asn Phe Thr Gln Ile
 65 70 75 80

Pro His Leu Ala Gly Thr Glu Gln Asn Phe Gln Leu Ala Lys Gln Ile
 85 90 95

Gln Ser Gln Trp Lys Glu Phe Gly Leu Asp Ser Val Glu Leu Ala His
 100 105 110

Tyr Asp Val Leu Leu Ser Tyr Pro Asn Lys Thr His Pro Asn Tyr Ile
 115 120 125

Ser Ile Ile Asn Glu Asp Gly Asn Glu Ile Phe Asn Thr Ser Leu Phe
 130 135 140

Glu Pro Pro Pro Pro Gly Tyr Glu Asn Val Ser Asp Ile Val Pro Pro
145 150 155 160

Phe Ser Ala Phe Ser Pro Gln Gly Met Pro Glu Gly Asp Leu Val Tyr
165 170 175

Val Asn Tyr Ala Arg Thr Glu Asp Phe Phe Lys Leu Glu Arg Asp Met
180 185 190

Lys Ile Asn Cys Ser Gly Lys Ile Val Ile Ala Arg Tyr Gly Lys Val
195 200 205

Phe Arg Gly Asn Lys Val Lys Asn Ala Gln Leu Ala Gly Ala Lys Gly
210 215 220

Val Ile Leu Tyr Ser Asp Pro Ala Asp Tyr Phe Ala Pro Gly Val Lys
225 230 235 240

Ser Tyr Pro Asp Gly Trp Asn Leu Pro Gly Gly Gly Val Gln Arg Gly
245 250 255

Asn Ile Leu Asn Leu Asn Gly Ala Gly Asp Pro Leu Thr Pro Gly Tyr
260 265 270

Pro Ala Asn Glu Tyr Ala Tyr Arg Arg Gly Ile Ala Glu Ala Val Gly
275 280 285

Leu Pro Ser Ile Pro Val His Pro Ile Gly Tyr Tyr Asp Ala Gln Lys
290 295 300

Leu Leu Glu Lys Met Gly Gly Ser Ala Pro Pro Asp Ser Ser Trp Arg
305 310 315 320

Gly Ser Leu Lys Val Pro Tyr Asn Val Gly Pro Gly Phe Thr Gly Asn
325 330 335

Phe Ser Thr Gln Lys Val Lys Met His Ile His Ser Thr Asn Glu Val
340 345 350

Thr Arg Ile Tyr Asn Val Ile Gly Thr Leu Arg Gly Ala Val Glu Pro

355

360

365

Asp Arg Tyr Val Ile Leu Gly Gly His Arg Asp Ser Trp Val Phe Gly
370 375 380

Gly Ile Asp Pro Gln Ser Gly Ala Ala Val Val His Glu Ile Val Arg
385 390 395 400

Ser Phe Gly Thr Leu Lys Lys Glu Gly Trp Arg Pro Arg Arg Thr Ile
405 410 415

Leu Phe Ala Ser Trp Asp Ala Glu Glu Phe Gly Leu Leu Gly Ser Thr
420 425 430

Glu Trp Ala Glu Glu Asn Ser Arg Leu Leu Gln Glu Arg Gly Val Ala
435 440 445

Tyr Ile Asn Ala Asp Ser Ser Ile Glu Gly Asn Tyr Thr Leu Arg Val
450 455 460

Asp Cys Thr Pro Leu Met Tyr Ser Leu Val His Asn Leu Thr Lys Glu
465 470 475 480

Leu Lys Ser Pro Asp Glu Gly Phe Glu Gly Lys Ser Leu Tyr Glu Ser
485 490 495

Trp Thr Lys Lys Ser Pro Ser Pro Glu Phe Ser Gly Met Pro Arg Ile
500 505 510

Ser Lys Leu Gly Ser Gly Asn Asp Phe Glu Val Phe Phe Gln Arg Leu
515 520 525

Gly Ile Ala Ser Gly Arg Ala Arg Tyr Thr Lys Asn Trp Glu Thr Asn
530 535 540

Lys Phe Ser Gly Tyr Pro Leu Tyr His Ser Val Tyr Glu Thr Tyr Glu
545 550 555 560

Leu Val Glu Lys Phe Tyr Asp Pro Met Phe Lys Tyr His Leu Thr Val
565 570 575

Ala Gln Val Arg Gly Gly Met Val Phe Glu Leu Ala Asn Ser Ile Val
580 585 590

Leu Pro Phe Asp Cys Arg Asp Tyr Ala Val Val Leu Arg Lys Tyr Ala
595 600 605

Asp Lys Ile Tyr Ser Ile Ser Met Lys His Pro Gln Glu Met Lys Thr
610 615 620

Tyr Ser Val Ser Phe Asp Ser Leu Phe Ser Ala Val Lys Asn Phe Thr
625 630 635 640

Glu Ile Ala Ser Lys Phe Ser Glu Arg Leu Gln Asp Phe Asp Lys Ser
645 650 655

Asn Pro Ile Val Leu Arg Met Met Asn Asp Gln Leu Met Phe Leu Glu
660 665 670

Arg Ala Phe Ile Asp Pro Leu Gly Leu Pro Asp Arg Pro Phe Tyr Arg
675 680 685

His Val Ile Tyr Ala Pro Ser Ser His Asn Lys Tyr Ala Gly Glu Ser
690 695 700

Phe Pro Gly Ile Tyr Asp Ala Leu Phe Asp Ile Glu Ser Lys Val Asp
705 710 715 720

Pro Ser Lys Ala Trp Gly Glu Val Lys Arg Gln Ile Tyr Val Ala Ala
725 730 735

Phe Thr Val Gln Ala Ala Ala Glu Thr Leu Ser Glu Val Ala
740 745 750

<210> 15
<211> 123
<212> PRT
<213> Homo sapiens

<400> 15

Met Lys Ala Val Leu Leu Ala Leu Leu Met Ala Gly Leu Ala Leu Gln
1 5 10 15

Pro Gly Thr Ala Leu Leu Cys Tyr Ser Cys Lys Ala Gln Val Ser Asn
20 25 30

Glu Asp Cys Leu Gln Val Glu Asn Cys Thr Gln Leu Gly Glu Gln Cys
35 40 45

Trp Thr Ala Arg Ile Arg Ala Val Gly Leu Leu Thr Val Ile Ser Lys
50 55 60

Gly Cys Ser Leu Asn Cys Val Asp Asp Ser Gln Asp Tyr Tyr Val Gly
65 70 75 80

Lys Lys Asn Ile Thr Cys Cys Asp Thr Asp Leu Cys Asn Ala Ser Gly
85 90 95

Ala His Ala Leu Gln Pro Ala Ala Ala Ile Leu Ala Leu Leu Pro Ala
100 105 110

Leu Gly Leu Leu Leu Trp Gly Pro Gly Gln Leu
115 120

<210> 16
<211> 622
<212> PRT
<213> Homo sapiens

<400> 16

Met Ala Leu Pro Thr Ala Arg Pro Leu Leu Gly Ser Cys Gly Thr Pro
1 5 10 15

Ala Leu Gly Ser Leu Leu Phe Leu Leu Phe Ser Leu Gly Trp Val Gln
20 25 30

Pro Ser Arg Thr Leu Ala Gly Glu Thr Gly Gln Glu Ala Ala Pro Leu
35 40 45

Asp Gly Val Leu Ala Asn Pro Pro Asn Ile Ser Ser Leu Ser Pro Arg
50 55 60

Gln Leu Leu Gly Phe Pro Cys Ala Glu Val Ser Gly Leu Ser Thr Glu
65 70 75 80

Arg Val Arg Glu Leu Ala Val Ala Leu Ala Gln Lys Asn Val Lys Leu
85 90 95

Ser Thr Glu Gln Leu Arg Cys Leu Ala His Arg Leu Ser Glu Pro Pro
100 105 110

Glu Asp Leu Asp Ala Leu Pro Leu Asp Leu Leu Leu Phe Leu Asn Pro
115 120 125

Asp Ala Phe Ser Gly Pro Gln Ala Cys Thr His Phe Phe Ser Arg Ile
130 135 140

Thr Lys Ala Asn Val Asp Leu Leu Pro Arg Gly Ala Pro Glu Arg Gln
145 150 155 160

Arg Leu Leu Pro Ala Ala Leu Ala Cys Trp Gly Val Arg Gly Ser Leu
165 170 175

Leu Ser Glu Ala Asp Val Arg Ala Leu Gly Gly Leu Ala Cys Asp Leu
180 185 190

Pro Gly Arg Phe Val Ala Glu Ser Ala Glu Val Leu Leu Pro Arg Leu
195 200 205

Val Ser Cys Pro Gly Pro Leu Asp Gln Asp Gln Gln Glu Ala Ala Arg
210 215 220

Ala Ala Leu Gln Gly Gly Gly Pro Pro Tyr Gly Pro Pro Ser Thr Trp
225 230 235 240

Ser Val Ser Thr Met Asp Ala Leu Arg Gly Leu Leu Pro Val Leu Gly
245 250 255

Gln Pro Ile Ile Arg Ser Ile Pro Gln Gly Ile Val Ala Ala Trp Arg
260 265 270

Gln Arg Ser Ser Arg Asp Pro Ser Trp Arg Gln Pro Glu Arg Thr Ile
275 280 285

Leu Arg Pro Arg Phe Arg Arg Glu Val Glu Lys Thr Ala Cys Pro Ser
290 295 300

Gly Lys Lys Ala Arg Glu Ile Asp Glu Ser Leu Ile Phe Tyr Lys Lys
305 310 315 320

Trp Glu Leu Glu Ala Cys Val Asp Ala Ala Leu Leu Ala Thr Gln Met
325 330 335

Asp Arg Val Asn Ala Ile Pro Phe Thr Tyr Glu Gln Leu Asp Val Leu
340 345 350

Lys His Lys Leu Asp Glu Leu Tyr Pro Gln Gly Tyr Pro Glu Ser Val
355 360 365

Ile Gln His Leu Gly Tyr Leu Phe Leu Lys Met Ser Pro Glu Asp Ile
370 375 380

Arg Lys Trp Asn Val Thr Ser Leu Glu Thr Leu Lys Ala Leu Leu Glu
385 390 395 400

Val Asn Lys Gly His Glu Met Ser Pro Gln Val Ala Thr Leu Ile Asp
405 410 415

Arg Phe Val Lys Gly Arg Gly Gln Leu Asp Lys Asp Thr Leu Asp Thr
420 425 430

Leu Thr Ala Phe Tyr Pro Gly Tyr Leu Cys Ser Leu Ser Pro Glu Glu
435 440 445

Leu Ser Ser Val Pro Pro Ser Ser Ile Trp Ala Val Arg Pro Gln Asp
450 455 460

Leu Asp Thr Cys Asp Pro Arg Gln Leu Asp Val Leu Tyr Pro Lys Ala
465 470 475 480

Arg Leu Ala Phe Gln Asn Met Asn Gly Ser Glu Tyr Phe Val Lys Ile
485 490 495

Gln Ser Phe Leu Gly Gly Ala Pro Thr Glu Asp Leu Lys Ala Leu Ser
500 505 510

Gln Gln Asn Val Ser Met Asp Leu Ala Thr Phe Met Lys Leu Arg Thr
515 520 525

Asp Ala Val Leu Pro Leu Thr Val Ala Glu Val Gln Lys Leu Leu Gly
530 535 540

Pro His Val Glu Gly Leu Lys Ala Glu Glu Arg His Arg Pro Val Arg
545 550 555 560

Asp Trp Ile Leu Arg Gln Arg Gln Asp Asp Leu Asp Thr Leu Gly Leu
565 570 575

Gly Leu Gln Gly Gly Ile Pro Asn Gly Tyr Leu Val Leu Asp Leu Ser
580 585 590

Val Gln Glu Ala Leu Ser Gly Thr Pro Cys Leu Leu Gly Pro Gly Pro
595 600 605

Val Leu Thr Val Leu Ala Leu Leu Leu Ala Ser Thr Leu Ala
610 615 620

<210> 17
<211> 556
<212> PRT
<213> Homo sapiens

<400> 17

Met Pro Pro Pro Arg Leu Leu Phe Phe Leu Leu Phe Leu Thr Pro Met
1 5 10 15

Glu Val Arg Pro Glu Glu Pro Leu Val Val Lys Val Glu Glu Gly Asp
20 25 30

Asn Ala Val Leu Gln Cys Leu Lys Gly Thr Ser Asp Gly Pro Thr Gln
35 40 45

Gln Leu Thr Trp Ser Arg Glu Ser Pro Leu Lys Pro Phe Leu Lys Leu
50 55 60

Ser Leu Gly Leu Pro Gly Leu Gly Ile His Met Arg Pro Leu Ala Ser
65 70 75 80

Trp Leu Phe Ile Phe Asn Val Ser Gln Gln Met Gly Gly Phe Tyr Leu
85 90 95

Cys Gln Pro Gly Pro Pro Ser Glu Lys Ala Trp Gln Pro Gly Trp Thr
100 105 110

Val Asn Val Glu Gly Ser Gly Glu Leu Phe Arg Trp Asn Val Ser Asp
115 120 125

Leu Gly Gly Leu Gly Cys Gly Leu Lys Asn Arg Ser Ser Glu Gly Pro
130 135 140

Ser Ser Pro Ser Gly Lys Leu Met Ser Pro Lys Leu Tyr Val Trp Ala
145 150 155 160

Lys Asp Arg Pro Glu Ile Trp Glu Gly Glu Pro Pro Cys Val Pro Pro
165 170 175

Arg Asp Ser Leu Asn Gln Ser Leu Ser Gln Asp Leu Thr Met Ala Pro
180 185 190

Gly Ser Thr Leu Trp Leu Ser Cys Gly Val Pro Pro Asp Ser Val Ser
195 200 205

Arg Gly Pro Leu Ser Trp Thr His Val His Pro Lys Gly Pro Lys Ser
210 215 220

Leu Leu Ser Leu Glu Leu Lys Asp Asp Arg Pro Ala Arg Asp Met Trp
225 230 235 240

Val Met Glu Thr Gly Leu Leu Leu Pro Arg Ala Thr Ala Gln Asp Ala
245 250 255

Gly Lys Tyr Tyr Cys His Arg Gly Asn Leu Thr Met Ser Phe His Leu
260 265 270

Glu Ile Thr Ala Arg Pro Val Leu Trp His Trp Leu Leu Arg Thr Gly
275 280 285

Gly Trp Lys Val Ser Ala Val Thr Leu Ala Tyr Leu Ile Phe Cys Leu
290 295 300

Cys Ser Leu Val Gly Ile Leu His Leu Gln Arg Ala Leu Val Leu Arg

305	310	315	320
Arg Lys Arg Lys Arg Met Thr Asp Pro Thr Arg Arg Phe Phe Lys Val			
	325	330	335
Thr Pro Pro Pro Gly Ser Gly Pro Gln Asn Gln Tyr Gly Asn Val Leu			
	340	345	350
Ser Leu Pro Thr Pro Thr Ser Gly Leu Gly Arg Ala Gln Arg Trp Ala			
	355	360	365
Ala Gly Leu Gly Gly Thr Ala Pro Ser Tyr Gly Asn Pro Ser Ser Asp			
	370	375	380
Val Gln Ala Asp Gly Ala Leu Gly Ser Arg Ser Pro Pro Gly Val Gly			
385	390	395	400
Pro Glu Glu Glu Glu Gly Glu Gly Tyr Glu Glu Pro Asp Ser Glu Glu			
	405	410	415
Asp Ser Glu Phe Tyr Glu Asn Asp Ser Asn Leu Gly Gln Asp Gln Leu			
	420	425	430
Ser Gln Asp Gly Ser Gly Tyr Glu Asn Pro Glu Asp Glu Pro Leu Gly			
	435	440	445
Pro Glu Asp Glu Asp Ser Phe Ser Asn Ala Glu Ser Tyr Glu Asn Glu			
	450	455	460
Asp Glu Glu Leu Thr Gln Pro Val Ala Arg Thr Met Asp Phe Leu Ser			
465	470	475	480
Pro His Gly Ser Ala Trp Asp Pro Ser Arg Glu Ala Thr Ser Leu Gly			
	485	490	495
Ser Gln Ser Tyr Glu Asp Met Arg Gly Ile Leu Tyr Ala Ala Pro Gln			
	500	505	510
Leu Arg Ser Ile Arg Gly Gln Pro Gly Pro Asn His Glu Glu Asp Ala			
	515	520	525

Asp Ser Tyr Glu Asn Met Asp Asn Pro Asp Gly Pro Asp Pro Ala Trp
530 535 540

Gly Gly Gly Gly Arg Met Gly Thr Trp Ser Thr Arg
545 550 555

<210> 18
<211> 297
<212> PRT
<213> Homo sapiens

<400> 18

Met Thr Thr Pro Arg Asn Ser Val Asn Gly Thr Phe Pro Ala Glu Pro
1 5 10 15

Met Lys Gly Pro Ile Ala Met Gln Ser Gly Pro Lys Pro Leu Phe Arg
20 25 30

Arg Met Ser Ser Leu Val Gly Pro Thr Gln Ser Phe Phe Met Arg Glu
35 40 45

Ser Lys Thr Leu Gly Ala Val Gln Ile Met Asn Gly Leu Phe His Ile
50 55 60

Ala Leu Gly Gly Leu Leu Met Ile Pro Ala Gly Ile Tyr Ala Pro Ile
65 70 75 80

Cys Val Thr Val Trp Tyr Pro Leu Trp Gly Gly Ile Met Tyr Ile Ile
85 90 95

Ser Gly Ser Leu Leu Ala Ala Thr Glu Lys Asn Ser Arg Lys Cys Leu
100 105 110

Val Lys Gly Lys Met Ile Met Asn Ser Leu Ser Leu Phe Ala Ala Ile
115 120 125

Ser Gly Met Ile Leu Ser Ile Met Asp Ile Leu Asn Ile Lys Ile Ser
130 135 140

His Phe Leu Lys Met Glu Ser Leu Asn Phe Ile Arg Ala His Thr Pro
145 150 155 160

Tyr Ile Asn Ile Tyr Asn Cys Glu Pro Ala Asn Pro Ser Glu Lys Asn
165 170 175

Ser Pro Ser Thr Gln Tyr Cys Tyr Ser Ile Gln Ser Leu Phe Leu Gly
180 185 190

Ile Leu Ser Val Met Leu Ile Phe Ala Phe Phe Gln Glu Leu Val Ile
195 200 205

Ala Gly Ile Val Glu Asn Glu Trp Lys Arg Thr Cys Ser Arg Pro Lys
210 215 220

Ser Asn Ile Val Leu Leu Ser Ala Glu Glu Lys Lys Glu Gln Thr Ile
225 230 235 240

Glu Ile Lys Glu Glu Val Val Gly Leu Thr Glu Thr Ser Ser Gln Pro
245 250 255

Lys Asn Glu Glu Asp Ile Glu Ile Ile Pro Ile Gln Glu Glu Glu
260 265 270

Glu Glu Thr Glu Thr Asn Phe Pro Glu Pro Pro Gln Asp Gln Glu Ser
275 280 285

Ser Pro Ile Glu Asn Asp Ser Ser Pro
290 295

<210> 19
<211> 937
<212> PRT
<213> Homo sapiens

<400> 19

Met His Arg Pro Arg Arg Arg Gly Thr Arg Pro Pro Leu Leu Ala Leu
1 5 10 15

Leu Ala Ala Leu Leu Leu Ala Ala Arg Gly Ala Ala Ala Gln Glu Thr
20 25 30

Glu Leu Ser Val Ser Ala Glu Leu Val Pro Thr Ser Ser Trp Asn Ile
35 40 45

Ser Ser Glu Leu Asn Lys Asp Ser Tyr Leu Thr Leu Asp Glu Pro Met
50 55 60

Asn Asn Ile Thr Thr Ser Leu Gly Gln Thr Ala Glu Leu His Cys Lys
65 70 75 80

Val Ser Gly Asn Pro Pro Pro Thr Ile Arg Trp Phe Lys Asn Asp Ala
85 90 95

Pro Val Val Gln Glu Pro Arg Arg Leu Ser Phe Arg Ser Thr Ile Tyr
100 105 110

Gly Ser Arg Leu Arg Ile Arg Asn Leu Asp Thr Thr Asp Thr Gly Tyr
115 120 125

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

Val Leu Phe Val Lys Phe Gly Pro Pro Pro Thr Ala Ser Pro Gly Tyr
145 150 155 160

Ser Asp Glu Tyr Glu Glu Asp Gly Phe Cys Gln Pro Tyr Arg Gly Ile
165 170 175

Ala Cys Ala Arg Phe Ile Gly Asn Arg Thr Val Tyr Met Glu Ser Leu
180 185 190

His Met Gln Gly Glu Ile Glu Asn Gln Ile Thr Ala Ala Phe Thr Met
195 200 205

Ile Gly Thr Ser Ser His Leu Ser Asp Lys Cys Ser Gln Phe Ala Ile
210 215 220

Pro Ser Leu Cys His Tyr Ala Phe Pro Tyr Cys Asp Glu Thr Ser Ser
225 230 235 240

Val Pro Lys Pro Arg Asp Leu Cys Arg Asp Glu Cys Glu Ile Leu Glu
245 250 255

Asn Val Leu Cys Gln Thr Glu Tyr Ile Phe Ala Arg Ser Asn Pro Met
260 265 270

Ile Leu Met Arg Leu Lys Leu Pro Asn Cys Glu Asp Leu Pro Gln Pro
275 280 285

Glu Ser Pro Glu Ala Ala Asn Cys Ile Arg Ile Gly Ile Pro Met Ala
290 295 300

Asp Pro Ile Asn Lys Asn His Lys Cys Tyr Asn Ser Thr Gly Val Asp
305 310 315 320

Tyr Arg Gly Thr Val Ser Val Thr Lys Ser Gly Arg Gln Cys Gln Pro
325 330 335

Trp Asn Ser Gln Tyr Pro His Thr His Thr Phe Thr Ala Leu Arg Phe
340 345 350

Pro Glu Leu Asn Gly Gly His Ser Tyr Cys Arg Asn Pro Gly Asn Gln
355 360 365

Lys Glu Ala Pro Trp Cys Phe Thr Leu Asp Glu Asn Phe Lys Ser Asp
370 375 380

Leu Cys Asp Ile Pro Ala Cys Asp Ser Lys Asp Ser Lys Glu Lys Asn
385 390 395 400

Lys Met Glu Ile Leu Tyr Ile Leu Val Pro Ser Val Ala Ile Pro Leu
405 410 415

Ala Ile Ala Leu Leu Phe Phe Phe Ile Cys Val Cys Arg Asn Asn Gln
420 425 430

Lys Ser Ser Ser Ala Pro Val Gln Arg Gln Pro Lys His Val Arg Gly
435 440 445

Gln Asn Val Glu Met Ser Met Leu Asn Ala Tyr Lys Pro Lys Ser Lys
450 455 460

Ala Lys Glu Leu Pro Leu Ser Ala Val Arg Phe Met Glu Glu Leu Gly
465 470 475 480

Glu Cys Ala Phe Gly Lys Ile Tyr Lys Gly His Leu Tyr Leu Pro Gly
485 490 495

Met Asn His Ala Gln Leu Val Ala Ile Lys Thr Leu Lys Asp Tyr Asn
500 505 510

Asn Pro Gln Gln Trp Thr Glu Phe Gln Gln Glu Ala Ser Leu Met Ala
515 520 525

Glu Leu His His Pro Asn Ile Val Cys Leu Leu Gly Ala Val Thr Gln
530 535 540

Glu Gln Pro Val Cys Met Leu Phe Glu Tyr Ile Asn Gln Gly Asp Leu
545 550 555 560

His Glu Phe Leu Ile Met Arg Ser Pro His Ser Asp Val Gly Cys Ser
565 570 575

Ser Asp Glu Asp Gly Thr Val Lys Ser Ser Leu Asp His Gly Asp Phe
580 585 590

Leu His Ile Ala Ile Gln Ile Ala Ala Gly Met Glu Tyr Leu Ser Ser
595 600 605

His Phe Phe Val His Lys Asp Leu Ala Ala Arg Asn Ile Leu Ile Gly
610 615 620

Glu Gln Leu His Val Lys Ile Ser Asp Leu Gly Leu Ser Arg Glu Ile
625 630 635 640

Tyr Ser Ala Asp Tyr Tyr Arg Val Gln Ser Lys Ser Leu Leu Pro Ile
645 650 655

Arg Trp Met Pro Pro Glu Ala Ile Met Tyr Gly Lys Phe Ser Ser Asp
660 665 670

Ser Asp Ile Trp Ser Phe Gly Val Val Leu Trp Glu Ile Phe Ser Phe
675 680 685

Gly Leu Gln Pro Tyr Tyr Gly Phe Ser Asn Gln Glu Val Ile Glu Met
690 695 700

Val Arg Lys Arg Gln Leu Leu Pro Cys Ser Glu Asp Cys Pro Pro Arg

705 710 715 720

Met Tyr Ser Leu Met Thr Glu Cys Trp Asn Glu Ile Pro Ser Arg Arg
 725 730 735

Pro Arg Phe Lys Asp Ile His Val Arg Leu Arg Ser Trp Glu Gly Leu
 740 745 750

Ser Ser His Thr Ser Ser Thr Thr Pro Ser Gly Gly Asn Ala Thr Thr
 755 760 765

Gln Thr Thr Ser Leu Ser Ala Ser Pro Val Ser Asn Leu Ser Asn Pro
 770 775 780

Arg Tyr Pro Asn Tyr Met Phe Pro Ser Gln Gly Ile Thr Pro Gln Gly
785 790 795 800

Gln Ile Ala Gly Phe Ile Gly Pro Pro Ile Pro Gln Asn Gln Arg Phe
 805 810 815

Ile Pro Ile Asn Gly Tyr Pro Ile Pro Pro Gly Tyr Ala Ala Phe Pro
 820 825 830

Ala Ala His Tyr Gln Pro Thr Gly Pro Pro Arg Val Ile Gln His Cys
 835 840 845

Pro Pro Pro Lys Ser Arg Ser Pro Ser Ser Ala Ser Gly Ser Thr Ser
 850 855 860

Thr Gly His Val Thr Ser Leu Pro Ser Ser Gly Ser Asn Gln Glu Ala
865 870 875 880

Asn Ile Pro Leu Leu Pro His Met Ser Ile Pro Asn His Pro Gly Gly
 885 890 895

Met Gly Ile Thr Val Phe Gly Asn Lys Ser Gln Lys Pro Tyr Lys Ile
 900 905 910

Asp Ser Lys Gln Ala Ser Leu Leu Gly Asp Ala Asn Ile His Gly His
 915 920 925

Thr Glu Ser Met Ile Ser Ala Glu Leu
930 935

<210> 20
<211> 168
<212> PRT
<213> Homo sapiens

<400> 20

Met Gly His His His His His His His His Ser Ser Gly His
1 5 10 15

Ile Glu Gly Arg His Met Arg Arg Val Pro Gly Val Ala Pro Thr Leu
20 25 30

Val Arg Ser Ala Ser Glu Thr Ser Glu Lys Arg Pro Phe Met Cys Ala
35 40 45

Tyr Pro Gly Cys Asn Lys Arg Tyr Phe Lys Leu Ser His Leu Gln Met
50 55 60

His Ser Arg Lys His Thr Gly Glu Lys Pro Tyr Gln Cys Asp Phe Lys
65 70 75 80

Asp Cys Glu Arg Arg Phe Phe Arg Ser Asp Gln Leu Lys Arg His Gln
85 90 95

Arg Arg His Thr Gly Val Lys Pro Phe Gln Cys Lys Thr Cys Gln Arg
100 105 110

Lys Phe Ser Arg Ser Asp His Leu Lys Thr His Thr Arg Thr His Thr
115 120 125

Gly Glu Lys Pro Phe Ser Cys Arg Trp Pro Ser Cys Gln Lys Lys Phe
130 135 140

Ala Arg Ser Asp Glu Leu Val Arg His His Asn Met His Gln Arg Asn
145 150 155 160

Met Thr Lys Leu Gln Leu Ala Leu
165

<210> 21
<211> 347
<212> PRT
<213> Homo sapiens

<400> 21

Asp Pro Asn Phe Trp Leu Gln Val Gln Glu Ser Val Thr Val Gln Glu
1 5 10 15

Gly Leu Cys Val Leu Val Pro Cys Thr Phe Phe His Pro Ile Pro Tyr
20 25 30

Tyr Asp Lys Asn Ser Pro Val His Gly Tyr Trp Phe Arg Glu Gly Ala
35 40 45

Ile Ile Ser Arg Asp Ser Pro Val Ala Thr Asn Lys Leu Asp Gln Glu
50 55 60

Val Gln Glu Glu Thr Gln Gly Arg Phe Arg Leu Leu Gly Asp Pro Ser
65 70 75 80

Arg Asn Asn Cys Ser Leu Ser Ile Val Asp Ala Arg Arg Arg Asp Asn
85 90 95

Gly Ser Tyr Phe Phe Arg Met Glu Arg Gly Ser Thr Lys Tyr Ser Tyr
100 105 110

Lys Ser Pro Gln Leu Ser Val His Val Thr Asp Leu Thr His Arg Pro
115 120 125

Lys Ile Leu Ile Pro Gly Thr Leu Glu Pro Gly His Ser Lys Asn Leu
130 135 140

Thr Cys Ser Val Ser Trp Ala Cys Glu Gln Gly Thr Pro Pro Ile Phe
145 150 155 160

Ser Trp Leu Ser Ala Ala Pro Thr Ser Leu Gly Pro Arg Thr Thr His
165 170 175

Ser Ser Val Leu Ile Ile Thr Pro Arg Pro Gln Asp His Gly Thr Asn
180 185 190

Leu Thr Cys Gln Val Lys Phe Ala Gly Ala Gly Val Thr Thr Glu Arg
195 200 205

Thr Ile Gln Leu Asn Val Thr Tyr Val Pro Gln Asn Pro Thr Thr Gly
210 215 220

Ile Phe Pro Gly Asp Gly Ser Gly Lys Gln Glu Thr Arg Ala Gly Val
225 230 235 240

Val His Gly Ala Ile Gly Gly Ala Gly Val Thr Ala Leu Leu Ala Leu
245 250 255

Cys Leu Cys Leu Ile Phe Phe Ile Val Lys Thr His Arg Arg Lys Ala
260 265 270

Ala Arg Thr Ala Val Gly Arg Asn Asp Thr His Pro Thr Thr Gly Ser
275 280 285

Ala Ser Pro Lys His Gln Lys Lys Ser Lys Leu His Gly Pro Thr Glu
290 295 300

Thr Ser Ser Cys Ser Gly Ala Ala Pro Thr Val Glu Met Asp Glu Glu
305 310 315 320

Leu His Tyr Ala Ser Leu Asn Phe His Gly Met Asn Pro Ser Lys Asp
325 330 335

Thr Ser Thr Glu Tyr Ser Glu Val Arg Thr Gln
340 345

<210> 22

<211> 11

<212> PRT

<213> Artificial Sequence

<220>

<223> anti-CD19 scFV CDRL1

<400> 22

Arg Ala Ser Gln Asp Ile Ser Lys Tyr Leu Asn
1 5 10

<210> 23

<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> anti-CD19 scFV CDR L2

<400> 23

Ser Arg Leu His Ser Gly Val
1 5

<210> 24
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> anti-CD19 scFV CDR L3

<400> 24

Gly Asn Thr Leu Pro Tyr Thr Phe Gly
1 5

<210> 25
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> anti-CD19 scFV CDR H1

<400> 25

Asp Tyr Gly Val Ser
1 5

<210> 26
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> anti-CD19 scFV CDR H2

<400> 26

Val Thr Trp Gly Ser Glu Thr Thr Tyr Tyr Asn Ser Ala Leu Lys Ser
1 5 10 15

<210> 27
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> anti-CD19 scFV CDRH3

<400> 27

Tyr Ala Met Asp Tyr Trp Gly
1 5

<210> 28
<211> 734
<212> DNA
<213> Artificial Sequence

<220>
<223> anti-CD19 scFv (VH-VL) FMC63

<400> 28

cacatccaga tgaccagac cacctccagc ctgagcgcca gcctgggcga ccgggtgacc 60
atcagctgcc gggccagcca ggacatcagc aagtacctga actggtatca gcagaagccc 120
gacggcaccg tcaagctgct gatctaccac accagccggc tgcacagcgg cgtgcccagc 180
cggtttagcg gcagcggctc cggcaccgac tacagcctga ccatctcaa cctggaacag 240
gaagatatcg ccactactt ttgccagcag ggcaacacac tgccttacac ctttggcggc 300
ggaacaaagc tggaatcac cggcagcacc tccggcagcg gcaagcctgg cagcggcgag 360
ggcagcacca agggcgaggt gaagctgcag gaaagcggcc ctggcctggt ggcccccagc 420
cagagcctga gcgtgacctg caccgtgagc ggcgtgagcc tgcccgacta cggcgtgagc 480
tggatccggc agccccccag gaagggcctg gaatggctgg gcgtgatctg gggcagcgag 540
accactact acaacagcgc cctgaagagc cggctgacca tcataagga caacagcaag 600
agccaggtgt tcctgaagat gaacagcctg cagaccgacg acaccgcat ctactactgc 660
gccaagcact actactacgg cggcagctac gccatggact actggggcca gggcaccagc 720
gtgaccgtga gcag 734

<210> 29
<211> 245
<212> PRT
<213> Artificial Sequence

<220>

<223> anti-CD19 scFv (VH-VL) FMC63

<400> 29

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

Asp Arg Val Thr Ile Ser Cys Arg Ala Ser Gln Asp Ile Ser Lys Tyr
20 25 30

Leu Asn Trp Tyr Gln Gln Lys Pro Asp Gly Thr Val Lys Leu Leu Ile
35 40 45

Tyr His Thr Ser Arg Leu His Ser Gly Val Pro Ser Arg Phe Ser Gly
50 55 60

Ser Gly Ser Gly Thr Asp Tyr Ser Leu Thr Ile Ser Asn Leu Glu Gln
65 70 75 80

Glu Asp Ile Ala Thr Tyr Phe Cys Gln Gln Gly Asn Thr Leu Pro Tyr
85 90 95

Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Thr Gly Ser Thr Ser Gly
100 105 110

Ser Gly Lys Pro Gly Ser Gly Glu Gly Ser Thr Lys Gly Glu Val Lys
115 120 125

Leu Gln Glu Ser Gly Pro Gly Leu Val Ala Pro Ser Gln Ser Leu Ser
130 135 140

Val Thr Cys Thr Val Ser Gly Val Ser Leu Pro Asp Tyr Gly Val Ser
145 150 155 160

Trp Ile Arg Gln Pro Pro Arg Lys Gly Leu Glu Trp Leu Gly Val Ile
165 170 175

Trp Gly Ser Glu Thr Thr Tyr Tyr Asn Ser Ala Leu Lys Ser Arg Leu
180 185 190

Thr Ile Ile Lys Asp Asn Ser Lys Ser Gln Val Phe Leu Lys Met Asn
195 200 205

Ser Leu Gln Thr Asp Asp Thr Ala Ile Tyr Tyr Cys Ala Lys His Tyr
210 215 220

Tyr Tyr Gly Gly Ser Tyr Ala Met Asp Tyr Trp Gly Gln Gly Thr Ser
225 230 235 240

Val Thr Val Ser Ser
245

<210> 30
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> anti-ROR1 scFV CDRL1

<400> 30

Ala Ser Gly Phe Asp Phe Ser Ala Tyr Tyr Met
1 5 10

<210> 31
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> anti-ROR1 scFV CDRL2

<400> 31

Thr Ile Tyr Pro Ser Ser Gly
1 5

<210> 32
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> anti-ROR1 scFV CDRL3

<400> 32

Ala Asp Arg Ala Thr Tyr Phe Cys Ala
1 5

<210> 33
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> anti-ROR1 scFV CDRH1

<400> 33

Asp Thr Ile Asp Trp Tyr
1 5

<210> 34
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> anti-ROR1 scFV CDRH2

<400> 34

Val Gln Ser Asp Gly Ser Tyr Thr Lys Arg Pro Gly Val Pro Asp Arg
1 5 10 15

<210> 35
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> anti-ROR1 scFV CDRH3

<400> 35

Tyr Ile Gly Gly Tyr Val Phe Gly
1 5

<210> 36
<211> 123
<212> DNA
<213> Homo sapiens

<400> 36
cggagcaagc ggagcagagg cggccacagc gactacatga acatgacccc cagacggcct 60

ggccccaccc ggaagcacta ccagccctac gccccaccca gggactttgc cgcctacaga 120

agc

123

<210> 37
<211> 1476
<212> DNA
<213> Artificial Sequence

<220>
<223> P28z CAR

<400> 37

```
gtggcctcac cgttgaccgc cttctgtcg ctgaacctgc tgctgctggg tgagtcgatt    60
atcctgggga gtggagaagc tgaggtgcag ctgcagcagt caggacctga actggtgaag   120
cctgggactt cagtgaggat atcctgcaag acttctggat acacattcac tgaatatacc   180
atacactggg tgaagcagag ccatggaaag agccttgagt ggattggaaa catcaatcct   240
aacaatggtg gtaccaccta caatcagaag ttcgaggaca aggccacatt gactgtagac   300
aagtctcca gtacagccta catggagctc cgcagcctaa catctgagga ttctgcagtc   360
tattattgtg cagctgggtg gaactttgac tactggggcc aagggaccac ggtcaccgtc   420
tcctcaggtg gaggtggatc aggtggaggt ggatctggtg gaggtggatc tgacattgtg   480
atgaccagtg ctacaaaatt catgtccaca tcagtaggag acagggtcag catcatctgt   540
aaggccagtc aagatgtggg tactgtctga gactggtatc aacagaaacc aggacaatct   600
cctaaactac tgattattg ggcattccact cggcacactg gattccctga tcgcttcaca   660
ggcagtggtg ctgggacaga cttcactctc accattacta atgttcagtc tgaagacttg   720
gcagattatt tctgtcagca atataacagc tatccctca cgttcggtgc tgggaccatg   780
ctggacctga aacgggcggc cgcattctact actaccaagc cagtgtctgc aactccctca   840
cctgtgcacc ctaccgggac atctcagccc cagagaccag aagattgtcg gccccgtggc   900
tcagtgaagg ggaccggatt ggacttcgcc tgtgatattt acatctgggc acccttgccc   960
ggaatctgcg tggccttct gctgtccttg atcatcactc tcattctgta caatagtaga  1020
aggaacagac tcctcaaag tgactacatg aacatgactc cccggaggcc tgggctcact  1080
cgaaagcctt accagcccta cggccctgcc agagactttg cagcgtaccg ccccagagca  1140
aaattcagca ggagtgcaga gactgtgcc aacctgcagg accccaacca gctctacaat  1200
gagctcaatc tagggcgaag agaggaatat gacgtcttgg agaagaagcg ggctcgggat  1260
ccagagatgg gaggcaaaca gcagaggagg aggaaccccc aggaaggcgt atacaatgca  1320
ctgcagaaag acaagatggc agaagcctac agtgagatcg gcacaaaagg cgagaggcgg  1380
```

agaggcaagg ggcacgatgg cctttaccag ggtctcagca ctgccaccaa ggacacctat 1440

gatgcctgc atatgcagac cctggcccct cgctaa 1476

<210> 38

<211> 15

<212> PRT

<213> Artificial Sequence

<220>

<223> Linker

<400> 38

Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser
1 5 10 15

<210> 39

<211> 327

<212> PRT

<213> Artificial Sequence

<220>

<223> IgG4-Fc

<400> 39

Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Cys Ser Arg
1 5 10 15

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 Ser 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 Leu Gly Lys
325

<210> 40

<211> 229

<212> PRT

<213> Artificial Sequence

<220>

<223> Hinge-CH2-CH3

<400> 40

Glu Ser Lys Tyr Gly Pro Pro Cys Pro Pro Cys Pro Ala Pro Glu Phe
1 5 10 15

Leu Gly Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr
20 25 30

Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val Asp Val
35 40 45

Ser Gln Glu Asp Pro Glu Val Gln Phe Asn Trp Tyr Val Asp Gly Val
50 55 60

Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Phe Asn Ser
65 70 75 80

Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln Asp Trp Leu
85 90 95

Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys Gly Leu Pro Ser
100 105 110

Ser Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro
115 120 125

Gln Val Tyr Thr Leu Pro Pro Ser Gln Glu Glu Met Thr Lys Asn Gln
130 135 140

Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile Ala
145 150 155 160

Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr

165 170 175

Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser Arg Leu
180 185 190

Thr Val Asp Lys Ser Arg Trp Gln Glu Gly Asn Val Phe Ser Cys Ser
195 200 205

Val Met His Glu Ala Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser
210 215 220

Leu Ser Leu Gly Lys
225

<210> 41
<211> 119
<212> PRT
<213> Artificial Sequence

<220>
<223> Hinge-CH3

<400> 41

Glu Ser Lys Tyr Gly Pro Pro Cys Pro Pro Cys Pro Gly Gln Pro Arg
1 5 10 15

Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Gln Glu Glu Met Thr Lys
20 25 30

Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp
35 40 45

Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys
50 55 60

Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser
65 70 75 80

Arg Leu Thr Val Asp Lys Ser Arg Trp Gln Glu Gly Asn Val Phe Ser
85 90 95

Cys Ser Val Met His Glu Ala Leu His Asn His Tyr Thr Gln Lys Ser
100 105 110

Leu Ser Leu Ser Leu Gly Lys
115

<210> 42
<211> 12
<212> PRT
<213> Artificial Sequence

<220>
<223> Hinge only

<400> 42

Glu Ser Lys Tyr Gly Pro Pro Cys Pro Pro Cys Pro
1 5 10

<210> 43
<211> 28
<212> PRT
<213> Homo sapiens

<400> 43

Met Phe Trp Val Leu Val Val Val Gly Gly Val Leu Ala Cys Tyr Ser
1 5 10 15

Leu Leu Val Thr Val Ala Phe Ile Ile Phe Trp Val
20 25

<210> 44
<211> 41
<212> PRT
<213> Artificial Sequence

<220>
<223> cytoplasmic domain of CD28 with LL to GG substitution

<400> 44

Arg Ser Lys Arg Ser Arg Gly Gly His Ser Asp Tyr Met Asn Met Thr
1 5 10 15

Pro Arg Arg Pro Gly Pro Thr Arg Lys His Tyr Gln Pro Tyr Ala Pro
20 25 30

Pro Arg Asp Phe Ala Ala Tyr Arg Ser
35 40

<210> 45
<211> 42
<212> PRT
<213> Homo sapiens

<400> 45

Lys Arg Gly Arg Lys Lys Leu Leu Tyr Ile Phe Lys Gln Pro Phe Met
1 5 10 15

Arg Pro Val Gln Thr Thr Gln Glu Glu Asp Gly Cys Ser Cys Arg Phe
20 25 30

Pro Glu Glu Glu Gly Gly Cys Glu Leu
35 40

<210> 46
<211> 112
<212> PRT
<213> Homo sapiens

<400> 46

Arg Val Lys Phe Ser Arg Ser Ala Asp Ala Pro Ala Tyr Gln Gln Gly
1 5 10 15

Gln Asn Gln Leu Tyr Asn Glu Leu Asn Leu Gly Arg Arg Glu Glu Tyr
20 25 30

Asp Val Leu Asp Lys Arg Arg Gly Arg Asp Pro Glu Met Gly Gly Lys
35 40 45

Pro Arg Arg Lys Asn Pro Gln Glu Gly Leu Tyr Asn Glu Leu Gln Lys
50 55 60

Asp Lys Met Ala Glu Ala Tyr Ser Glu Ile Gly Met Lys Gly Glu Arg
65 70 75 80

Arg Arg Gly Lys Gly His Asp Gly Leu Tyr Gln Gly Leu Ser Thr Ala
85 90 95

Thr Lys Asp Thr Tyr Asp Ala Leu His Met Gln Ala Leu Pro Pro Arg
100 105 110

<210> 47
<211> 24
<212> PRT
<213> Artificial Sequence

<220>
<223> T2A ribosomal skip element

<400> 47

Leu Glu Gly Gly Gly Glu Gly Arg Gly Ser Leu Leu Thr Cys Gly Asp
1 5 10 15

Val Glu Glu Asn Pro Gly Pro Arg
20

<210> 48
<211> 356
<212> PRT
<213> Artificial Sequence

<220>
<223> tEGFR

<400> 48

Met Leu Leu Leu Val Thr Ser Leu Leu Leu Cys Glu Leu Pro His Pro
1 5 10 15

Ala Phe Leu Leu Ile Pro Arg Lys Val Cys Asn Gly Ile Gly Ile Gly
20 25 30

Glu Phe Lys Asp Ser Leu Ser Ile Asn Ala Thr Asn Ile Lys His Phe
35 40 45

Lys Asn Cys Thr Ser Ile Ser Gly Asp Leu His Ile Leu Pro Val Ala
50 55 60

Phe Arg Gly Asp Ser Phe Thr His Thr Pro Pro Leu Asp Pro Gln Glu
65 70 75 80

Leu Asp Ile Leu Lys Thr Val Lys Glu Ile Thr Gly Phe Leu Leu Ile
85 90 95

Gln Ala Trp Pro Glu Asn Arg Thr Asp Leu His Ala Phe Glu Asn Leu
100 105 110

Glu Ile Ile Arg Gly Arg Thr Gln His Gly Gln Phe Ser Leu Ala Val
115 120 125

Val Ser Leu Asn Ile Thr Ser Leu Gly Leu Arg Ser Leu Lys Glu Ile
130 135 140

Ser Asp Gly Asp Val Ile Ile Ser Gly Asn Lys Asn Leu Cys Tyr Ala
145 150 155 160

Asn Thr Ile Asn Trp Lys Lys Leu Phe Gly Thr Ser Gly Gln Lys Thr
165 170 175

Lys Ile Ile Ser Asn Arg Gly Glu Asn Ser Cys Lys Ala Thr Gly Gln
180 185 190

Val Cys His Ala Leu Cys Ser Pro Glu Gly Cys Trp Gly Pro Glu Pro
195 200 205

Arg Asp Cys Val Ser Cys Arg Asn Val Ser Arg Gly Arg Glu Cys Val
210 215 220

Asp Lys Cys Asn Leu Leu Glu Gly Glu Pro Arg Glu Phe Val Glu Asn
225 230 235 240

Ser Glu Cys Ile Gln Cys His Pro Glu Cys Leu Pro Gln Ala Met Asn
245 250 255

Ile Thr Cys Thr Gly Arg Gly Pro Asp Asn Cys Ile Gln Cys Ala His
260 265 270

Tyr Ile Asp Gly Pro His Cys Val Lys Thr Cys Pro Ala Gly Val Met
275 280 285

Gly Glu Asn Asn Thr Leu Val Trp Lys Tyr Ala Asp Ala Gly His Val
290 295 300

Cys His Leu Cys His Pro Asn Cys Thr Tyr Gly Cys Thr Gly Pro Gly
305 310 315 320

Leu Glu Gly Cys Pro Thr Asn Gly Pro Lys Ile Pro Ser Ile Ala Thr

325 330 335

Gly Met Val Gly Ala Leu Leu Leu Leu Val Val Ala Leu Gly Ile
340 345 350

Gly Leu Phe Met
355

<210> 49
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> STREP TAG II

<400> 49

Trp Ser His Pro Gln Phe Glu Lys
1 5

<210> 50
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Myc tag

<400> 50

Glu Gln Lys Leu Ile Ser Glu Glu Asp Leu
1 5 10

<210> 51
<211> 14
<212> PRT
<213> Artificial Sequence

<220>
<223> V5 tag

<400> 51

Gly Lys Pro Ile Pro Asn Pro Leu Leu Gly Leu Asp Ser Thr
1 5 10

<210> 52
<211> 8

<212> PRT
<213> Artificial Sequence

<220>
<223> FLAG tag

<400> 52

Asp Tyr Lys Asp Asp Asp Asp Lys
1 5

<210> 53
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> TRAC-Forward

<400> 53
cccgtgtcat tctctggact 20

<210> 54
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> TRAC-Reverse

<400> 54
atcacgagca gctggttct 20

<210> 55
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Foxo13A Forward

<400> 55
ggacagccta gaaagagcag 20

<210> 56
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> Foxo13A Probe

<400> 56
aggtcggcgt agctcagatt gc 22

<210> 57
<211> 21
<212> DNA
<213> Artificial Sequence

<220>
<223> Foxo13A Reverse

<400> 57
ctcttgacca tccactcgta g 21