SEQUENCE LISTING

<110> Fred Hutchinson Cancer Research Center
Riddell, Stanley R.
Liu, Lingfeng

<120> TAGGED CHIMERIC EFFECTOR MOLECULES AND RECEPTORS THEREOF

<130> 360056.426WO

<140> PCT
<141> 2014-12-22

<150> US 61/919,201
<151> 2013-12-20

<160> 73

<170> FastSEQ for Windows Version 4.0

<210> 1
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Strep-tag II

<400> 1
Trp Ser His Pro Gln Phe Glu Lys
1 5

<210> 2
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Strep-tag

<400> 2
Trp Arg His Pro Gln Phe Gly Gly
1 5

<210> 3
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Flag Tag

<400> 3
Asp Tyr Lys Asp Asp Asp Asp Lys
1 5

<210> 4
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Xpress tag

<400> 4
Asp Leu Tyr Asp Asp Asp Asp Lys

1 5

<210> 5
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<223> Avi tag

<400> 5
Gly Leu Asn Asp Ile Phe Glu Ala Gln Lys Ile Glu Trp His Glu
1 5 10 15

<210> 6
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> HA tag

<400> 6
Tyr Pro Tyr Asp Val Pro Asp Tyr Ala
1 5

<210> 7
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Myc tag

<400> 7
Glu Gln Lys Leu Ile Ser Glu Glu Asp Leu
1 5 10

<210> 8
<211> 14
<212> PRT
<213> Artificial Sequence

<220>
<223> V5 tag

<400> 8
Gly Lys Pro Ile Pro Asn Pro Leu Leu Gly Leu Asp Ser Thr
1 5 10

<210> 9
<211> 13
<212> PRT
<213> Artificial Sequence

<220>
<223> Soft tag 1

<400> 9
Ser Leu Ala Glu Leu Leu Asn Ala Gly Leu Gly Gly Ser
1 5 10

<210> 10
<211> 5
<212> PRT
<213> Artificial Sequence

<220>

<223> linker

<400> 10
Gly Gly Gly Gly Ser
 1   5

<210> 11
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> linker

<400> 11
Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser
 1   5   10

<210> 12
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> linker

<400> 12
Gly Gly Gly Ser Gly Gly Gly Ser Gly Gly Ser
 1   5   10

<210> 13
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<223> linker

<400> 13
Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser
 1   5   10   15

<210> 14
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> linker

<400> 14
Gly Gly Gly Ser Gly Gly Gly Ser Gly Gly Gly Ser Gly Gly Gly Ser
 1   5   10   15

<210> 15
<211> 12
<212> PRT
<213> Artificial Sequence

<220>
<223> IgG4 Hinge

<400> 15
Glu Ser Lys Tyr Gly Pro Pro Cys Pro Pro Cys Pro
 1   5   10

<210> 16
<211> 28

<212> PRT
<213> Artificial Sequence

<220>
<223> CD28 transmembrane domain

<400> 16
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> 17
<211> 42
<212> PRT
<213> Artificial Sequence

<220>
<223> 4 1BB portion

<400> 17
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 Glu Gly Gly Cys Glu Leu
        35   40

<210> 18
<211> 112
<212> PRT
<213> Artificial Sequence

<220>
<223> CD3 zeta portion

<400> 18
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> 19
<211> 26
<212> PRT
<213> Artificial Sequence

<220>
<223> Calmodulin tag

<400> 19
Lys Arg Arg Trp Lys Lys Asn Phe Ile Ala Val Ser Ala Ala Asn Arg
 1   5   10   15
Phe Lys Lys Ile Ser Ser Ser Gly Ala Leu
            20   25

<210> 20
<211> 18

<212> PRT
<213> Artificial Sequence

<220>
<223> linker+tag

<400> 20
Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Trp Ser His Pro Gln Phe
 1   5   10   15
Glu Lys

<210> 21
<211> 18
<212> PRT
<213> Artificial Sequence

<220>
<223> linker+tag

<400> 21
Trp Ser His Pro Gln Phe Glu Lys Gly Gly Gly Gly Ser Gly Gly Gly
 1   5   10   15
Gly Ser

<210> 22
<211> 37
<212> PRT
<213> Artificial Sequence

<220>
<223> linker tag

<400> 22
Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Trp Ser His Pro Gln Phe
 1   5   10   15
Glu Lys Gly Gly Ser Gly Gly Gly Ser Gly Gly Ser Trp Ser His
            20   25   30
Pro Gln Phe Glu Lys
        35

<210> 23
<211> 37
<212> PRT
<213> Artificial Sequence

<220>
<223> linker tag

<400> 23
Trp Ser His Pro Gln Phe Glu Lys Gly Gly Gly Ser Gly Gly Gly Ser
 1   5   10   15
Gly Gly Ser Trp Ser His Pro Gln Phe Glu Lys Gly Gly Gly Gly Ser
            20   25   30
Gly Gly Gly Gly Ser
        35

<210> 24
<211> 55
<212> PRT
<213> Artificial Sequence

<220>
<223> linker tag

<400> 24
Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Trp Ser His Pro Gln Phe
 1   5   10   15
Glu Lys Gly Gly Gly Ser Gly Gly Gly Ser Gly Gly Ser Trp Ser His
            20   25   30
Pro Gln Phe Glu Lys Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Trp
        35   40   45
Ser His Pro Gln Phe Glu Lys
    50   55

<210> 25
<211> 55
<212> PRT
<213> Artificial Sequence

<220>
<223> linker tag

<400> 25
Trp Ser His Pro Gln Phe Glu Lys Gly Gly Gly Gly Ser Gly Gly Gly
 1   5   10   15
Gly Ser Trp Ser His Pro Gln Phe Glu Lys Gly Gly Gly Ser Gly Gly
            20   25   30
Gly Ser Gly Gly Ser Trp Ser His Pro Gln Phe Glu Lys Gly Gly Gly
        35   40   45
Gly Ser Gly Gly Gly Gly Ser
    50   55

<210> 26
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> core hinge region

<400> 26
Cys Pro Pro Cys Pro
 1   5

<210> 27
<211> 36
<212> DNA
<213> Artificial Sequence

<220>
<223> IgG4 Hinge

<400> 27
gagagcaagt acggaccgcc ctgcccccct tgccct   36

<210> 28
<211> 84
<212> DNA
<213> Artificial Sequence

<220>
<223> CD28 transmembrane domain

<400> 28
atgttctggg tgctggtggt ggtcggaggc gtgctggcct gctacagcct gctggtcacc   60
gtggccttca tcatcttttg ggtg   84

<210> 29

<211> 126
<212> DNA
<213> Artificial Sequence

<220>
<223> 4 1BB portion

<400> 29
aaacggggca gaaagaaact cctgtatata ttcaaacaac catttatgag accagtacaa 60
actactcaag aggaagatgg ctgtagctgc cgatttccag aagaagaaga aggaggatgt 120
gaactg 126

<210> 30
<211> 336
<212> DNA
<213> Artificial Sequence

<220>
<223> CD3 zeta portion

<400> 30
cgggtgaagt tcagcagaag cgccgacgcc cctgcctacc agcagggcca gaatcagctg 60
tacaacgagc tgaacctggg cagaagggaa gagtacgacg tcctggataa gcggagaggc 120
cgggaccctg agatgggcgg caagcctcgg cggaagaacc cccaggaagg cctgtataac 180
gaactgcaga aagacaagat ggccgaggcc tacagcgaga tcggcatgaa gggcgagcgg 240
aggcggggca agggccacga cggcctgtat cagggcctgt ccaccgccac caaggatacc 300
tacgacgccc tgcacatgca ggccctgccc ccaagg 336

<210> 31
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<223> S tag

<400> 31
Lys Glu Thr Ala Ala Ala Lys Phe Glu Arg Gln His Met Asp Ser
1 5 10 15

<210> 32
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Softag 3

<400> 32
Thr Gln Asp Pro Ser Arg Val Gly
1 5

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

<220>
<223> Engineered tag of a minimal chelation site

<400> 33
His Gly Gly His His Gly
1 5

<210> 34
<211> 123
<212> DNA
<213> Artificial Sequence

<220>
<223> CD28 effector domain

<400> 34
cggagcaagc ggagcagagg cggccacagc gactacatga acatgacccc cagacggcct 60
ggccccaccc ggaagcacta ccagccctac gccccaccca gggactttgc cgcctacaga 120
agc 123

<210> 35
<211> 41
<212> PRT
<213> Artificial Sequence

<220>
<223> CD28 effector domain

<400> 35
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> 36
<211> 735
<212> DNA
<213> Artificial Sequence

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

<400> 36
gacatccaga tgacccagac cacctccagc ctgagcgcca gcctgggcga ccgggtgacc 60
atcagctgcc gggccagcca ggacatcagc aagtacctga actggtatca gcagaagccc 120
gacggcaccg tcaagctgct gatctaccac accagccggc tgcacagcgg cgtgcccagc 180
cggtttagcg gcagcggctc cggcaccgac tacagcctga ccatctccaa cctggaacag 240
gaagatatcg ccacctactt ttgccagcag ggcaacacac tgccctacac ctttggcggc 300
ggaacaaagc tggaaatcac 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
accacctact acaacagcgc cctgaagagc cggctgacca tcatcaagga caacagcaag 600
agccaggtgt tcctgaagat gaacagcctg cagaccgacg acaccgccat ctactactgc 660
gccaagcact actactacgg cggcagctac gccatggact actggggcca gggcaccagc 720
gtgaccgtga gcagc 735

<210> 37
<211> 245
<212> PRT
<213> Artificial Sequence

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

<400> 37
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> 38
<211> 24
<212> DNA
<213> Artificial Sequence

<220>
<223> Strep-tag II

<400> 38
tggagccacc cgcagttcga aaaa 24

<210> 39
<211> 15
<212> DNA
<213> Artificial Sequence

<220>
<223> G4S

<400> 39
ggaggtggag gttca 15

<210> 40
<211> 15
<212> DNA
<213> Artificial Sequence

<220>
<223> G4S

<400> 40
ggtggtggag gctct 15

<210> 41
<211> 15
<212> DNA
<213> Artificial Sequence

<220>
<223> G4S

<400> 41
ggtggcggag gctct 15

<210> 42
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> (G4S)2

<400> 42
ggaggtggag gttcaggtgg tggaggttca 30

<210> 43
<211> 33
<212> DNA
<213> Artificial Sequence

<220>
<223> G3SG3SG2S

<400> 43
ggaggcggtt ctggaggtgg aagcggtggc tct 33

<210> 44
<211> 18
<212> PRT
<213> Artificial Sequence

<220>
<223> variable domain linker

<400> 44
Gly Ser Thr Ser Gly Ser Gly Lys Pro Gly Ser Gly Glu Gly Ser Thr
 1 5 10 15
Lys Gly

<210> 45
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> variable domain linker + imbedded tag

<220>
<221> VARIANT
<222> (1)...(20)
<223> Xaa = Any Amino Acid

<400> 45
Gly Gly Ser Gly Ser Gly Xaa Trp Ser His Pro Gln Phe Glu Lys Gly
 1   5   10   15
Ser Gly Ser Gly
            20

<210> 46
<211> 18
<212> PRT
<213> Artificial Sequence

<220>
<223> N-terminal tag + linker

<400> 46
Trp Ser His Pro Gln Phe Glu Lys Gly Gly Gly Gly Ser Gly Gly Gly
 1   5   10   15
Gly Ser

<210> 47
<211> 22
<212> PRT
<213> Artificial Sequence

<220>
<223> secretory signal peptide

<400> 47
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
            20

<210> 48
<211> 23
<212> PRT
<213> Artificial Sequence

<220>
<223> secretory signal peptide

<220>
<221> VARIANT
<222> (1)...(23)
<223> Xaa = Any Amino Acid

<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 Xaa
            20

<210> 49
<211> 13
<212> PRT
<213> Artificial Sequence

<220>
<223> C-terminal junction amino acids

<400> 49
Glu Ser Lys Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser

1 5 10

<210> 50
<211> 4
<212> PRT
<213> Artificial Sequence

<220>
<223> C-terminal junction amino acids

<400> 50
Gly Glu Ser Lys
1

<210> 51
<211> 107
<212> PRT
<213> Artificial Sequence

<220>
<223> anti-CD19 VH domain

<400> 51
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
100 105

<210> 52
<211> 120
<212> PRT
<213> Artificial Sequence

<220>
<223> anti-CD19 VL domain

<400> 52
Glu Val Lys Leu Gln Glu Ser Gly Pro Gly Leu Val Ala Pro Ser Gln
1 5 10 15
Ser Leu Ser Val Thr Cys Thr Val Ser Gly Val Ser Leu Pro Asp Tyr
20 25 30
Gly Val Ser Trp Ile Arg Gln Pro Pro Arg Lys Gly Leu Glu Trp Leu
35 40 45
Gly Val Ile Trp Gly Ser Glu Thr Thr Tyr Tyr Asn Ser Ala Leu Lys
50 55 60
Ser Arg Leu Thr Ile Ile Lys Asp Asn Ser Lys Ser Gln Val Phe Leu
65 70 75 80
Lys Met Asn Ser Leu Gln Thr Asp Asp Thr Ala Ile Tyr Tyr Cys Ala
85 90 95
Lys His Tyr Tyr Tyr Gly Gly Ser Tyr Ala Met Asp Tyr Trp Gly Gln
100 105 110
Gly Thr Ser Val Thr Val Ser Ser
115 120

<210> 53
<211> 263
<212> PRT
<213> Artificial Sequence

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

<400> 53
Trp Ser His Pro Gln Phe Glu Lys Gly Gly Gly Gly Ser Gly Gly Gly
 1   5   10   15
Gly Ser Asp Ile Gln Met Thr Gln Thr Thr Ser Ser Leu Ser Ala Ser
            20   25   30
Leu Gly Asp Arg Val Thr Ile Ser Cys Arg Ala Ser Gln Asp Ile Ser
        35   40   45
Lys Tyr Leu Asn Trp Tyr Gln Gln Lys Pro Asp Gly Thr Val Lys Leu
    50   55   60
Leu Ile Tyr His Thr Ser Arg Leu His Ser Gly Val Pro Ser Arg Phe
65   70   75   80
Ser Gly Ser Gly Ser Gly Thr Asp Tyr Ser Leu Thr Ile Ser Asn Leu
                85   90   95
Glu Gln Glu Asp Ile Ala Thr Tyr Phe Cys Gln Gln Gly Asn Thr Leu
            100   105   110
Pro Tyr Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Thr Gly Ser Thr
        115   120   125
Ser Gly Ser Gly Lys Pro Gly Ser Gly Glu Gly Ser Thr Lys Gly Glu
    130   135   140
Val Lys Leu Gln Glu Ser Gly Pro Gly Leu Val Ala Pro Ser Gln Ser
145   150   155   160
Leu Ser Val Thr Cys Thr Val Ser Gly Val Ser Leu Pro Asp Tyr Gly
                165   170   175
Val Ser Trp Ile Arg Gln Pro Pro Arg Lys Gly Leu Glu Trp Leu Gly
            180   185   190
Val Ile Trp Gly Ser Glu Thr Thr Tyr Tyr Asn Ser Ala Leu Lys Ser
        195   200   205
Arg Leu Thr Ile Ile Lys Asp Asn Ser Lys Ser Gln Val Phe Leu Lys
    210   215   220
Met Asn Ser Leu Gln Thr Asp Asp Thr Ala Ile Tyr Tyr Cys Ala Lys
225   230   235   240
His Tyr Tyr Tyr Gly Gly Ser Tyr Ala Met Asp Tyr Trp Gly Gln Gly
                245   250   255
Thr Ser Val Thr Val Ser Ser
            260

<210> 54
<211> 247
<212> PRT
<213> Artificial Sequence

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

<400> 54
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 Gly Ser Gly Ser
            100   105   110
Gly Asn Trp Ser His Pro Gln Phe Glu Lys Gly Ser Gly Ser Gly Glu
        115   120   125
Val Lys Leu Gln Glu Ser Gly Pro Gly Leu Val Ala Pro Ser Gln Ser
    130   135   140
Leu Ser Val Thr Cys Thr Val Ser Gly Val Ser Leu Pro Asp Tyr Gly

145 150 155 160
Val Ser Trp Ile Arg Gln Pro Pro Arg Lys Gly Leu Glu Trp Leu Gly
165 170 175
Val Ile Trp Gly Ser Glu Thr Thr Tyr Tyr Asn Ser Ala Leu Lys Ser
180 185 190
Arg Leu Thr Ile Ile Lys Asp Asn Ser Lys Ser Gln Val Phe Leu Lys
195 200 205
Met Asn Ser Leu Gln Thr Asp Asp Thr Ala Ile Tyr Tyr Cys Ala Lys
210 215 220
His Tyr Tyr Tyr Gly Gly Ser Tyr Ala Met Asp Tyr Trp Gly Gln Gly
225 230 235 240
Thr Ser Val Thr Val Ser Ser
245

<210> 55
<211> 121
<212> PRT
<213> Artificial Sequence

<220>
<223> anti-ROR1 R12 VH domain

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

<210> 56
<211> 111
<212> PRT
<213> Artificial Sequence

<220>
<223> anti-ROR1 R12 VL domain

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

<210> 57
<211> 247
<212> PRT
<213> Artificial Sequence

<220>
<223> anti-ROR1 scFv (VH-VL) from R12

<400> 57
Gln Glu Gln Leu Val Glu Ser Gly Gly Arg Leu Val Thr Pro Gly Gly
 1   5   10   15
Ser Leu Thr Leu Ser Cys Lys Ala Ser Gly Phe Asp Phe Ser Ala Tyr
            20   25   30
Tyr Met Ser Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Ile
        35   40   45
Ala Thr Ile Tyr Pro Ser Ser Gly Lys Thr Tyr Tyr Ala Thr Trp Val
    50   55   60
Asn Gly Arg Phe Thr Ile Ser Ser Asp Asn Ala Gln Asn Thr Val Asp
65   70   75   80
Leu Gln Met Asn Ser Leu Thr Ala Ala Asp Arg Ala Thr Tyr Phe Cys
                85   90   95
Ala Arg Asp Ser Tyr Ala Asp Asp Gly Ala Leu Phe Asn Ile Trp Gly
            100   105   110
Pro Gly Thr Leu Val Thr Ile Ser Ser Gly Gly Gly Gly Ser Gly Gly
        115   120   125
Gly Gly Ser Gly Gly Gly Gly Ser Glu Leu Val Leu Thr Gln Ser Pro
    130   135   140
Ser Val Ser Ala Ala Leu Gly Ser Pro Ala Lys Ile Thr Cys Thr Leu
145   150   155   160
Ser Ser Ala His Lys Thr Asp Thr Ile Asp Trp Tyr Gln Gln Leu Gln
                165   170   175
Gly Glu Ala Pro Arg Tyr Leu Met Gln Val Gln Ser Asp Gly Ser Tyr
            180   185   190
Thr Lys Arg Pro Gly Val Pro Asp Arg Phe Ser Gly Ser Ser Ser Gly
        195   200   205
Ala Asp Arg Tyr Leu Ile Ile Pro Ser Val Gln Ala Asp Asp Glu Ala
    210   215   220
Asp Tyr Tyr Cys Gly Ala Asp Tyr Ile Gly Gly Tyr Val Phe Gly Gly
225   230   235   240
Gly Thr Gln Leu Thr Val Thr
                245

<210> 58
<211> 858
<212> DNA
<213> Artificial Sequence

<220>
<223> secretory signal peptide-[anti-CD19 scFv
      (Tag-VH-VL)]

<400> 58
atgctgctgc tggtgaccag cctgctgctg tgcgagctgc cccaccccgc ctttctgctg   60
atccccaatt ggagccaccc gcagttcgaa aaaggaggtg gaggttcagg tggtggaggc   120
tctgacatcc agatgaccca gaccacctcc agcctgagcg ccagcctggg cgaccgggtg   180
accatcagct gccgggccag ccaggacatc agcaagtacc tgaactggta tcagcagaag   240
cccgacggca ccgtcaagct gctgatctac cacaccagcc ggctgcacag cggcgtgccc   300
agccggttta gcggcagcgg ctccggcacc gactacagcc tgaccatctc caacctggaa   360
caggaagata tcgccaccta cttttgccag cagggcaaca cactgcccta caccttggc   420
ggcggaacaa agctggaaat caccggcagc acctccggca gcggcaagcc tggcagcggc   480
gagggcagca ccaagggcga ggtgaagctg caggaaagcg gccctggcct ggtggccccc   540
agccagagcc tgagcgtgac ctgcaccgtg agcggcgtga gcctgcccga ctacggcgtg   600
agctggatca ggcagccccc caggaagggc ctggaatggc tgggcgtgat ctggggcagc   660
gagaccacct actacaacag cgccctgaag agccggctga ccatcatcaa ggacaacagc   720
aagagccagg tgttcctgaa gatgaacagc ctgcagaccg acgacaccgc catctactac   780
tgcgccaagc actactacta cggcggcagc tacgccatgg actactgggg ccagggcacc   840
agcgtgaccg tgagcagc   858

<210> 59
<211> 807
<212> DNA
<213> Artificial Sequence

<220>
<223> secretory signal peptide-[anti-CD19 scFv (VH-Tag-VL)]

<400> 59
atgctgctgc tggtgaccag cctgctgctg tgcgagctgc cccaccccgc ctttctgctg 60
atccccgaca tccagatgac ccagaccacc tccagcctga gcgccagcct gggcgaccgg 120
gtgaccatca gctgccgggc cagccaggac atcagcaagt acctgaactg gtatcagcag 180
aagcccgacg gcaccgtcaa gctgctgatc taccacacca gccggctgca cagcggcgtg 240
cccagccggt ttagcggcag cggctccggc accgactaca gcctgaccat ctccaacctg 300
gaacaggaag atatcgccac ctacttttgc cagcagggca acacactgcc ctacaccttt 360
ggcggcggaa caaagctgga aatcaccgga ggttcaggat ctggcaattg gagccacccg 420
cagttcgaaa aaggctctgg atcaggtgag gtgaagctgc aggaaagcgg ccctggcctg 480
gtggccccca gccagagcct gagcgtgacc tgcaccgtga gcggcgtgag cctgcccgac 540
tacggcgtga gctggatcag gcagcccccc aggaagggcc tggaatggct gggcgtgatc 600
tggggcagcg agaccaccta ctacaacagc gccctgaaga gccggctgac catcatcaag 660
gacaacagca agagccaggt gttcctgaag atgaacagcc tgcagaccga cgacaccgcc 720
atctactact gcgccaagca ctactactac ggcggcagct acgccatgga ctactggggc 780
cagggcacca gcgtgaccgt gagcagc 807

<210> 60
<211> 807
<212> DNA
<213> Artificial Sequence

<220>
<223> secretory signal peptide-anti-ROR1 scFv (VH-VL)

<400> 60
atgctgctgc tggtgacaag cctgctgctg tgcgagctgc cccaccccgc ctttctgctg 60
atcccccagg aacagctcgt cgaaagcggc ggcagactgg tgacacctgg cggcagcctg 120
accctgagct gcaaggccag cggcttcgac ttcagcgcct actacatgag ctgggtccgc 180
caggcccctg gcaagggact ggaatggatc gccaccatct accccagcag cggcaagacc 240
tactacgcca cctgggtgaa cggacggttc accatctcca gcgacaacgc ccagaacacc 300
gtggacctgc agatgaacag cctgacagcc gccgaccggg ccacctactt ttgcgccaga 360
gacagctacg ccgacgacgg cgccctgttc aacatctggg gccctggcac cctggtgaca 420
atctctagcg gcggaggcgg atctggtggc ggaggaagtg gcggcggagg atctgagctg 480
gtgctgaccc agagcccctc tgtgtctgct gccctgggaa gccctgccaa gatcacctgt 540
accctgagca gcgcccacaa gaccgacacc atcgactggt atcagcagct gcagggcgag 600
gcccccagat acctgatgca ggtgcagagc gacggcagct acaccaagag gccaggcgtg 660
cccgaccggt tcagcggatc tagctctggc gccgaccgct acctgatcat ccccagcgtg 720
caggccgatg acgaggccga ttactactgt ggcgccgact acatcggcgg ctacgtgttc 780
ggcggaggca cccagctgac cgtgacc 807

<210> 61
<211> 30
<212> DNA
<213> Artificial Sequence

<220>
<223> (G4S)2

<400> 61
ggaggtggag gttcaggtgg tggaggctct 30

<210> 62
<211> 45
<212> DNA
<213> Artificial Sequence

<220>
<223> (G4S)3

<400> 62
ggcggaggcg gatctggtgg cggaggaagt ggcggcggag gatct 45

<210> 63

<211> 66
<212> DNA
<213> Artificial Sequence

<220>
<223> secretory signal peptide

<400> 63
atgctgctgc tggtgaccag cctgctgctg tgcgagctgc cccaccccgc ctttctgctg 60
atcccc 66

<210> 64
<211> 66
<212> DNA
<213> Artificial Sequence

<220>
<223> secretory signal peptide

<400> 64
atgctgctgc tggtgacaag cctgctgctg tgcgagctgc cccaccccgc ctttctgctg 60
atcccc 66

<210> 65
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> linker

<400> 65
Gly Gly Ser Gly Ser Gly
1 5

<210> 66
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> linker

<400> 66
Gly Ser Gly Ser Gly
1 5

<210> 67
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> linker

<400> 67
Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser
1 5 10

<210> 68
<211> 8
<212> PRT
<213> Artificial Sequence

<220>

<223> linker

<400> 68
Gly Gly Gly Ser Gly Gly Gly Ser
 1   5

<210> 69
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> linker

<400> 69
Gly Gly Gly Ser Gly Gly Gly Ser Gly Gly Ser
 1   5   10

<210> 70
<211> 28
<212> PRT
<213> Artificial Sequence

<220>
<223> modified CD28 transmembrane domain

<400> 70
Met Phe Trp Val Leu Val Val Val Gly Gly Val Leu Ala Cys Tyr Ser
 1   5   10   15
Gly Gly Val Thr Val Ala Phe Ile Ile Phe Trp Val
            20   25

<210> 71
<211> 4
<212> PRT
<213> Artificial Sequence

<220>
<223> linker

<400> 71
Gly Gly Gly Ser
 1

<210> 72
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> linker

<400> 72
Gly Gly Gly Ser Gly Gly Gly Gly Ser
 1   5

<210> 73
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> linker

<400> 73
Gly Gly Gly Ser Gly Gly Ser
 1   5