SEQUENCE LISTING

<110> Juno Therapeutics, Inc.

<120> CD19-DIRECTED CHIMERIC ANTIGEN RECEPTOR
T CELL COMPOSITIONS AND METHODS AND USES THEREOF

<130> 735042022740

<140> Not yet assigned
<141> Concurrently herewith

<150> US 62/975,724
<151> 2020-02-12

<160> 90

<170> FastSEQ for Windows Version 4.0

<210> 1
<211> 12
<212> PRT
<213> Homo sapiens

<220>
<223> spacer (IgG4hinge)

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

<210> 2
<211> 36
<212> DNA
<213> Homo sapiens

<220>
<223> spacer (IgG4hinge)

<400> 2
gaatctaagt acggaccgcc ctgcccccct tgccct 36

<210> 3
<211> 119
<212> PRT
<213> Homo sapiens

<220>

<223> Hinge-CH3 spacer

<400> 3
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> 4
<211> 229
<212> PRT
<213> Homo sapiens

<220>
<223> Hinge-CH2-CH3 spacer

<400> 4
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

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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> 5
<211> 282
<212> PRT
<213> Homo sapiens

<220>
<223> IgD-hinge-Fc

<400> 5
Arg Trp Pro Glu Ser Pro Lys Ala Gln Ala Ser Ser Val Pro Thr Ala
 1               5                  10                  15
Gln Pro Gln Ala Glu Gly Ser Leu Ala Lys Ala Thr Thr Ala Pro Ala
            20                  25                  30
Thr Thr Arg Asn Thr Gly Arg Gly Gly Glu Glu Lys Lys Lys Glu Lys
        35                  40                  45
Glu Lys Glu Glu Gln Glu Glu Arg Glu Thr Lys Thr Pro Glu Cys Pro
    50                  55                  60
Ser His Thr Gln Pro Leu Gly Val Tyr Leu Leu Thr Pro Ala Val Gln
65                  70                  75                  80
Asp Leu Trp Leu Arg Asp Lys Ala Thr Phe Thr Cys Phe Val Val Gly
                85                  90                  95
Ser Asp Leu Lys Asp Ala His Leu Thr Trp Glu Val Ala Gly Lys Val
            100                 105                 110
Pro Thr Gly Gly Val Glu Glu Gly Leu Leu Glu Arg His Ser Asn Gly
        115                 120                 125
Ser Gln Ser Gln His Ser Arg Leu Thr Leu Pro Arg Ser Leu Trp Asn
    130                 135                 140
Ala Gly Thr Ser Val Thr Cys Thr Leu Asn His Pro Ser Leu Pro Pro
145                 150                 155                 160
Gln Arg Leu Met Ala Leu Arg Glu Pro Ala Ala Gln Ala Pro Val Lys
                165                 170                 175
Leu Ser Leu Asn Leu Leu Ala Ser Ser Asp Pro Pro Glu Ala Ala Ser
            180                 185                 190
Trp Leu Leu Cys Glu Val Ser Gly Phe Ser Pro Pro Asn Ile Leu Leu
        195                 200                 205
Met Trp Leu Glu Asp Gln Arg Glu Val Asn Thr Ser Gly Phe Ala Pro
    210                 215                 220
Ala Arg Pro Pro Pro Gln Pro Gly Ser Thr Thr Phe Trp Ala Trp Ser
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225 230 235 240
Val Leu Arg Val Pro Ala Pro Pro Ser Pro Gln Pro Ala Thr Tyr Thr
245 250 255
Cys Val Val Ser His Glu Asp Ser Arg Thr Leu Leu Asn Ala Ser Arg
260 265 270
Ser Leu Glu Val Ser Tyr Val Thr Asp His
275 280

<210> 6
<211> 24
<212> PRT
<213> Artificial Sequence

<220>
<223> T2A

<400> 6
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> 7
<211> 357
<212> PRT
<213> Artificial Sequence

<220>
<223> tEGFR

<400> 7
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 Lys Gln His Gly Gln Phe Ser Leu Ala
115 120 125
Val Val Ser Leu Asn Ile Thr Ser Leu Gly Leu Arg Ser Leu Lys Glu

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    130                 135                 140
Ile Ser Asp Gly Asp Val Ile Ile Ser Gly Asn Lys Asn Leu Cys Tyr
145                 150                 155                 160
Ala Asn Thr Ile Asn Trp Lys Lys Leu Phe Gly Thr Ser Gly Gln Lys
                165                 170                 175
Thr Lys Ile Ile Ser Asn Arg Gly Glu Asn Ser Cys Lys Ala Thr Gly
            180                 185                 190
Gln Val Cys His Ala Leu Cys Ser Pro Glu Gly Cys Trp Gly Pro Glu
        195                 200                 205
Pro Arg Asp Cys Val Ser Cys Arg Asn Val Ser Arg Gly Arg Glu Cys
    210                 215                 220
Val Asp Lys Cys Asn Leu Leu Glu Gly Glu Pro Arg Glu Phe Val Glu
225                 230                 235                 240
Asn Ser Glu Cys Ile Gln Cys His Pro Glu Cys Leu Pro Gln Ala Met
                245                 250                 255
Asn Ile Thr Cys Thr Gly Arg Gly Pro Asp Asn Cys Ile Gln Cys Ala
            260                 265                 270
His Tyr Ile Asp Gly Pro His Cys Val Lys Thr Cys Pro Ala Gly Val
        275                 280                 285
Met Gly Glu Asn Asn Thr Leu Val Trp Lys Tyr Ala Asp Ala Gly His
    290                 295                 300
Val Cys His Leu Cys His Pro Asn Cys Thr Tyr Gly Cys Thr Gly Pro
305                 310                 315                 320
Gly Leu Glu Gly Cys Pro Thr Asn Gly Pro Lys Ile Pro Ser Ile Ala
                325                 330                 335
Thr Gly Met Val Gly Ala Leu Leu Leu Leu Leu Val Val Ala Leu Gly
            340                 345                 350
Ile Gly Leu Phe Met
        355
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<210> 8
<211> 27
<212> PRT
<213> Homo sapiens

<220>
<223> CD28 (amino acids 153-179 of Accession No. P10747)

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<400> 8
Phe Trp Val Leu Val Val Val Gly Gly Val Leu Ala Cys Tyr Ser Leu
 1               5                  10                  15
Leu Val Thr Val Ala Phe Ile Ile Phe Trp Val
            20                  25
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<210> 9
<211> 66
<212> PRT
<213> Homo sapiens

<220>
<223> CD28 (amino acids 114-179 of Accession No. P10747)

<400> 9
Ile Glu Val Met Tyr Pro Pro Pro Tyr Leu Asp Asn Glu Lys Ser Asn
 1   5   10   15
Gly Thr Ile Ile His Val Lys Gly Lys His Leu Cys Pro Ser Pro Leu
            20   25   30
Phe Pro Gly Pro Ser Lys Pro Phe Trp Val Leu Val Val Val Gly Gly
        35   40   45
Val Leu Ala Cys Tyr Ser Leu Leu Val Thr Val Ala Phe Ile Ile Phe
    50   55   60
Trp Val
65

<210> 10
<211> 41
<212> PRT
<213> Homo sapiens

<220>
<223> CD28 (amino acids 180-220 of P10747)

<400> 10
Arg Ser Lys Arg Ser Arg Leu Leu 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> 11
<211> 41
<212> PRT
<213> Homo sapiens

<220>
<223> CD28 (LL to GG)

<400> 11
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> 12
<211> 42
<212> PRT
<213> Homo sapiens

<220>
<223> 4-1BB (amino acids 214-255 of Q07011.1)

<400> 12
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> 13
<211> 112
<212> PRT
<213> Homo sapiens

<220>
<223> CD3 zeta

<400> 13
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> 14
<211> 112
<212> PRT
<213> Homo sapiens

<220>
<223> CD3 zeta

<400> 14
Arg Val Lys Phe Ser Arg Ser Ala Glu Pro 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> 15
<211> 112
<212> PRT
<213> Homo sapiens

<220>
<223> CD3 zeta

<400> 15
Arg Val Lys Phe Ser Arg Ser Ala Asp Ala Pro Ala Tyr Lys 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> 16
<211> 335
<212> PRT
<213> Artificial Sequence

<220>
<223> tEGFR

<400> 16
Arg Lys Val Cys Asn Gly Ile Gly Ile Gly Glu Phe Lys Asp Ser Leu
 1   5   10   15
Ser Ile Asn Ala Thr Asn Ile Lys His Phe Lys Asn Cys Thr Ser Ile
            20   25   30
Ser Gly Asp Leu His Ile Leu Pro Val Ala Phe Arg Gly Asp Ser Phe
        35   40   45
Thr His Thr Pro Pro Leu Asp Pro Gln Glu Leu Asp Ile Leu Lys Thr
    50   55   60
Val Lys Glu Ile Thr Gly Phe Leu Leu Ile Gln Ala Trp Pro Glu Asn
65   70   75   80
Arg Thr Asp Leu His Ala Phe Glu Asn Leu Glu Ile Ile Arg Gly Arg
                85   90   95
Thr Lys Gln His Gly Gln Phe Ser Leu Ala Val Val Ser Leu Asn Ile
            100   105   110
Thr Ser Leu Gly Leu Arg Ser Leu Lys Glu Ile Ser Asp Gly Asp Val
        115   120   125
Ile Ile Ser Gly Asn Lys Asn Leu Cys Tyr Ala Asn Thr Ile Asn Trp
    130   135   140
Lys Lys Leu Phe Gly Thr Ser Gly Gln Lys Thr Lys Ile Ile Ser Asn
145   150   155   160
Arg Gly Glu Asn Ser Cys Lys Ala Thr Gly Gln Val Cys His Ala Leu
                165   170   175
Cys Ser Pro Glu Gly Cys Trp Gly Pro Glu Pro Arg Asp Cys Val Ser
            180   185   190
Cys Arg Asn Val Ser Arg Gly Arg Glu Cys Val Asp Lys Cys Asn Leu
        195   200   205
Leu Glu Gly Glu Pro Arg Glu Phe Val Glu Asn Ser Glu Cys Ile Gln
    210   215   220
Cys His Pro Glu Cys Leu Pro Gln Ala Met Asn Ile Thr Cys Thr Gly
225   230   235   240
Arg Gly Pro Asp Asn Cys Ile Gln Cys Ala His Tyr Ile Asp Gly Pro
                245   250   255
His Cys Val Lys Thr Cys Pro Ala Gly Val Met Gly Glu Asn Asn Thr
            260   265   270
Leu Val Trp Lys Tyr Ala Asp Ala Gly His Val Cys His Leu Cys His
        275   280   285
Pro Asn Cys Thr Tyr Gly Cys Thr Gly Pro Gly Leu Glu Gly Cys Pro
    290   295   300
Thr Asn Gly Pro Lys Ile Pro Ser Ile Ala Thr Gly Met Val Gly Ala
305   310   315   320
Leu Leu Leu Leu Leu Val Val Ala Leu Gly Ile Gly Leu Phe Met
                325   330   335

<210> 17
<211> 18
<212> PRT
<213> Artificial Sequence

<220>
<223> T2A

<400> 17
Glu Gly Arg Gly Ser Leu Leu Thr Cys Gly Asp Val Glu Glu Asn Pro
 1   5   10   15
Gly Pro

<210> 18
<211> 22
<212> PRT
<213> Artificial Sequence

<220>
<223> P2A

<400> 18
Gly Ser Gly Ala Thr Asn Phe Ser Leu Leu Lys Gln Ala Gly Asp Val
 1   5   10   15
Glu Glu Asn Pro Gly Pro
            20

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

<220>
<223> P2A

<400> 19
Ala Thr Asn Phe Ser Leu Leu Lys Gln Ala Gly Asp Val Glu Glu Asn
 1   5   10   15
Pro Gly Pro

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

<220>
<223> E2A

<400> 20

Gln Cys Thr Asn Tyr Ala Leu Leu Lys Leu Ala Gly Asp Val Glu Ser
 1   5   10   15
Asn Pro Gly Pro
            20

<210> 21
<211> 22
<212> PRT
<213> Artificial Sequence

<220>
<223> F2A

<400> 21
Val Lys Gln Thr Leu Asn Phe Asp Leu Leu Lys Leu Ala Gly Asp Val
 1   5   10   15
Glu Ser Asn Pro Gly Pro
            20

<210> 22
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Linker

<220>
<221> REPEAT
<222> (5)...(9)
<223> SGGGG is repeated 5 times

<400> 22
Pro Gly Gly Gly Ser Gly Gly Gly Gly Pro
 1   5   10

<210> 23
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> Linker

<400> 23
Gly Ser Ala Asp Asp Ala Lys Lys Asp Ala Ala Lys Lys Asp Gly Lys
 1   5   10   15

Ser

<210> 24
<211> 18
<212> PRT
<213> Artificial Sequence

<220>
<223> Linker

<400> 24
Gly Ser Thr Ser Gly Ser Gly Lys Pro Gly Ser Gly Glu Gly Ser Thr
 1   5   10   15
Lys Gly

<210> 25
<211> 735
<212> DNA
<213> Artificial Sequence

<220>
<223> Sequence encoding scFv

<400> 25
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> 26
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Hinge

<220>
<221> VARIANT
<222> (1)...(1)
<223> Xaa is glycine, cysteine or arginine

<220>
<221> VARIANT
<222> (4)...(4)
<223> Xaa is cysteine or threonine

<400> 26
Xaa Pro Pro Xaa Pro
 1   5

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

<220>
<223> Hinge

<400> 27
Glu Pro Lys Ser Cys Asp Lys Thr His Thr Cys Pro Pro Cys Pro
 1   5   10   15

<210> 28
<211> 12
<212> PRT
<213> Artificial Sequence

<220>
<223> Hinge

<400> 28
Glu Arg Lys Cys Cys Val Glu Cys Pro Pro Cys Pro
 1   5   10

<210> 29
<211> 61
<212> PRT
<213> Artificial Sequence

<220>
<223> Hinge

<400> 29

Glu Leu Lys Thr Pro Leu Gly Asp Thr His Thr Cys Pro Arg Cys Pro
 1   5   10   15
Glu Pro Lys Ser Cys Asp Thr Pro Pro Pro Cys Pro Arg Cys Pro Glu
            20   25   30
Pro Lys Ser Cys Asp Thr Pro Pro Pro Cys Pro Arg Cys Pro Glu Pro
        35   40   45
Lys Ser Cys Asp Thr Pro Pro Pro Cys Pro Arg Cys Pro
    50   55   60

<210> 30
<211> 12
<212> PRT
<213> Artificial Sequence

<220>
<223> Hinge

<400> 30
Glu Ser Lys Tyr Gly Pro Pro Cys Pro Ser Cys Pro
 1   5   10

<210> 31
<211> 12
<212> PRT
<213> Artificial Sequence

<220>
<223> Hinge

<400> 31
Glu Ser Lys Tyr Gly Pro Pro Cys Pro Pro Cys Pro
 1   5   10

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

<220>
<223> Hinge

<400> 32
Tyr Gly Pro Pro Cys Pro Pro Cys Pro
 1   5

<210> 33

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

<220>
<223> Hinge

<400> 33
Lys Tyr Gly Pro Pro Cys Pro Pro Cys Pro
 1   5   10

<210> 34
<211> 14
<212> PRT
<213> Artificial Sequence

<220>
<223> Hinge

<400> 34
Glu Val Val Val Lys Tyr Gly Pro Pro Cys Pro Pro Cys Pro
 1   5   10

<210> 35
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> CDR L1

<400> 35
Arg Ala Ser Gln Asp Ile Ser Lys Tyr Leu Asn
 1   5   10

<210> 36
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> CDR L2

<400> 36
Ser Arg Leu His Ser Gly Val
 1   5

<210> 37
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> CDR L3

<400> 37
Gly Asn Thr Leu Pro Tyr Thr Phe Gly
 1   5

<210> 38
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> CDR H1

<400> 38
Asp Tyr Gly Val Ser
 1   5

<210> 39
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> CDR H2

<400> 39
Val Ile Trp Gly Ser Glu Thr Thr Tyr Tyr Asn Ser Ala Leu Lys Ser
 1   5   10   15

<210> 40
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> CDR H3

<400> 40
Tyr Ala Met Asp Tyr Trp Gly

1 5

<210> 41
<211> 120
<212> PRT
<213> Artificial Sequence

<220>
<223> VH

<400> 41
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> 42
<211> 107
<212> PRT
<213> Artificial Sequence

<220>
<223> VL

<400> 42
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

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                85                  90                  95
Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Thr
            100                 105


<210> 43
<211> 245
<212> PRT
<213> Artificial Sequence

<220>
<223> scFv

<400> 43
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> 44
<211> 11
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<212> PRT
<213> Artificial Sequence

<220>
<223> CDR L1

<400> 44
Lys Ala Ser Gln Asn Val Gly Thr Asn Val Ala
 1   5   10

<210> 45
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> CDR L2

<400> 45
Ser Ala Thr Tyr Arg Asn Ser
 1   5

<210> 46
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> CDR L3

<400> 46
Gln Gln Tyr Asn Arg Tyr Pro Tyr Thr
 1   5

<210> 47
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> CDR H1

<400> 47
Ser Tyr Trp Met Asn
 1   5

<210> 48
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> CDR H2

<400> 48
Gln Ile Tyr Pro Gly Asp Gly Asp Thr Asn Tyr Asn Gly Lys Phe Lys
 1   5   10   15
Gly

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

<220>
<223> CDR H3

<400> 49
Lys Thr Ile Ser Ser Val Val Asp Phe Tyr Phe Asp Tyr
 1   5   10

<210> 50
<211> 122
<212> PRT
<213> Artificial Sequence

<220>
<223> VH

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

```
            100                 105                 110
Gly Gln Gly Thr Thr Val Thr Val Ser Ser
        115                 120
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<210> 51
<211> 108
<212> PRT
<213> Artificial Sequence

<220>
<223> VL

<400> 51

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

<210> 52
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<223> Linker

<400> 52

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

<210> 53
<211> 245
<212> PRT
<213> Artificial Sequence

<220>
<223> scFv

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

<210> 54
<211> 12
<212> PRT
<213> Artificial Sequence

<220>
<223> CDR H3

<400> 54
His Tyr Tyr Tyr Gly Gly Ser Tyr Ala Met Asp Tyr
 1   5   10

<210> 55

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

<220>
<223> CDR L2

<400> 55
His Thr Ser Arg Leu His Ser
 1   5

<210> 56
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> CDR L3

<400> 56
Gln Gln Gly Asn Thr Leu Pro Tyr Thr
 1   5

<210> 57
<211> 22
<212> DNA
<213> Artificial Sequence

<220>
<223> IGH primer

<400> 57
acacggcctc gtgtattact gt   22

<210> 58
<211> 19
<212> DNA
<213> Artificial Sequence

<220>
<223> IGH primer

<400> 58
acctgaggag acggtgacc   19

<210> 59
<211> 127
<212> PRT

<213> Artificial Sequence

<220>
<223> Mutein Streptavidin Ile44-Gly45-Ala-46-Arg47

<400> 59
Met Glu Ala Gly Ile Thr Gly Thr Trp Tyr Asn Gln Leu Gly Ser Thr
 1   5   10   15
Phe Ile Val Thr Ala Gly Ala Asp Gly Ala Leu Thr Gly Thr Tyr Ile
            20   25   30
Gly Ala Arg Gly Asn Ala Glu Ser Arg Tyr Val Leu Thr Gly Arg Tyr
        35   40   45
Asp Ser Ala Pro Ala Thr Asp Gly Ser Gly Thr Ala Leu Gly Trp Thr
    50   55   60
Val Ala Trp Lys Asn Asn Tyr Arg Asn Ala His Ser Ala Thr Thr Trp
65   70   75   80
Ser Gly Gln Tyr Val Gly Gly Ala Glu Ala Arg Ile Asn Thr Gln Trp
                85   90   95
Leu Leu Thr Ser Gly Thr Thr Glu Ala Asn Ala Trp Lys Ser Thr Leu
            100   105   110
Val Gly His Asp Thr Phe Thr Lys Val Lys Pro Ser Ala Ala Ser
        115   120   125

<210> 60
<211> 119
<212> PRT
<213> Artificial Sequence

<220>
<223> Variable Heavy chain of anti-CD3 antibody OKT3

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

<210> 61
<211> 106
<212> PRT
<213> Artificial Sequence

<220>
<223> Variable Light chain of anti-CD3 antibody OKT3

<400> 61
Gln Ile Val Leu Thr Gln Ser Pro Ala Ile Met Ser Ala Ser Pro Gly
 1   5   10   15
Glu Lys Val Thr Met Thr Cys Ser Ala Ser Ser Ser Val Ser Tyr Met
            20   25   30
Asn Trp Tyr Gln Gln Lys Ser Gly Thr Ser Pro Lys Arg Trp Ile Tyr
        35   40   45
Asp Thr Ser Lys Leu Ala Ser Gly Val Pro Ala His Phe Arg Gly Ser
    50   55   60
Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile Ser Gly Met Glu Ala Glu
65   70   75   80
Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Trp Ser Ser Asn Pro Phe Thr
                85   90   95
Phe Gly Ser Gly Thr Lys Leu Glu Ile Asn
            100   105

<210> 62
<211> 116
<212> PRT
<213> Artificial Sequence

<220>
<223> Variable Heavy chain of anti-CD28 antibody CD28.3

<400> 62
Leu Gln Gln Ser Gly Ala Glu Leu Val Lys Pro Gly Ala Ser Val Arg
 1   5   10   15
Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Glu Tyr Ile Ile His
            20   25   30
Trp Ile Lys Leu Arg Ser Gly Gln Gly Leu Glu Trp Ile Gly Trp Phe
        35   40   45
Tyr Pro Gly Ser Asn Asp Ile Gln Tyr Asn Ala Lys Phe Lys Gly Lys
    50   55   60
Ala Thr Leu Thr Ala Asp Lys Ser Ser Ser Thr Val Tyr Met Glu Leu
65   70   75   80
Thr Gly Leu Thr Ser Glu Asp Ser Ala Val Tyr Phe Cys Ala Arg Arg
                85   90   95
Asp Asp Phe Ser Gly Tyr Asp Ala Leu Pro Tyr Trp Gly Gln Gly Thr
            100   105   110
Met Val Thr Val

115

<210> 63
<211> 108
<212> PRT
<213> Artificial Sequence

<220>
<223> Variable Light chain of anti-CD28 antibody CD28.3

<400> 63
Asp Ile Gln Met Thr Gln Ser Pro Ala Ser Leu Ser Val Ser Val Gly
 1   5   10   15
Glu Thr Val Thr Ile Thr Cys Arg Thr Asn Glu Asn Ile Tyr Ser Asn
            20   25   30
Leu Ala Trp Tyr Gln Gln Lys Gln Gly Lys Ser Pro Gln Leu Leu Ile
        35   40   45
Tyr Ala Ala Thr His Leu Val Glu Gly Val Pro Ser Arg Phe Ser Gly
    50   55   60
Ser Gly Ser Gly Thr Gln Tyr Ser Leu Lys Ile Thr Ser Leu Gln Ser
65   70   75   80
Glu Asp Phe Gly Asn Tyr Tyr Cys Gln His Phe Trp Gly Thr Pro Cys
                85   90   95
Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg
            100   105

<210> 64
<211> 30
<212> PRT
<213> Artificial Sequence

<220>
<223> Twin-Strep-tag

<400> 64
Ser Ala Trp Ser His Pro Gln Phe Glu Lys Gly Gly Gly Ser Gly Gly
 1   5   10   15
Gly Ser Gly Gly Ser Ala Trp Ser His Pro Gln Phe Glu Lys
            20   25   30

<210> 65
<211> 22
<212> PRT
<213> Artificial Sequence

<220>
<223> GMCSFR alpha chain signal sequence

<400> 65
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> 66
<211> 66
<212> DNA
<213> Artificial Sequence

<220>
<223> GMCSFR alpha chain signal sequence

<400> 66
atgcttctcc tggtgacaag ccttctgctc tgtgagttac cacacccagc attcctcctg 60
atccca   66

<210> 67
<211> 18
<212> PRT
<213> Artificial Sequence

<220>
<223> CD8 alpha signal peptide

<400> 67
Met Ala Leu Pro Val Thr Ala Leu Leu Leu Pro Leu Ala Leu Leu Leu
 1   5   10   15
His Ala

<210> 68
<211> 159
<212> PRT
<213> Streptomyces avidinii

<220>
<223> Streptomyces avidinii (UniProt No. P22629)

<400> 68
Asp Pro Ser Lys Asp Ser Lys Ala Gln Val Ser Ala Ala Glu Ala Gly
 1   5   10   15
Ile Thr Gly Thr Trp Tyr Asn Gln Leu Gly Ser Thr Phe Ile Val Thr
            20   25   30
Ala Gly Ala Asp Gly Ala Leu Thr Gly Thr Tyr Glu Ser Ala Val Gly
        35   40   45

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Asn Ala Glu Ser Arg Tyr Val Leu Thr Gly Arg Tyr Asp Ser Ala Pro
    50                  55                  60
Ala Thr Asp Gly Ser Gly Thr Ala Leu Gly Trp Thr Val Ala Trp Lys
65                  70                  75                  80
Asn Asn Tyr Arg Asn Ala His Ser Ala Thr Thr Trp Ser Gly Gln Tyr
                85                  90                  95
Val Gly Gly Ala Glu Ala Arg Ile Asn Thr Gln Trp Leu Leu Thr Ser
            100                 105                 110
Gly Thr Thr Glu Ala Asn Ala Trp Lys Ser Thr Leu Val Gly His Asp
        115                 120                 125
Thr Phe Thr Lys Val Lys Pro Ser Ala Ala Ser Ile Asp Ala Ala Lys
    130                 135                 140
Lys Ala Gly Val Asn Asn Gly Asn Pro Leu Asp Ala Val Gln Gln
145                 150                 155


<210> 69
<211> 126
<212> PRT
<213> Streptomyces avidinii

<220>
<223> Minimal streptavidin

<400> 69
Glu Ala Gly Ile Thr Gly Thr Trp Tyr Asn Gln Leu Gly Ser Thr Phe
 1               5                  10                  15
Ile Val Thr Ala Gly Ala Asp Gly Ala Leu Thr Gly Thr Tyr Glu Ser
            20                  25                  30
Ala Val Gly Asn Ala Glu Ser Arg Tyr Val Leu Thr Gly Arg Tyr Asp
        35                  40                  45
Ser Ala Pro Ala Thr Asp Gly Ser Gly Thr Ala Leu Gly Trp Thr Val
    50                  55                  60
Ala Trp Lys Asn Asn Tyr Arg Asn Ala His Ser Ala Thr Thr Trp Ser
65                  70                  75                  80
Gly Gln Tyr Val Gly Gly Ala Glu Ala Arg Ile Asn Thr Gln Trp Leu
                85                  90                  95
Leu Thr Ser Gly Thr Thr Glu Ala Asn Ala Trp Lys Ser Thr Leu Val
            100                 105                 110
Gly His Asp Thr Phe Thr Lys Val Lys Pro Ser Ala Ala Ser
        115                 120                 125


<210> 70
<211> 4
<212> PRT
<213> Artificial Sequence

<220>
<223> Streptavidin-binding peptide
```

<400> 70
His Pro Gln Phe
 1

<210> 71
<211> 3
<212> PRT
<213> Artificial Sequence

<220>
<223> Streptavidin-binding peptide

<220>
<221> VARIANT
<222> (3)...(3)
<223> Xaa is selected from Gln, Asp, and Met

<400> 71
His Pro Xaa
 1

<210> 72
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Streptavidin-binding peptide

<220>
<221> VARIANT
<222> (1)...(1)
<223> Xaa is Trp, Lys or Arg

<220>
<221> VARIANT
<222> (2)...(2)
<223> Xaa is any amino acid

<220>
<221> VARIANT
<222> (7)...(7)
<223> Xaa is Gly or Glu

<220>
<221> VARIANT
<222> (8)...(8)

<223> Xaa is Gly, Lys or Arg

<400> 72
Xaa Xaa His Pro Gln Phe Xaa Xaa
 1   5

<210> 73
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Streptavidin-binding peptide

<220>
<221> VARIANT
<222> (2)...(2)
<223> Xaa is any amino acid

<220>
<221> VARIANT
<222> (7)...(7)
<223> Xaa is Gly or Glu

<220>
<221> VARIANT
<222> (8)...(8)
<223> Xaa is Gly, Lys or Arg

<400> 73
Trp Xaa His Pro Gln Phe Xaa Xaa
 1   5

<210> 74
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Streptavidin-binding peptide, Strep-tag

<400> 74
Trp Arg His Pro Gln Phe Gly Gly
 1   5

<210> 75
<211> 8

<212> PRT
<213> Artificial Sequence

<220>
<223> Streptavidin-binding peptide, Strep-tag II

<400> 75
Trp Ser His Pro Gln Phe Glu Lys
 1   5

<210> 76
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> Sequential modules of streptavidin-binding peptide

<220>
<221> VARIANT
<222> (9)...(9)
<223> Xaa is any amino acid

<220>
<221> REPEAT
<222> (9)...(9)
<223> Xaa is repeated 8 or 12 times

<400> 76
Trp Ser His Pro Gln Phe Glu Lys Xaa Trp Ser His Pro Gln Phe Glu
 1   5   10   15
Lys

<210> 77
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> Sequential modules of streptavidin-binding peptide

<220>
<221> REPEAT
<222> (9)...(12)
<223> GlyGlyGlySer is repeated two or three times

<400> 77

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

<210> 78
<211> 28
<212> PRT
<213> Artificial Sequence

<220>
<223> Twin-Strep-tag

<400> 78
Trp Ser His Pro Gln Phe Glu Lys Gly Gly Gly Ser Gly Gly Gly Ser
 1   5   10   15
Gly Gly Gly Ser Trp Ser His Pro Gln Phe Glu Lys
            20   25

<210> 79
<211> 24
<212> PRT
<213> Artificial Sequence

<220>
<223> Twin-Strep-tag

<400> 79
Trp Ser His Pro Gln Phe Glu Lys Gly Gly Gly Ser Gly Gly Gly Ser
 1   5   10   15
Trp Ser His Pro Gln Phe Glu Lys
            20

<210> 80
<211> 28
<212> PRT
<213> Artificial Sequence

<220>
<223> Twin-Strep-tag

<400> 80
Trp Ser His Pro Gln Phe Glu Lys Gly Gly Gly Ser Gly Gly Gly Ser
 1   5   10   15
Gly Gly Ser Ala Trp Ser His Pro Gln Phe Glu Lys
            20   25

<210> 81
<211> 30
<212> PRT
<213> Artificial Sequence

<220>
<223> Twin-Strep-tag

<400> 81
Ser Ala Trp Ser His Pro Gln Phe Glu Lys Gly Gly Gly Ser Gly Gly
 1   5   10   15
Gly Ser Gly Gly Gly Ser Trp Ser His Pro Gln Phe Glu Lys
            20   25   30

<210> 82
<211> 30
<212> PRT
<213> Artificial Sequence

<220>
<223> Twin-Strep-tag

<400> 82
Ser Ala Trp Ser His Pro Gln Phe Glu Lys Gly Gly Gly Ser Gly Gly
 1   5   10   15
Gly Ser Gly Gly Ser Ala Trp Ser His Pro Gln Phe Glu Lys
            20   25   30

<210> 83
<211> 159
<212> PRT
<213> Artificial Sequence

<220>
<223> Mutein Streptavidin Val44-Thr45-Ala46-Arg47

<400> 83
Asp Pro Ser Lys Asp Ser Lys Ala Gln Val Ser Ala Ala Glu Ala Gly
 1   5   10   15
Ile Thr Gly Thr Trp Tyr Asn Gln Leu Gly Ser Thr Phe Ile Val Thr
            20   25   30
Ala Gly Ala Asp Gly Ala Leu Thr Gly Thr Tyr Val Thr Ala Arg Gly
        35   40   45
Asn Ala Glu Ser Arg Tyr Val Leu Thr Gly Arg Tyr Asp Ser Ala Pro
    50   55   60
Ala Thr Asp Gly Ser Gly Thr Ala Leu Gly Trp Thr Val Ala Trp Lys
65   70   75   80

```
Asn Asn Tyr Arg Asn Ala His Ser Ala Thr Thr Trp Ser Gly Gln Tyr
                85                  90                  95
Val Gly Gly Ala Glu Ala Arg Ile Asn Thr Gln Trp Leu Leu Thr Ser
            100                 105                 110
Gly Thr Thr Glu Ala Asn Ala Trp Lys Ser Thr Leu Val Gly His Asp
        115                 120                 125
Thr Phe Thr Lys Val Lys Pro Ser Ala Ala Ser Ile Asp Ala Ala Lys
    130                 135                 140
Lys Ala Gly Val Asn Asn Gly Asn Pro Leu Asp Ala Val Gln Gln
145                 150                 155


<210> 84
<211> 126
<212> PRT
<213> Artificial Sequence

<220>
<223> Mutein Streptavidin Val44-Thr45-Ala46-Arg47

<400> 84
Glu Ala Gly Ile Thr Gly Thr Trp Tyr Asn Gln Leu Gly Ser Thr Phe
 1               5                  10                  15
Ile Val Thr Ala Gly Ala Asp Gly Ala Leu Thr Gly Thr Tyr Val Thr
            20                  25                  30
Ala Arg Gly Asn Ala Glu Ser Arg Tyr Val Leu Thr Gly Arg Tyr Asp
        35                  40                  45
Ser Ala Pro Ala Thr Asp Gly Ser Gly Thr Ala Leu Gly Trp Thr Val
    50                  55                  60
Ala Trp Lys Asn Asn Tyr Arg Asn Ala His Ser Ala Thr Thr Trp Ser
65                  70                  75                  80
Gly Gln Tyr Val Gly Gly Ala Glu Ala Arg Ile Asn Thr Gln Trp Leu
                85                  90                  95
Leu Thr Ser Gly Thr Thr Glu Ala Asn Ala Trp Lys Ser Thr Leu Val
            100                 105                 110
Gly His Asp Thr Phe Thr Lys Val Lys Pro Ser Ala Ala Ser
        115                 120                 125


<210> 85
<211> 127
<212> PRT
<213> Artificial Sequence

<220>
<223> Mutein Streptavidin Val44-Thr45-Ala46-Arg47

<400> 85
Met Glu Ala Gly Ile Thr Gly Thr Trp Tyr Asn Gln Leu Gly Ser Thr
 1               5                  10                  15
```

```
Phe Ile Val Thr Ala Gly Ala Asp Gly Ala Leu Thr Gly Thr Tyr Val
            20                  25                  30
Thr Ala Arg Gly Asn Ala Glu Ser Arg Tyr Val Leu Thr Gly Arg Tyr
        35                  40                  45
Asp Ser Ala Pro Ala Thr Asp Gly Ser Gly Thr Ala Leu Gly Trp Thr
    50                  55                  60
Val Ala Trp Lys Asn Asn Tyr Arg Asn Ala His Ser Ala Thr Thr Trp
65                  70                  75                  80
Ser Gly Gln Tyr Val Gly Gly Ala Glu Ala Arg Ile Asn Thr Gln Trp
                85                  90                  95
Leu Leu Thr Ser Gly Thr Thr Glu Ala Asn Ala Trp Lys Ser Thr Leu
            100                 105                 110
Val Gly His Asp Thr Phe Thr Lys Val Lys Pro Ser Ala Ala Ser
        115                 120                 125


<210> 86
<211> 159
<212> PRT
<213> Artificial Sequence

<220>
<223> Mutein Streptavidin Ile44-Gly45-Ala-46-Arg47

<400> 86
Asp Pro Ser Lys Asp Ser Lys Ala Gln Val Ser Ala Ala Glu Ala Gly
 1               5                  10                  15
Ile Thr Gly Thr Trp Tyr Asn Gln Leu Gly Ser Thr Phe Ile Val Thr
            20                  25                  30
Ala Gly Ala Asp Gly Ala Leu Thr Gly Thr Tyr Ile Gly Ala Arg Gly
        35                  40                  45
Asn Ala Glu Ser Arg Tyr Val Leu Thr Gly Arg Tyr Asp Ser Ala Pro
    50                  55                  60
Ala Thr Asp Gly Ser Gly Thr Ala Leu Gly Trp Thr Val Ala Trp Lys
65                  70                  75                  80
Asn Asn Tyr Arg Asn Ala His Ser Ala Thr Thr Trp Ser Gly Gln Tyr
                85                  90                  95
Val Gly Gly Ala Glu Ala Arg Ile Asn Thr Gln Trp Leu Leu Thr Ser
            100                 105                 110
Gly Thr Thr Glu Ala Asn Ala Trp Lys Ser Thr Leu Val Gly His Asp
        115                 120                 125
Thr Phe Thr Lys Val Lys Pro Ser Ala Ala Ser Ile Asp Ala Ala Lys
    130                 135                 140
Lys Ala Gly Val Asn Asn Gly Asn Pro Leu Asp Ala Val Gln Gln
145                 150                 155


<210> 87
<211> 126
<212> PRT
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<213> Artificial Sequence

<220>
<223> Mutein Streptavidin Ile44-Gly45-Ala-46-Arg47

<400> 87
Glu Ala Gly Ile Thr Gly Thr Trp Tyr Asn Gln Leu Gly Ser Thr Phe
 1   5   10   15
Ile Val Thr Ala Gly Ala Asp Gly Ala Leu Thr Gly Thr Tyr Ile Gly
            20   25   30
Ala Arg Gly Asn Ala Glu Ser Arg Tyr Val Leu Thr Gly Arg Tyr Asp
        35   40   45
Ser Ala Pro Ala Thr Asp Gly Ser Gly Thr Ala Leu Gly Trp Thr Val
    50   55   60
Ala Trp Lys Asn Asn Tyr Arg Asn Ala His Ser Ala Thr Thr Trp Ser
65   70   75   80
Gly Gln Tyr Val Gly Gly Ala Glu Ala Arg Ile Asn Thr Gln Trp Leu
                85   90   95
Leu Thr Ser Gly Thr Thr Glu Ala Asn Ala Trp Lys Ser Thr Leu Val
            100   105   110
Gly His Asp Thr Phe Thr Lys Val Lys Pro Ser Ala Ala Ser
        115   120   125

<210> 88
<211> 126
<212> PRT
<213> Artificial Sequence

<220>
<223> Mutein Streptavidin Val44-Thr45-Ala46-Arg47 and
      Glu117, Gly120, Try121 (mutein m1-9)

<400> 88
Glu Ala Gly Ile Thr Gly Thr Trp Tyr Asn Gln Leu Gly Ser Thr Phe
 1   5   10   15
Ile Val Thr Ala Gly Ala Asp Gly Ala Leu Thr Gly Thr Tyr Val Thr
            20   25   30
Ala Arg Gly Asn Ala Glu Ser Arg Tyr Val Leu Thr Gly Arg Tyr Asp
        35   40   45
Ser Ala Pro Ala Thr Asp Gly Ser Gly Thr Ala Leu Gly Trp Thr Val
    50   55   60
Ala Trp Lys Asn Asn Tyr Arg Asn Ala His Ser Ala Thr Thr Trp Ser
65   70   75   80
Gly Gln Tyr Val Gly Gly Ala Glu Ala Arg Ile Asn Thr Gln Trp Leu
                85   90   95
Leu Thr Ser Gly Thr Thr Glu Glu Asn Ala Gly Tyr Ser Thr Leu Val
            100   105   110
Gly His Asp Thr Phe Thr Lys Val Lys Pro Ser Ala Ala Ser
        115   120   125

<210> 89
<211> 139
<212> PRT
<213> Artificial Sequence

<220>
<223> Mutein Streptavidin Val44-Thr45-Ala46-Arg47 and
Glu117, Gly120, Try121 (mutein m1-9)

<400> 89
Asp Pro Ser Lys Asp Ser Lys Ala Gln Val Ser Ala Ala Glu Ala Gly
1 5 10 15
Ile Thr Gly Thr Trp Tyr Asn Gln Leu Gly Ser Thr Phe Ile Val Thr
20 25 30
Ala Gly Ala Asp Gly Ala Leu Thr Gly Thr Tyr Val Thr Ala Arg Gly
35 40 45
Asn Ala Glu Ser Arg Tyr Val Leu Thr Gly Arg Tyr Asp Ser Ala Pro
50 55 60
Ala Thr Asp Gly Ser Gly Thr Ala Leu Gly Trp Thr Val Ala Trp Lys
65 70 75 80
Asn Asn Tyr Arg Asn Ala His Ser Ala Thr Thr Trp Ser Gly Gln Tyr
85 90 95
Val Gly Gly Ala Glu Ala Arg Ile Asn Thr Gln Trp Leu Leu Thr Ser
100 105 110
Gly Thr Thr Glu Glu Asn Ala Gly Tyr Ser Thr Leu Val Gly His Asp
115 120 125
Thr Phe Thr Lys Val Lys Pro Ser Ala Ala Ser
130 135

<210> 90
<211> 127
<212> PRT
<213> Artificial Sequence

<220>
<223> Minimal streptavidin

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

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65                  70                  75                  80
Ser Gly Gln Tyr Val Gly Gly Ala Glu Ala Arg Ile Asn Thr Gln Trp
                85                  90                  95
Leu Leu Thr Ser Gly Thr Thr Glu Ala Asn Ala Trp Lys Ser Thr Leu
            100                 105                 110
Val Gly His Asp Thr Phe Thr Lys Val Lys Pro Ser Ala Ala Ser
        115                 120                 125
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