SEQUENCE LISTING

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<120> Dual Variable Region Antibody-Like Binding Proteins Having Cross-over Binding Region Orientation

<130> US2011/026

<140> TBD
<141> 2011-03-11

<160> 59

<170> PatentIn version 3.5

<210> 1
<211> 108
<212> PRT
<213> Artificial Sequence

<220>
<223> Humanized antibody light chain (VL) from anti-IL4

<400> 1

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

Asp Thr Ile Thr Leu Thr Cys His Ala Ser Gln Asn Ile Asp Val Trp
20 25 30

Leu Ser Trp Phe Gln Gln Lys Pro Gly Asn Ile Pro Lys Leu Leu Ile
35 40 45

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

Ser Gly Ser Gly Thr Gly Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
65 70 75 80

Glu Asp Ile Ala Thr Tyr Tyr Cys Gln Gln Ala His Ser Tyr Pro Phe
85 90 95

Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg
100 105

<210> 2
<211> 124
<212> PRT
<213> Artificial Sequence

<220>
<223> Humanized heavy chain V region (VH) from anti-IL4 antibody

<400> 2

Gln Val Gln Leu Gln Gln Ser Gly Pro Glu Leu Val Lys Pro Gly Ala
1 5 10 15

Ser Val Lys Ile Ser Cys Lys Ala Ser Gly Tyr Ser Phe Thr Ser Tyr
20 25 30

Trp Ile His Trp Ile Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile
35 40 45

Gly Met Ile Asp Pro Ser Asp Gly Glu Thr Arg Leu Asn Gln Arg Phe
50 55 60

Gln Gly Arg Ala Thr Leu Thr Val Asp Glu Ser Thr Ser Thr Ala Tyr
65 70 75 80

Met Gln Leu Arg Ser Pro Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys
85 90 95

Thr Arg Leu Lys Glu Tyr Gly Asn Tyr Asp Ser Phe Tyr Phe Asp Val
100 105 110

Trp Gly Ala Gly Thr Leu Val Thr Val Ser Ser Ala
115 120

<210> 3
<211> 111
<212> PRT
<213> Artificial Sequence

<220>
<223> Humanized light chain V region (VL) from an anti-IL13 antibody

<400> 3

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

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

Gly Gln Ser Tyr Met His Trp Tyr Gln Gln Lys Ala Gly Gln Pro Pro
35 40 45

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

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

Pro Val Gln Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Asn Ala
85 90 95

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

<210> 4
<211> 118
<212> PRT
<213> Artificial Sequence

<220>
<223> Humanized heavy chain V region (VH) from an anti-IL-13 antibody.

<400> 4

Glu Val Gln Leu Lys Glu Ser Gly Pro Gly Leu Val Ala Pro Gly Gly
1 5 10 15

Ser Leu Ser Ile Thr Cys Thr Val Ser Gly Phe Ser Leu Thr Asp Ser
20 25 30

Ser Ile Asn Trp Val Arg Gln Pro Pro Gly Lys Gly Leu Glu Trp Leu
35 40 45

Gly Met Ile Trp Gly Asp Gly Arg Ile Asp Tyr Ala Asp Ala Leu Lys
50 55 60

Ser Arg Leu Ser Ile Ser Lys Asp Ser Ser Lys Ser Gln Val Phe Leu
65 70 75 80

Glu Met Thr Ser Leu Arg Thr Asp Asp Thr Ala Thr Tyr Tyr Cys Ala
85 90 95

Arg Asp Gly Tyr Phe Pro Tyr Ala Met Asp Phe Trp Gly Gln Gly Thr
100 105 110

Ser Val Thr Val Ser Ser
115

<210> 5
<211> 575
<212> PRT
<213> Artificial Sequence

<220>
<223> Heavy chain of cross over double head construct IL13(G4S)IL4CHFc

<400> 5

Glu Val Gln Leu Lys Glu Ser Gly Pro Gly Leu Val Ala Pro Gly Gly
1 5 10 15

Ser Leu Ser Ile Thr Cys Thr Val Ser Gly Phe Ser Leu Thr Asp Ser
20 25 30

Ser Ile Asn Trp Val Arg Gln Pro Pro Gly Lys Gly Leu Glu Trp Leu
35 40 45

```
Gly Met Ile Trp Gly Asp Gly Arg Ile Asp Tyr Ala Asp Ala Leu Lys
    50                  55                  60

Ser Arg Leu Ser Ile Ser Lys Asp Ser Ser Lys Ser Gln Val Phe Leu
65                  70                  75                  80

Glu Met Thr Ser Leu Arg Thr Asp Asp Thr Ala Thr Tyr Tyr Cys Ala
                85                  90                  95

Arg Asp Gly Tyr Phe Pro Tyr Ala Met Asp Phe Trp Gly Gln Gly Thr
            100                 105                 110

Ser Val Thr Val Ser Ser Gly Gly Gly Gly Ser Gln Val Gln Leu Gln
        115                 120                 125

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

Cys Lys Ala Ser Gly Tyr Ser Phe Thr Ser Tyr Trp Ile His Trp Ile
145                 150                 155                 160

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

Ser Asp Gly Glu Thr Arg Leu Asn Gln Arg Phe Gln Gly Arg Ala Thr
            180                 185                 190

Leu Thr Val Asp Glu Ser Thr Ser Thr Ala Tyr Met Gln Leu Arg Ser
        195                 200                 205

Pro Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys Thr Arg Leu Lys Glu
    210                 215                 220

Tyr Gly Asn Tyr Asp Ser Phe Tyr Phe Asp Val Trp Gly Ala Gly Thr
225                 230                 235                 240

Leu Val Thr Val Ser Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro
                245                 250                 255

Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly
            260                 265                 270

Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn
        275                 280                 285

Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln
    290                 295                 300

Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
305                 310                 315                 320
```

```
Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser
                325                 330                 335

Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr
            340                 345                 350

His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser
        355                 360                 365

Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg
    370                 375                 380

Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro
385                 390                 395                 400

Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala
                405                 410                 415

Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val
            420                 425                 430

Ser Val Leu Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr
        435                 440                 445

Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr
    450                 455                 460

Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu
465                 470                 475                 480

Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys
                485                 490                 495

Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser
            500                 505                 510

Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp
        515                 520                 525

Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser
    530                 535                 540

Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala
545                 550                 555                 560

Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly
                565                 570                 575
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<210> 6
<211> 580
<212> PRT

<213> Artificial Sequence

<220>
<223> heavy chain of cross over double head construct IL13(G4S2)IL4CHFc

<400> 6

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Glu Val Gln Leu Lys Glu Ser Gly Pro Gly Leu Val Ala Pro Gly Gly
1               5                  10                  15

Ser Leu Ser Ile Thr Cys Thr Val Ser Gly Phe Ser Leu Thr Asp Ser
            20                  25                  30

Ser Ile Asn Trp Val Arg Gln Pro Pro Gly Lys Gly Leu Glu Trp Leu
        35                  40                  45

Gly Met Ile Trp Gly Asp Gly Arg Ile Asp Tyr Ala Asp Ala Leu Lys
    50                  55                  60

Ser Arg Leu Ser Ile Ser Lys Asp Ser Ser Lys Ser Gln Val Phe Leu
65                  70                  75                  80

Glu Met Thr Ser Leu Arg Thr Asp Asp Thr Ala Thr Tyr Tyr Cys Ala
                85                  90                  95

Arg Asp Gly Tyr Phe Pro Tyr Ala Met Asp Phe Trp Gly Gln Gly Thr
            100                 105                 110

Ser Val Thr Val Ser Ser Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser
        115                 120                 125

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

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

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

Gly Met Ile Asp Pro Ser Asp Gly Glu Thr Arg Leu Asn Gln Arg Phe
            180                 185                 190

Gln Gly Arg Ala Thr Leu Thr Val Asp Glu Ser Thr Ser Thr Ala Tyr
        195                 200                 205

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

Thr Arg Leu Lys Glu Tyr Gly Asn Tyr Asp Ser Phe Tyr Phe Asp Val
225                 230                 235                 240

Trp Gly Ala Gly Thr Leu Val Thr Val Ser Ser Ala Ser Thr Lys Gly
```

245 250 255

Pro Ser Val Phe Pro Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly
260 265 270

Thr Ala Ala Leu Gly Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val
275 280 285

Thr Val Ser Trp Asn Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe
290 295 300

Pro Ala Val Leu Gln Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val
305 310 315 320

Thr Val Pro Ser Ser Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val
325 330 335

Asn His Lys Pro Ser Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys
340 345 350

Ser Cys Asp Lys Thr His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu
355 360 365

Leu Gly Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr
370 375 380

Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val Asp Val
385 390 395 400

Ser His Glu Asp Pro Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val
405 410 415

Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser
420 425 430

Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln Asp Trp Leu
435 440 445

Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala
450 455 460

Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro
465 470 475 480

Gln Val Tyr Thr Leu Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln
485 490 495

Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile Ala
500 505 510

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

515 520 525

Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu
530 535 540

Thr Val Asp Lys Ser Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser
545 550 555 560

Val Met His Glu Ala Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser
565 570 575

Leu Ser Pro Gly
580

<210> 7
<211> 698
<212> PRT
<213> Artificial Sequence

<220>
<223> Heavy chain cross over double head construct IL4(G4S)IL13CHFc

<400> 7

Gln Val Gln Leu Gln Gln Ser Gly Pro Glu Leu Val Lys Pro Gly Ala
1 5 10 15

Ser Val Lys Ile Ser Cys Lys Ala Ser Gly Tyr Ser Phe Thr Ser Tyr
20 25 30

Trp Ile His Trp Ile Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile
35 40 45

Gly Met Ile Asp Pro Ser Asp Gly Glu Thr Arg Leu Asn Gln Arg Phe
50 55 60

Gln Gly Arg Ala Thr Leu Thr Val Asp Glu Ser Thr Ser Thr Ala Tyr
65 70 75 80

Met Gln Leu Arg Ser Pro Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys
85 90 95

Thr Arg Leu Lys Glu Tyr Gly Asn Tyr Asp Ser Phe Tyr Phe Asp Val
100 105 110

Trp Gly Ala Gly Thr Leu Val Thr Val Ser Ser Gly Gly Gly Gly Ser
115 120 125

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

Ser Leu Ser Ile Thr Cys Thr Val Ser Gly Phe Ser Leu Thr Asp Ser
145 150 155 160

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

Gly Met Ile Trp Gly Asp Gly Arg Ile Asp Tyr Ala Asp Ala Leu Lys
            180                 185                 190

Ser Arg Leu Ser Ile Ser Lys Asp Ser Ser Lys Ser Gln Val Phe Leu
        195                 200                 205

Glu Met Thr Ser Leu Arg Thr Asp Asp Thr Ala Thr Tyr Tyr Cys Ala
    210                 215                 220

Arg Asp Gly Tyr Phe Pro Tyr Ala Met Asp Phe Trp Gly Gln Gly Thr
225                 230                 235                 240

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

Leu Val Lys Pro Gly Ala Ser Val Lys Ile Ser Cys Lys Ala Ser Gly
            260                 265                 270

Tyr Ser Phe Thr Ser Tyr Trp Ile His Trp Ile Lys Gln Arg Pro Gly
        275                 280                 285

Gln Gly Leu Glu Trp Ile Gly Met Ile Asp Pro Ser Asp Gly Glu Thr
    290                 295                 300

Arg Leu Asn Gln Arg Phe Gln Gly Arg Ala Thr Leu Thr Val Asp Glu
305                 310                 315                 320

Ser Thr Ser Thr Ala Tyr Met Gln Leu Arg Ser Pro Thr Ser Glu Asp
                325                 330                 335

Ser Ala Val Tyr Tyr Cys Thr Arg Leu Lys Glu Tyr Gly Asn Tyr Asp
            340                 345                 350

Ser Phe Tyr Phe Asp Val Trp Gly Ala Gly Thr Leu Val Thr Val Ser
        355                 360                 365

Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser Ser
    370                 375                 380

Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val Lys Asp
385                 390                 395                 400

Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly Ala Leu Thr
                405                 410                 415

Ser Gly Val His Thr Phe Pro Ala Val Leu Gln Ser Ser Gly Leu Tyr
            420                 425                 430
```

```
Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser Ser Leu Gly Thr Gln
        435                 440                 445

Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser Asn Thr Lys Val Asp
    450                 455                 460

Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr His Thr Cys Pro Pro
465                 470                 475                 480

Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser Val Phe Leu Phe Pro
                485                 490                 495

Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val Thr
            500                 505                 510

Cys Val Val Val Asp Val Ser His Glu Asp Pro Glu Val Lys Phe Asn
        515                 520                 525

Trp Tyr Val Asp Gly Val Glu Val His Asn Ala Lys Thr Lys Pro Arg
    530                 535                 540

Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val
545                 550                 555                 560

Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser
                565                 570                 575

Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys
            580                 585                 590

Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg Asp
        595                 600                 605

Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe
    610                 615                 620

Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu
625                 630                 635                 640

Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe
                645                 650                 655

Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser Arg Trp Gln Gln Gly
            660                 665                 670

Asn Val Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn His Tyr
        675                 680                 685

Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly
    690                 695
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<210> 8
<211> 703
<212> PRT
<213> Artificial Sequence

<220>
<223> Heavy chain cross over double head construct IL4(G4S2)IL13CHFc

<400> 8

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Gln Val Gln Leu Gln Gln Ser Gly Pro Glu Leu Val Lys Pro Gly Ala
1               5                   10                  15

Ser Val Lys Ile Ser Cys Lys Ala Ser Gly Tyr Ser Phe Thr Ser Tyr
            20                  25                  30

Trp Ile His Trp Ile Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile
        35                  40                  45

Gly Met Ile Asp Pro Ser Asp Gly Glu Thr Arg Leu Asn Gln Arg Phe
    50                  55                  60

Gln Gly Arg Ala Thr Leu Thr Val Asp Glu Ser Thr Ser Thr Ala Tyr
65                  70                  75                  80

Met Gln Leu Arg Ser Pro Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys
                85                  90                  95

Thr Arg Leu Lys Glu Tyr Gly Asn Tyr Asp Ser Phe Tyr Phe Asp Val
            100                 105                 110

Trp Gly Ala Gly Thr Leu Val Thr Val Ser Ser Gly Gly Gly Gly Ser
        115                 120                 125

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

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

Ser Leu Thr Asp Ser Ser Ile Asn Trp Val Arg Gln Pro Pro Gly Lys
                165                 170                 175

Gly Leu Glu Trp Leu Gly Met Ile Trp Gly Asp Gly Arg Ile Asp Tyr
            180                 185                 190

Ala Asp Ala Leu Lys Ser Arg Leu Ser Ile Ser Lys Asp Ser Ser Lys
        195                 200                 205

Ser Gln Val Phe Leu Glu Met Thr Ser Leu Arg Thr Asp Asp Thr Ala
    210                 215                 220

Thr Tyr Tyr Cys Ala Arg Asp Gly Tyr Phe Pro Tyr Ala Met Asp Phe
```

225 230 235 240

Trp Gly Gln Gly Thr Ser Val Thr Val Ser Ser Gln Val Gln Leu Gln
245 250 255

Gln Ser Gly Pro Glu Leu Val Lys Pro Gly Ala Ser Val Lys Ile Ser
260 265 270

Cys Lys Ala Ser Gly Tyr Ser Phe Thr Ser Tyr Trp Ile His Trp Ile
275 280 285

Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile Gly Met Ile Asp Pro
290 295 300

Ser Asp Gly Glu Thr Arg Leu Asn Gln Arg Phe Gln Gly Arg Ala Thr
305 310 315 320

Leu Thr Val Asp Glu Ser Thr Ser Thr Ala Tyr Met Gln Leu Arg Ser
325 330 335

Pro Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys Thr Arg Leu Lys Glu
340 345 350

Tyr Gly Asn Tyr Asp Ser Phe Tyr Phe Asp Val Trp Gly Ala Gly Thr
355 360 365

Leu Val Thr Val Ser Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro
370 375 380

Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly
385 390 395 400

Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn
405 410 415

Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln
420 425 430

Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
435 440 445

Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser
450 455 460

Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr
465 470 475 480

His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser
485 490 495

Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg

500 505 510

Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro
515 520 525

Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala
530 535 540

Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val
545 550 555 560

Ser Val Leu Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr
565 570 575

Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr
580 585 590

Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu
595 600 605

Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys
610 615 620

Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser
625 630 635 640

Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp
645 650 655

Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser
660 665 670

Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala
675 680 685

Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly
690 695 700

<210> 9
<211> 330
<212> PRT
<213> Artificial Sequence

<220>
<223> Light chain cross over double head construct IL13(G4S)IL4CL

<400> 9

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

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

```
Gly Gln Ser Tyr Met His Trp Tyr Gln Gln Lys Ala Gly Gln Pro Pro
        35                  40                  45

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

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

Pro Val Gln Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Asn Ala
                85                  90                  95

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

Gly Gly Gly Ser Asp Ile Gln Met Thr Gln Ser Pro Ala Ser Leu Ser
        115                 120                 125

Val Ser Val Gly Asp Thr Ile Thr Leu Thr Cys His Ala Ser Gln Asn
    130                 135                 140

Ile Asp Val Trp Leu Ser Trp Phe Gln Gln Lys Pro Gly Asn Ile Pro
145                 150                 155                 160

Lys Leu Leu Ile Tyr Lys Ala Ser Asn Leu His Thr Gly Val Pro Ser
                165                 170                 175

Arg Phe Ser Gly Ser Gly Ser Gly Thr Gly Phe Thr Leu Thr Ile Ser
            180                 185                 190

Ser Leu Gln Pro Glu Asp Ile Ala Thr Tyr Tyr Cys Gln Gln Ala His
        195                 200                 205

Ser Tyr Pro Phe Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg
    210                 215                 220

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

Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn Asn Phe Tyr
                245                 250                 255

Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala Leu Gln Ser
            260                 265                 270

Gly Asn Ser Gln Glu Ser Val Thr Glu Gln Asp Ser Lys Asp Ser Thr
        275                 280                 285

Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu Lys
    290                 295                 300
```

His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser Pro
305 310 315 320

Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
325 330

<210> 10
<211> 335
<212> PRT
<213> Artificial Sequence

<220>
<223> Light chain cross over double head construct IL13(G4S2)IL4CL

<400> 10

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

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

Gly Gln Ser Tyr Met His Trp Tyr Gln Gln Lys Ala Gly Gln Pro Pro
35 40 45

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

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

Pro Val Gln Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Asn Ala
85 90 95

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

Gly Gly Gly Ser Gly Gly Gly Gly Ser Asp Ile Gln Met Thr Gln Ser
115 120 125

Pro Ala Ser Leu Ser Val Ser Val Gly Asp Thr Ile Thr Leu Thr Cys
130 135 140

His Ala Ser Gln Asn Ile Asp Val Trp Leu Ser Trp Phe Gln Gln Lys
145 150 155 160

Pro Gly Asn Ile Pro Lys Leu Leu Ile Tyr Lys Ala Ser Asn Leu His
165 170 175

Thr Gly Val Pro Ser Arg Phe Ser Gly Ser Gly Ser Gly Thr Gly Phe
180 185 190

Thr Leu Thr Ile Ser Ser Leu Gln Pro Glu Asp Ile Ala Thr Tyr Tyr

195 200 205

Cys Gln Gln Ala His Ser Tyr Pro Phe Thr Phe Gly Gly Gly Thr Lys
210 215 220

Leu Glu Ile Lys Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro
225 230 235 240

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

Leu Asn Asn Phe Tyr Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp
260 265 270

Asn Ala Leu Gln Ser Gly Asn Ser Gln Glu Ser Val Thr Glu Gln Asp
275 280 285

Ser Lys Asp Ser Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys
290 295 300

Ala Asp Tyr Glu Lys His Lys Val Tyr Ala Cys Glu Val Thr His Gln
305 310 315 320

Gly Leu Ser Ser Pro Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
325 330 335

<210> 11
<211> 330
<212> PRT
<213> Artificial Sequence

<220>
<223> Light chain cross over double head construct IL4(G4S)IL13CL

<400> 11

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

Asp Thr Ile Thr Leu Thr Cys His Ala Ser Gln Asn Ile Asp Val Trp
20 25 30

Leu Ser Trp Phe Gln Gln Lys Pro Gly Asn Ile Pro Lys Leu Leu Ile
35 40 45

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

Ser Gly Ser Gly Thr Gly Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
65 70 75 80

Glu Asp Ile Ala Thr Tyr Tyr Cys Gln Gln Ala His Ser Tyr Pro Phe
85 90 95

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

Asp Ile Val Leu Thr Gln Ser Pro Ala Ser Leu Ala Val Ser Leu Gly
        115                 120                 125

Gln Arg Ala Thr Ile Ser Cys Arg Ala Ser Glu Ser Val Asp Ser Tyr
    130                 135                 140

Gly Gln Ser Tyr Met His Trp Tyr Gln Gln Lys Ala Gly Gln Pro Pro
145                 150                 155                 160

Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu Ser Gly Val Pro Ala
                165                 170                 175

Arg Phe Ser Gly Ser Gly Ser Arg Thr Asp Phe Thr Leu Thr Ile Asp
            180                 185                 190

Pro Val Gln Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Asn Ala
        195                 200                 205

Glu Asp Ser Arg Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg
    210                 215                 220

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

Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn Asn Phe Tyr
                245                 250                 255

Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala Leu Gln Ser
            260                 265                 270

Gly Asn Ser Gln Glu Ser Val Thr Glu Gln Asp Ser Lys Asp Ser Thr
        275                 280                 285

Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu Lys
    290                 295                 300

His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser Pro
305                 310                 315                 320

Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
                325                 330
```

<210> 12
<211> 335
<212> PRT
<213> Artificial Sequence

<220>
<223> Light chain cross over double head construct IL4(G4S2)IL13CL

<400> 12

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

Asp Thr Ile Thr Leu Thr Cys His Ala Ser Gln Asn Ile Asp Val Trp
            20                  25                  30

Leu Ser Trp Phe Gln Gln Lys Pro Gly Asn Ile Pro Lys Leu Leu Ile
        35                  40                  45

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

Ser Gly Ser Gly Thr Gly Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
65                  70                  75                  80

Glu Asp Ile Ala Thr Tyr Tyr Cys Gln Gln Ala His Ser Tyr Pro Phe
                85                  90                  95

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

Gly Gly Gly Gly Ser Asp Ile Val Leu Thr Gln Ser Pro Ala Ser Leu
        115                 120                 125

Ala Val Ser Leu Gly Gln Arg Ala Thr Ile Ser Cys Arg Ala Ser Glu
    130                 135                 140

Ser Val Asp Ser Tyr Gly Gln Ser Tyr Met His Trp Tyr Gln Gln Lys
145                 150                 155                 160

Ala Gly Gln Pro Pro Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu
                165                 170                 175

Ser Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Arg Thr Asp Phe
            180                 185                 190

Thr Leu Thr Ile Asp Pro Val Gln Ala Glu Asp Ala Ala Thr Tyr Tyr
        195                 200                 205

Cys Gln Gln Asn Ala Glu Asp Ser Arg Thr Phe Gly Gly Gly Thr Lys
    210                 215                 220

Leu Glu Ile Lys Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro
225                 230                 235                 240

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

Leu Asn Asn Phe Tyr Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp
```

260 265 270

Asn Ala Leu Gln Ser Gly Asn Ser Gln Glu Ser Val Thr Glu Gln Asp
275 280 285

Ser Lys Asp Ser Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys
290 295 300

Ala Asp Tyr Glu Lys His Lys Val Tyr Ala Cys Glu Val Thr His Gln
305 310 315 320

Gly Leu Ser Ser Pro Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
325 330 335

<210> 13
<211> 583
<212> PRT
<213> Artificial Sequence

<220>
<223> Heavy chain sequence for cross over dual V-Ig having code HC1

<400> 13

Glu Val Gln Leu Lys Glu Ser Gly Pro Gly Leu Val Ala Pro Gly Gly
1 5 10 15

Ser Leu Ser Ile Thr Cys Thr Val Ser Gly Phe Ser Leu Thr Asp Ser
20 25 30

Ser Ile Asn Trp Val Arg Gln Pro Pro Gly Lys Gly Leu Glu Trp Leu
35 40 45

Gly Met Ile Trp Gly Asp Gly Arg Ile Asp Tyr Ala Asp Ala Leu Lys
50 55 60

Ser Arg Leu Ser Ile Ser Lys Asp Ser Ser Lys Ser Gln Val Phe Leu
65 70 75 80

Glu Met Thr Ser Leu Arg Thr Asp Asp Thr Ala Thr Tyr Tyr Cys Ala
85 90 95

Arg Asp Gly Tyr Phe Pro Tyr Ala Met Asp Phe Trp Gly Gln Gly Thr
100 105 110

Ser Val Thr Val Ser Ser Gly Gly Gly Gly Gly Gly Gln Val Gln Leu
115 120 125

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

Ser Cys Lys Ala Ser Gly Tyr Ser Phe Thr Ser Tyr Trp Ile His Trp
145 150 155 160

```
Ile Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile Gly Met Ile Asp
                165                 170                 175

Pro Ser Asp Gly Glu Thr Arg Leu Asn Gln Arg Phe Gln Gly Arg Ala
            180                 185                 190

Thr Leu Thr Val Asp Glu Ser Thr Ser Thr Ala Tyr Met Gln Leu Arg
        195                 200                 205

Ser Pro Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys Thr Arg Leu Lys
    210                 215                 220

Glu Tyr Gly Asn Tyr Asp Ser Phe Tyr Phe Asp Val Trp Gly Ala Gly
225                 230                 235                 240

Thr Leu Val Thr Val Ser Ser Gly Gly Gly Gly Gly Gly Gly Ala Ser
                245                 250                 255

Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser Ser Lys Ser Thr
            260                 265                 270

Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val Lys Asp Tyr Phe Pro
        275                 280                 285

Glu Pro Val Thr Val Ser Trp Asn Ser Gly Ala Leu Thr Ser Gly Val
    290                 295                 300

His Thr Phe Pro Ala Val Leu Gln Ser Ser Gly Leu Tyr Ser Leu Ser
305                 310                 315                 320

Ser Val Val Thr Val Pro Ser Ser Ser Leu Gly Thr Gln Thr Tyr Ile
                325                 330                 335

Cys Asn Val Asn His Lys Pro Ser Asn Thr Lys Val Asp Lys Lys Val
            340                 345                 350

Glu Pro Lys Ser Cys Asp Lys Thr His Thr Cys Pro Pro Cys Pro Ala
        355                 360                 365

Pro Glu Leu Leu Gly Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro
    370                 375                 380

Lys Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val
385                 390                 395                 400

Val Asp Val Ser His Glu Asp Pro Glu Val Lys Phe Asn Trp Tyr Val
                405                 410                 415

Asp Gly Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln
            420                 425                 430
```

```
Tyr Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln
        435                 440                 445

Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys Ala
    450                 455                 460

Leu Pro Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln Pro
465                 470                 475                 480

Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg Asp Glu Leu Thr
                485                 490                 495

Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser
            500                 505                 510

Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn Asn Tyr
        515                 520                 525

Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr
    530                 535                 540

Ser Lys Leu Thr Val Asp Lys Ser Arg Trp Gln Gln Gly Asn Val Phe
545                 550                 555                 560

Ser Cys Ser Val Met His Glu Ala Leu His Asn His Tyr Thr Gln Lys
                565                 570                 575

Ser Leu Ser Leu Ser Pro Gly
            580


<210>  14
<211>  580
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Heavy chain sequence for cross over dual V-Ig having code HC2

<400>  14

Glu Val Gln Leu Lys Glu Ser Gly Pro Gly Leu Val Ala Pro Gly Gly
1               5                   10                  15

Ser Leu Ser Ile Thr Cys Thr Val Ser Gly Phe Ser Leu Thr Asp Ser
            20                  25                  30

Ser Ile Asn Trp Val Arg Gln Pro Pro Gly Lys Gly Leu Glu Trp Leu
        35                  40                  45

Gly Met Ile Trp Gly Asp Gly Arg Ile Asp Tyr Ala Asp Ala Leu Lys
    50                  55                  60

Ser Arg Leu Ser Ile Ser Lys Asp Ser Ser Lys Ser Gln Val Phe Leu
```

65 70 75 80

Glu Met Thr Ser Leu Arg Thr Asp Asp Thr Ala Thr Tyr Tyr Cys Ala
85 90 95

Arg Asp Gly Tyr Phe Pro Tyr Ala Met Asp Phe Trp Gly Gln Gly Thr
100 105 110

Ser Val Thr Val Ser Ser Gly Gly Gly Gly Gly Gly Gln Val Gln Leu
115 120 125

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

Ser Cys Lys Ala Ser Gly Tyr Ser Phe Thr Ser Tyr Trp Ile His Trp
145 150 155 160

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

Pro Ser Asp Gly Glu Thr Arg Leu Asn Gln Arg Phe Gln Gly Arg Ala
180 185 190

Thr Leu Thr Val Asp Glu Ser Thr Ser Thr Ala Tyr Met Gln Leu Arg
195 200 205

Ser Pro Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys Thr Arg Leu Lys
210 215 220

Glu Tyr Gly Asn Tyr Asp Ser Phe Tyr Phe Asp Val Trp Gly Ala Gly
225 230 235 240

Thr Leu Val Thr Val Ser Ser Gly Gly Gly Gly Ala Ser Thr Lys Gly
245 250 255

Pro Ser Val Phe Pro Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly
260 265 270

Thr Ala Ala Leu Gly Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val
275 280 285

Thr Val Ser Trp Asn Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe
290 295 300

Pro Ala Val Leu Gln Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val
305 310 315 320

Thr Val Pro Ser Ser Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val
325 330 335

Asn His Lys Pro Ser Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys

340 345 350

Ser Cys Asp Lys Thr His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu
355 360 365

Leu Gly Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr
370 375 380

Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val Asp Val
385 390 395 400

Ser His Glu Asp Pro Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val
405 410 415

Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser
420 425 430

Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln Asp Trp Leu
435 440 445

Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala
450 455 460

Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro
465 470 475 480

Gln Val Tyr Thr Leu Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln
485 490 495

Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile Ala
500 505 510

Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr
515 520 525

Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu
530 535 540

Thr Val Asp Lys Ser Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser
545 550 555 560

Val Met His Glu Ala Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser
565 570 575

Leu Ser Pro Gly
580

<210> 15
<211> 579
<212> PRT
<213> Artificial Sequence

<220>
<223> Heavy chain sequence for cross over dual V-Ig having code HC3

<400> 15

```
Glu Val Gln Leu Lys Glu Ser Gly Pro Gly Leu Val Ala Pro Gly Gly
1               5                  10                  15

Ser Leu Ser Ile Thr Cys Thr Val Ser Gly Phe Ser Leu Thr Asp Ser
            20                  25                  30

Ser Ile Asn Trp Val Arg Gln Pro Pro Gly Lys Gly Leu Glu Trp Leu
        35                  40                  45

Gly Met Ile Trp Gly Asp Gly Arg Ile Asp Tyr Ala Asp Ala Leu Lys
    50                  55                  60

Ser Arg Leu Ser Ile Ser Lys Asp Ser Ser Lys Ser Gln Val Phe Leu
65                  70                  75                  80

Glu Met Thr Ser Leu Arg Thr Asp Asp Thr Ala Thr Tyr Tyr Cys Ala
                85                  90                  95

Arg Asp Gly Tyr Phe Pro Tyr Ala Met Asp Phe Trp Gly Gln Gly Thr
            100                 105                 110

Ser Val Thr Val Ser Ser Gly Gly Gln Val Gln Leu Gln Gln Ser Gly
        115                 120                 125

Pro Glu Leu Val Lys Pro Gly Ala Ser Val Lys Ile Ser Cys Lys Ala
    130                 135                 140

Ser Gly Tyr Ser Phe Thr Ser Tyr Trp Ile His Trp Ile Lys Gln Arg
145                 150                 155                 160

Pro Gly Gln Gly Leu Glu Trp Ile Gly Met Ile Asp Pro Ser Asp Gly
                165                 170                 175

Glu Thr Arg Leu Asn Gln Arg Phe Gln Gly Arg Ala Thr Leu Thr Val
            180                 185                 190

Asp Glu Ser Thr Ser Thr Ala Tyr Met Gln Leu Arg Ser Pro Thr Ser
        195                 200                 205

Glu Asp Ser Ala Val Tyr Tyr Cys Thr Arg Leu Lys Glu Tyr Gly Asn
    210                 215                 220

Tyr Asp Ser Phe Tyr Phe Asp Val Trp Gly Ala Gly Thr Leu Val Thr
225                 230                 235                 240

Val Ser Ser Gly Gly Gly Gly Gly Gly Gly Ala Ser Thr Lys Gly Pro
                245                 250                 255
```

```
Ser Val Phe Pro Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly Thr
            260                 265                 270

Ala Ala Leu Gly Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val Thr
        275                 280                 285

Val Ser Trp Asn Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe Pro
    290                 295                 300

Ala Val Leu Gln Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr
305                 310                 315                 320

Val Pro Ser Ser Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn
                325                 330                 335

His Lys Pro Ser Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser
            340                 345                 350

Cys Asp Lys Thr His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu
        355                 360                 365

Gly Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu
    370                 375                 380

Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser
385                 390                 395                 400

His Glu Asp Pro Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val Glu
                405                 410                 415

Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr
            420                 425                 430

Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln Asp Trp Leu Asn
        435                 440                 445

Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala Pro
    450                 455                 460

Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln
465                 470                 475                 480

Val Tyr Thr Leu Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln Val
                485                 490                 495

Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile Ala Val
            500                 505                 510

Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro
        515                 520                 525
```

```
Pro Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr
    530                 535                 540

Val Asp Lys Ser Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val
545                 550                 555                 560

Met His Glu Ala Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu
                565                 570                 575

Ser Pro Gly
```

<210> 16
<211> 576
<212> PRT
<213> Artificial Sequence

<220>
<223> Heavy chain sequence for cross over dual V-Ig having code HC4

<400> 16

```
Glu Val Gln Leu Lys Glu Ser Gly Pro Gly Leu Val Ala Pro Gly Gly
1               5                   10                  15

Ser Leu Ser Ile Thr Cys Thr Val Ser Gly Phe Ser Leu Thr Asp Ser
            20                  25                  30

Ser Ile Asn Trp Val Arg Gln Pro Pro Gly Lys Gly Leu Glu Trp Leu
        35                  40                  45

Gly Met Ile Trp Gly Asp Gly Arg Ile Asp Tyr Ala Asp Ala Leu Lys
    50                  55                  60

Ser Arg Leu Ser Ile Ser Lys Asp Ser Ser Lys Ser Gln Val Phe Leu
65                  70                  75                  80

Glu Met Thr Ser Leu Arg Thr Asp Asp Thr Ala Thr Tyr Tyr Cys Ala
                85                  90                  95

Arg Asp Gly Tyr Phe Pro Tyr Ala Met Asp Phe Trp Gly Gln Gly Thr
            100                 105                 110

Ser Val Thr Val Ser Ser Gly Gly Gln Val Gln Leu Gln Gln Ser Gly
        115                 120                 125

Pro Glu Leu Val Lys Pro Gly Ala Ser Val Lys Ile Ser Cys Lys Ala
    130                 135                 140

Ser Gly Tyr Ser Phe Thr Ser Tyr Trp Ile His Trp Ile Lys Gln Arg
145                 150                 155                 160

Pro Gly Gln Gly Leu Glu Trp Ile Gly Met Ile Asp Pro Ser Asp Gly
```

165 170 175

Glu Thr Arg Leu Asn Gln Arg Phe Gln Gly Arg Ala Thr Leu Thr Val
180 185 190

Asp Glu Ser Thr Ser Thr Ala Tyr Met Gln Leu Arg Ser Pro Thr Ser
195 200 205

Glu Asp Ser Ala Val Tyr Tyr Cys Thr Arg Leu Lys Glu Tyr Gly Asn
210 215 220

Tyr Asp Ser Phe Tyr Phe Asp Val Trp Gly Ala Gly Thr Leu Val Thr
225 230 235 240

Val Ser Ser Gly Gly Gly Gly Ala Ser Thr Lys Gly Pro Ser Val Phe
245 250 255

Pro Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu
260 265 270

Gly Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp
275 280 285

Asn Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu
290 295 300

Gln Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser
305 310 315 320

Ser Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro
325 330 335

Ser Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys
340 345 350

Thr His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro
355 360 365

Ser Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser
370 375 380

Arg Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser His Glu Asp
385 390 395 400

Pro Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn
405 410 415

Ala Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val
420 425 430

Val Ser Val Leu Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu

435 440 445

Tyr Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys
450 455 460

Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr
465 470 475 480

Leu Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr
485 490 495

Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu
500 505 510

Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu
515 520 525

Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys
530 535 540

Ser Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu
545 550 555 560

Ala Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly
565 570 575

<210> 17
<211> 581
<212> PRT
<213> Artificial Sequence

<220>
<223> Heavy chain sequence for cross over dual V-Ig having code HC5

<400> 17

Glu Val Gln Leu Lys Glu Ser Gly Pro Gly Leu Val Ala Pro Gly Gly
1 5 10 15

Ser Leu Ser Ile Thr Cys Thr Val Ser Gly Phe Ser Leu Thr Asp Ser
20 25 30

Ser Ile Asn Trp Val Arg Gln Pro Pro Gly Lys Gly Leu Glu Trp Leu
35 40 45

Gly Met Ile Trp Gly Asp Gly Arg Ile Asp Tyr Ala Asp Ala Leu Lys
50 55 60

Ser Arg Leu Ser Ile Ser Lys Asp Ser Ser Lys Ser Gln Val Phe Leu
65 70 75 80

Glu Met Thr Ser Leu Arg Thr Asp Asp Thr Ala Thr Tyr Tyr Cys Ala
85 90 95

```
Arg Asp Gly Tyr Phe Pro Tyr Ala Met Asp Phe Trp Gly Gln Gly Thr
            100                 105                 110

Ser Val Thr Val Ser Ser Gly Gly Gly Gly Gln Val Gln Leu Gln Gln
        115                 120                 125

Ser Gly Pro Glu Leu Val Lys Pro Gly Ala Ser Val Lys Ile Ser Cys
    130                 135                 140

Lys Ala Ser Gly Tyr Ser Phe Thr Ser Tyr Trp Ile His Trp Ile Lys
145                 150                 155                 160

Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile Gly Met Ile Asp Pro Ser
                165                 170                 175

Asp Gly Glu Thr Arg Leu Asn Gln Arg Phe Gln Gly Arg Ala Thr Leu
            180                 185                 190

Thr Val Asp Glu Ser Thr Ser Thr Ala Tyr Met Gln Leu Arg Ser Pro
        195                 200                 205

Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys Thr Arg Leu Lys Glu Tyr
    210                 215                 220

Gly Asn Tyr Asp Ser Phe Tyr Phe Asp Val Trp Gly Ala Gly Thr Leu
225                 230                 235                 240

Val Thr Val Ser Ser Gly Gly Gly Gly Gly Gly Gly Ala Ser Thr Lys
                245                 250                 255

Gly Pro Ser Val Phe Pro Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly
            260                 265                 270

Gly Thr Ala Ala Leu Gly Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro
        275                 280                 285

Val Thr Val Ser Trp Asn Ser Gly Ala Leu Thr Ser Gly Val His Thr
    290                 295                 300

Phe Pro Ala Val Leu Gln Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val
305                 310                 315                 320

Val Thr Val Pro Ser Ser Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn
                325                 330                 335

Val Asn His Lys Pro Ser Asn Thr Lys Val Asp Lys Lys Val Glu Pro
            340                 345                 350

Lys Ser Cys Asp Lys Thr His Thr Cys Pro Pro Cys Pro Ala Pro Glu
        355                 360                 365
```

```
Leu Leu Gly Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro Lys Asp
    370                 375                 380

Thr Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val Asp
385                 390                 395                 400

Val Ser His Glu Asp Pro Glu Val Lys Phe Asn Trp Tyr Val Asp Gly
                405                 410                 415

Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn
            420                 425                 430

Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln Asp Trp
        435                 440                 445

Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys Ala Leu Pro
    450                 455                 460

Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu
465                 470                 475                 480

Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn
                485                 490                 495

Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile
            500                 505                 510

Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr
        515                 520                 525

Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys
    530                 535                 540

Leu Thr Val Asp Lys Ser Arg Trp Gln Gln Gly Asn Val Phe Ser Cys
545                 550                 555                 560

Ser Val Met His Glu Ala Leu His Asn His Tyr Thr Gln Lys Ser Leu
                565                 570                 575

Ser Leu Ser Pro Gly
            580
```

<210> 18
<211> 578
<212> PRT
<213> Artificial Sequence

<220>
<223> Heavy chain for cross over dual V-Ig having code HC6

<400> 18

```
Glu Val Gln Leu Lys Glu Ser Gly Pro Gly Leu Val Ala Pro Gly Gly
```

1 5 10 15

Ser Leu Ser Ile Thr Cys Thr Val Ser Gly Phe Ser Leu Thr Asp Ser
20 25 30

Ser Ile Asn Trp Val Arg Gln Pro Pro Gly Lys Gly Leu Glu Trp Leu
35 40 45

Gly Met Ile Trp Gly Asp Gly Arg Ile Asp Tyr Ala Asp Ala Leu Lys
50 55 60

Ser Arg Leu Ser Ile Ser Lys Asp Ser Ser Lys Ser Gln Val Phe Leu
65 70 75 80

Glu Met Thr Ser Leu Arg Thr Asp Asp Thr Ala Thr Tyr Tyr Cys Ala
85 90 95

Arg Asp Gly Tyr Phe Pro Tyr Ala Met Asp Phe Trp Gly Gln Gly Thr
100 105 110

Ser Val Thr Val Ser Ser Gly Gly Gly Gly Gln Val Gln Leu Gln Gln
115 120 125

Ser Gly Pro Glu Leu Val Lys Pro Gly Ala Ser Val Lys Ile Ser Cys
130 135 140

Lys Ala Ser Gly Tyr Ser Phe Thr Ser Tyr Trp Ile His Trp Ile Lys
145 150 155 160

Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile Gly Met Ile Asp Pro Ser
165 170 175

Asp Gly Glu Thr Arg Leu Asn Gln Arg Phe Gln Gly Arg Ala Thr Leu
180 185 190

Thr Val Asp Glu Ser Thr Ser Thr Ala Tyr Met Gln Leu Arg Ser Pro
195 200 205

Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys Thr Arg Leu Lys Glu Tyr
210 215 220

Gly Asn Tyr Asp Ser Phe Tyr Phe Asp Val Trp Gly Ala Gly Thr Leu
225 230 235 240

Val Thr Val Ser Ser Gly Gly Gly Gly Ala Ser Thr Lys Gly Pro Ser
245 250 255

Val Phe Pro Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly Thr Ala
260 265 270

Ala Leu Gly Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val

275 280 285

Ser Trp Asn Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala
290 295 300

Val Leu Gln Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val
305 310 315 320

Pro Ser Ser Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His
325 330 335

Lys Pro Ser Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys
340 345 350

Asp Lys Thr His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly
355 360 365

Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu Met
370 375 380

Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser His
385 390 395 400

Glu Asp Pro Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val Glu Val
405 410 415

His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr
420 425 430

Arg Val Val Ser Val Leu Thr Val Leu His Gln Asp Trp Leu Asn Gly
435 440 445

Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala Pro Ile
450 455 460

Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln Val
465 470 475 480

Tyr Thr Leu Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln Val Ser
485 490 495

Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile Ala Val Glu
500 505 510

Trp Glu Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro
515 520 525

Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val
530 535 540

Asp Lys Ser Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met

545 550 555 560

His Glu Ala Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser
565 570 575

Pro Gly

<210> 19
<211> 328
<212> PRT
<213> Artificial Sequence

<220>
<223> Light chain sequence for cross over dual V-Ig having code LC1

<400> 19

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

Asp Thr Ile Thr Leu Thr Cys His Ala Ser Gln Asn Ile Asp Val Trp
20 25 30

Leu Ser Trp Phe Gln Gln Lys Pro Gly Asn Ile Pro Lys Leu Leu Ile
35 40 45

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

Ser Gly Ser Gly Thr Gly Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
65 70 75 80

Glu Asp Ile Ala Thr Tyr Tyr Cys Gln Gln Ala His Ser Tyr Pro Phe
85 90 95

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

Val Leu Thr Gln Ser Pro Ala Ser Leu Ala Val Ser Leu Gly Gln Arg
115 120 125

Ala Thr Ile Ser Cys Arg Ala Ser Glu Ser Val Asp Ser Tyr Gly Gln
130 135 140

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

Leu Ile Tyr Leu Ala Ser Asn Leu Glu Ser Gly Val Pro Ala Arg Phe
165 170 175

Ser Gly Ser Gly Ser Arg Thr Asp Phe Thr Leu Thr Ile Asp Pro Val
180 185 190

```
Gln Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Asn Ala Glu Asp
        195                 200                 205

Ser Arg Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg Thr Val
    210                 215                 220

Ala Ala Pro Ser Val Phe Ile Phe Pro Pro Ser Asp Glu Gln Leu Lys
225                 230                 235                 240

Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn Asn Phe Tyr Pro Arg
                245                 250                 255

Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala Leu Gln Ser Gly Asn
            260                 265                 270

Ser Gln Glu Ser Val Thr Glu Gln Asp Ser Lys Asp Ser Thr Tyr Ser
        275                 280                 285

Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu Lys His Lys
    290                 295                 300

Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser Pro Val Thr
305                 310                 315                 320

Lys Ser Phe Asn Arg Gly Glu Cys
                325
```

<210> 20
<211> 326
<212> PRT
<213> Artificial Sequence

<220>
<223> Light chain sequence for cross over dual V-Ig having code LC2

<400> 20

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

Asp Thr Ile Thr Leu Thr Cys His Ala Ser Gln Asn Ile Asp Val Trp
            20                  25                  30

Leu Ser Trp Phe Gln Gln Lys Pro Gly Asn Ile Pro Lys Leu Leu Ile
        35                  40                  45

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

Ser Gly Ser Gly Thr Gly Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
65                  70                  75                  80

Glu Asp Ile Ala Thr Tyr Tyr Cys Gln Gln Ala His Ser Tyr Pro Phe
```

85 90 95

Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Gly Asp Ile Val Leu
100 105 110

Thr Gln Ser Pro Ala Ser Leu Ala Val Ser Leu Gly Gln Arg Ala Thr
115 120 125

Ile Ser Cys Arg Ala Ser Glu Ser Val Asp Ser Tyr Gly Gln Ser Tyr
130 135 140

Met His Trp Tyr Gln Gln Lys Ala Gly Gln Pro Pro Lys Leu Leu Ile
145 150 155 160

Tyr Leu Ala Ser Asn Leu Glu Ser Gly Val Pro Ala Arg Phe Ser Gly
165 170 175

Ser Gly Ser Arg Thr Asp Phe Thr Leu Thr Ile Asp Pro Val Gln Ala
180 185 190

Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Asn Ala Glu Asp Ser Arg
195 200 205

Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg Thr Val Ala Ala
210 215 220

Pro Ser Val Phe Ile Phe Pro Pro Ser Asp Glu Gln Leu Lys Ser Gly
225 230 235 240

Thr Ala Ser Val Val Cys Leu Leu Asn Asn Phe Tyr Pro Arg Glu Ala
245 250 255

Lys Val Gln Trp Lys Val Asp Asn Ala Leu Gln Ser Gly Asn Ser Gln
260 265 270

Glu Ser Val Thr Glu Gln Asp Ser Lys Asp Ser Thr Tyr Ser Leu Ser
275 280 285

Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu Lys His Lys Val Tyr
290 295 300

Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser Pro Val Thr Lys Ser
305 310 315 320

Phe Asn Arg Gly Glu Cys
325

<210> 21
<211> 330
<212> PRT
<213> Artificial Sequence

<220>
<223> Light chain sequence for cross over dual V-Ig having code LC3

<400> 21

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

Asp Thr Ile Thr Leu Thr Cys His Ala Ser Gln Asn Ile Asp Val Trp
            20                  25                  30

Leu Ser Trp Phe Gln Gln Lys Pro Gly Asn Ile Pro Lys Leu Leu Ile
        35                  40                  45

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

Ser Gly Ser Gly Thr Gly Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
65                  70                  75                  80

Glu Asp Ile Ala Thr Tyr Tyr Cys Gln Gln Ala His Ser Tyr Pro Phe
                85                  90                  95

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

Val Leu Thr Gln Ser Pro Ala Ser Leu Ala Val Ser Leu Gly Gln Arg
        115                 120                 125

Ala Thr Ile Ser Cys Arg Ala Ser Glu Ser Val Asp Ser Tyr Gly Gln
    130                 135                 140

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

Leu Ile Tyr Leu Ala Ser Asn Leu Glu Ser Gly Val Pro Ala Arg Phe
                165                 170                 175

Ser Gly Ser Gly Ser Arg Thr Asp Phe Thr Leu Thr Ile Asp Pro Val
            180                 185                 190

Gln Ala Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Asn Ala Glu Asp
        195                 200                 205

Ser Arg Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Gly Gly Arg
    210                 215                 220

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

Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn Asn Phe Tyr
                245                 250                 255
```

```
Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala Leu Gln Ser
            260                 265                 270


Gly Asn Ser Gln Glu Ser Val Thr Glu Gln Asp Ser Lys Asp Ser Thr
        275                 280                 285


Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu Lys
    290                 295                 300


His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser Pro
305                 310                 315                 320


Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
                325                 330


<210>  22
<211>  328
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Light chain sequence for cross over dual V-Ig having code LC4

<400>  22

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


Asp Thr Ile Thr Leu Thr Cys His Ala Ser Gln Asn Ile Asp Val Trp
            20                  25                  30


Leu Ser Trp Phe Gln Gln Lys Pro Gly Asn Ile Pro Lys Leu Leu Ile
        35                  40                  45


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


Ser Gly Ser Gly Thr Gly Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
65                  70                  75                  80


Glu Asp Ile Ala Thr Tyr Tyr Cys Gln Gln Ala His Ser Tyr Pro Phe
                85                  90                  95


Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Gly Asp Ile Val Leu
            100                 105                 110


Thr Gln Ser Pro Ala Ser Leu Ala Val Ser Leu Gly Gln Arg Ala Thr
        115                 120                 125


Ile Ser Cys Arg Ala Ser Glu Ser Val Asp Ser Tyr Gly Gln Ser Tyr
    130                 135                 140


Met His Trp Tyr Gln Gln Lys Ala Gly Gln Pro Pro Lys Leu Leu Ile
```

145 150 155 160

Tyr Leu Ala Ser Asn Leu Glu Ser Gly Val Pro Ala Arg Phe Ser Gly
165 170 175

Ser Gly Ser Arg Thr Asp Phe Thr Leu Thr Ile Asp Pro Val Gln Ala
180 185 190

Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Asn Ala Glu Asp Ser Arg
195 200 205

Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Gly Gly Arg Thr Val
210 215 220

Ala Ala Pro Ser Val Phe Ile Phe Pro Pro Ser Asp Glu Gln Leu Lys
225 230 235 240

Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn Asn Phe Tyr Pro Arg
245 250 255

Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala Leu Gln Ser Gly Asn
260 265 270

Ser Gln Glu Ser Val Thr Glu Gln Asp Ser Lys Asp Ser Thr Tyr Ser
275 280 285

Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu Lys His Lys
290 295 300

Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser Pro Val Thr
305 310 315 320

Lys Ser Phe Asn Arg Gly Glu Cys
325

<210> 23
<211> 107
<212> PRT
<213> Homo sapiens

<400> 23

Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro Pro Ser Asp Glu
1 5 10 15

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

Tyr Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala Leu Gln
35 40 45

Ser Gly Asn Ser Gln Glu Ser Val Thr Glu Gln Asp Ser Lys Asp Ser
50 55 60

```
Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu
65                  70                  75                  80

Lys His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser
                85                  90                  95

Pro Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
            100                 105
```

<210> 24
<211> 329
<212> PRT
<213> Homo sapiens

<400> 24

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

Ser Thr Ser Gly Gly 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 Gln Thr
65                  70                  75                  80

Tyr Ile Cys Asn Val Asn His Lys Pro Ser Asn Thr Lys Val Asp Lys
                85                  90                  95

Lys Val Glu Pro Lys Ser Cys Asp Lys Thr His Thr Cys Pro Pro Cys
            100                 105                 110

Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser Val Phe Leu Phe Pro Pro
        115                 120                 125

Lys Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys
    130                 135                 140

Val Val Val Asp Val Ser His Glu Asp Pro Glu Val Lys Phe Asn Trp
145                 150                 155                 160

Tyr Val Asp Gly Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu
                165                 170                 175

Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu
            180                 185                 190
```

```
His Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn
        195                 200                 205

Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly
    210                 215                 220

Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg Asp Glu
225                 230                 235                 240

Leu Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr
                245                 250                 255

Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn
            260                 265                 270

Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe
        275                 280                 285

Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser Arg Trp Gln Gln Gly Asn
    290                 295                 300

Val Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn His Tyr Thr
305                 310                 315                 320

Gln Lys Ser Leu Ser Leu Ser Pro Gly
                325
```

<210> 25
<211> 4
<212> PRT
<213> Artificial Sequence

<220>
<223> Peptide linker with four glycine residues

<400> 25

```
Gly Gly Gly Gly
1
```

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

<220>
<223> Peptide linker with 5 glycine amino acid residues

<400> 26

```
Gly Gly Gly Gly Gly
1               5
```

<210> 27
<211> 6
<212> PRT

<213> Artificial Sequence

<220>
<223> Peptide linker with 6 glycine amino acid residues.

<400> 27

Gly Gly Gly Gly Gly Gly
1 5

<210> 28
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> Peptide linker with seven glycine amino acid residues.

<400> 28

Gly Gly Gly Gly Gly Gly Gly
1 5

<210> 29
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Peptide linker with eight glycine amino acid residues.

<400> 29

Gly Gly Gly Gly Gly Gly Gly Gly
1 5

<210> 30
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> artificial peptide linker

<400> 30

Gly Gly Gly Gly Ser
1 5

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

<220>
<223> artificial peptide linker

<400> 31

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

<210> 32

<211> 582
<212> PRT
<213> Artificial Sequence

<220>
<223> Heavy chain sequence for cross over dual V-Ig having code HC10

<400> 32

```
Glu Val Gln Leu Val Gln Ser Gly Ala Glu Val Lys Lys Pro Gly Ser
1               5                   10                  15


Ser Val Lys Val Ser Cys Lys Ala Ser Gly Gly Thr Phe Ser Ser Tyr
            20                  25                  30


Ala Ile Ser Trp Val Arg Gln Ala Pro Gly Gln Gly Leu Glu Trp Met
        35                  40                  45


Gly Gly Ile Ile Pro Ile Phe Gly Thr Ala Asn Tyr Ala Gln Lys Phe
    50                  55                  60


Gln Gly Arg Val Thr Ile Thr Ala Asp Lys Ser Thr Ser Thr Ala Tyr
65                  70                  75                  80


Met Glu Leu Ser Ser Leu Arg Ser Glu Asp Thr Ala Val Tyr Tyr Cys
                85                  90                  95


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


Tyr Tyr Tyr Tyr Met Asp Val Trp Gly Lys Gly Thr Thr Val Thr Val
        115                 120                 125


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


Pro Gly Gly Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Asn Ile
145                 150                 155                 160


Lys Asp Thr Tyr Ile His Trp Val Arg Gln Ala Pro Gly Lys Gly Leu
                165                 170                 175


Glu Trp Val Ala Arg Ile Tyr Pro Thr Asn Gly Tyr Thr Arg Tyr Ala
            180                 185                 190


Asp Ser Val Lys Gly Arg Phe Thr Ile Ser Ala Asp Thr Ser Lys Asn
        195                 200                 205


Thr Ala Tyr Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val
    210                 215                 220


Tyr Tyr Cys Ser Arg Trp Gly Gly Asp Gly Phe Tyr Ala Met Asp Tyr
225                 230                 235                 240
```

```
Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser Gly Gly Ala Ser Thr
                245                 250                 255

Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser Ser Lys Ser Thr Ser
            260                 265                 270

Gly Gly Thr Ala Ala Leu Gly Cys Leu Val Lys Asp Tyr Phe Pro Glu
        275                 280                 285

Pro Val Thr Val Ser Trp Asn Ser Gly Ala Leu Thr Ser Gly Val His
    290                 295                 300

Thr Phe Pro Ala Val Leu Gln Ser Ser Gly Leu Tyr Ser Leu Ser Ser
305                 310                 315                 320

Val Val Thr Val Pro Ser Ser Ser Leu Gly Thr Gln Thr Tyr Ile Cys
                325                 330                 335

Asn Val Asn His Lys Pro Ser Asn Thr Lys Val Asp Lys Lys Val Glu
            340                 345                 350

Pro Lys Ser Cys Asp Lys Thr His Thr Cys Pro Pro Cys Pro Ala Pro
        355                 360                 365

Glu Leu Leu Gly Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro Lys
    370                 375                 380

Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val
385                 390                 395                 400

Asp Val Ser His Glu Asp Pro Glu Val Lys Phe Asn Trp Tyr Val Asp
                405                 410                 415

Gly Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Tyr
            420                 425                 430

Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln Asp
        435                 440                 445

Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys Ala Leu
    450                 455                 460

Pro Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg
465                 470                 475                 480

Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg Asp Glu Leu Thr Lys
                485                 490                 495

Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp
            500                 505                 510
```

```
Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys
        515                 520                 525


Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser
    530                 535                 540


Lys Leu Thr Val Asp Lys Ser Arg Trp Gln Gln Gly Asn Val Phe Ser
545                 550                 555                 560


Cys Ser Val Met His Glu Ala Leu His Asn His Tyr Thr Gln Lys Ser
                565                 570                 575


Leu Ser Leu Ser Pro Gly
            580


<210>  33
<211>  582
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Heavy chain sequence for cross over dual V-Ig having code HC11

<400>  33

Glu Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Gly
1               5                   10                  15


Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Asn Ile Lys Asp Thr
            20                  25                  30


Tyr Ile His Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val
        35                  40                  45


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


Lys Gly Arg Phe Thr Ile Ser Ala Asp Thr Ser Lys Asn Thr Ala Tyr
65                  70                  75                  80


Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys
                85                  90                  95


Ser Arg Trp Gly Gly Asp Gly Phe Tyr Ala Met Asp Tyr Trp Gly Gln
            100                 105                 110


Gly Thr Leu Val Thr Val Ser Ser Gly Glu Val Gln Leu Val Gln Ser
        115                 120                 125


Gly Ala Glu Val Lys Lys Pro Gly Ser Ser Val Lys Val Ser Cys Lys
    130                 135                 140


Ala Ser Gly Gly Thr Phe Ser Ser Tyr Ala Ile Ser Trp Val Arg Gln
```

```
145                 150                 155                 160

Ala Pro Gly Gln Gly Leu Glu Trp Met Gly Gly Ile Ile Pro Ile Phe
                165                 170                 175

Gly Thr Ala Asn Tyr Ala Gln Lys Phe Gln Gly Arg Val Thr Ile Thr
            180                 185                 190

Ala Asp Lys Ser Thr Ser Thr Ala Tyr Met Glu Leu Ser Ser Leu Arg
        195                 200                 205

Ser Glu Asp Thr Ala Val Tyr Tyr Cys Ala Arg Ala Pro Leu Arg Phe
    210                 215                 220

Leu Glu Trp Ser Thr Gln Asp His Tyr Tyr Tyr Tyr Tyr Met Asp Val
225                 230                 235                 240

Trp Gly Lys Gly Thr Thr Val Thr Val Ser Ser Gly Gly Ala Ser Thr
                245                 250                 255

Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser Ser Lys Ser Thr Ser
            260                 265                 270

Gly Gly Thr Ala Ala Leu Gly Cys Leu Val Lys Asp Tyr Phe Pro Glu
        275                 280                 285

Pro Val Thr Val Ser Trp Asn Ser Gly Ala Leu Thr Ser Gly Val His
    290                 295                 300

Thr Phe Pro Ala Val Leu Gln Ser Ser Gly Leu Tyr Ser Leu Ser Ser
305                 310                 315                 320

Val Val Thr Val Pro Ser Ser Ser Leu Gly Thr Gln Thr Tyr Ile Cys
                325                 330                 335

Asn Val Asn His Lys Pro Ser Asn Thr Lys Val Asp Lys Lys Val Glu
            340                 345                 350

Pro Lys Ser Cys Asp Lys Thr His Thr Cys Pro Pro Cys Pro Ala Pro
        355                 360                 365

Glu Leu Leu Gly Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro Lys
    370                 375                 380

Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val
385                 390                 395                 400

Asp Val Ser His Glu Asp Pro Glu Val Lys Phe Asn Trp Tyr Val Asp
                405                 410                 415

Gly Val Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Tyr
```

420 425 430

Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln Asp
435 440 445

Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys Ala Leu
450 455 460

Pro Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg
465 470 475 480

Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg Asp Glu Leu Thr Lys
485 490 495

Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp
500 505 510

Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys
515 520 525

Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser
530 535 540

Lys Leu Thr Val Asp Lys Ser Arg Trp Gln Gln Gly Asn Val Phe Ser
545 550 555 560

Cys Ser Val Met His Glu Ala Leu His Asn His Tyr Thr Gln Lys Ser
565 570 575

Leu Ser Leu Ser Pro Gly
580

<210> 34
<211> 571
<212> PRT
<213> Artificial Sequence

<220>
<223> Heavy chain sequence for cross over dual V-Ig having code HC12

<400> 34

Glu Val Gln Leu Val Gln Ser Gly Gly Gly Leu Val Lys Pro Gly Gly
1 5 10 15

Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Ser Phe
20 25 30

Ala Met His Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Ile
35 40 45

Ser Val Ile Asp Thr Arg Gly Ala Thr Tyr Tyr Ala Asp Ser Val Lys
50 55 60

```
Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Ser Leu Tyr Leu
65                  70                  75                  80

Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys Ala
                85                  90                  95

Arg Leu Gly Asn Phe Tyr Tyr Gly Met Asp Val Trp Gly Gln Gly Thr
            100                 105                 110

Thr Val Thr Val Ser Ser Gly Gln Val Gln Leu Gln Glu Ser Gly Pro
        115                 120                 125

Gly Leu Val Lys Pro Ser Gln Thr Leu Ser Leu Thr Cys Thr Val Ser
    130                 135                 140

Gly Gly Ser Ile Ser Ser Gly Asp Tyr Tyr Trp Ser Trp Ile Arg Gln
145                 150                 155                 160

Pro Pro Gly Lys Gly Leu Glu Trp Ile Gly Tyr Ile Tyr Tyr Ser Gly
                165                 170                 175

Ser Thr Asp Tyr Asn Pro Ser Leu Lys Ser Arg Val Thr Met Ser Val
            180                 185                 190

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

Ala Asp Thr Ala Val Tyr Tyr Cys Ala Arg Val Ser Ile Phe Gly Val
    210                 215                 220

Gly Thr Phe Asp Tyr Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser
225                 230                 235                 240

Gly Gly Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser
                245                 250                 255

Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val Lys
            260                 265                 270

Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly Ala Leu
        275                 280                 285

Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln Ser Ser Gly Leu
    290                 295                 300

Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser Ser Leu Gly Thr
305                 310                 315                 320

Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser Asn Thr Lys Val
                325                 330                 335
```

```
Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr His Thr Cys Pro
            340                 345                 350

Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser Val Phe Leu Phe
        355                 360                 365

Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val
    370                 375                 380

Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro Glu Val Lys Phe
385                 390                 395                 400

Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala Lys Thr Lys Pro
                405                 410                 415

Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr
            420                 425                 430

Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val
        435                 440                 445

Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala
    450                 455                 460

Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg
465                 470                 475                 480

Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly
                485                 490                 495

Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro
            500                 505                 510

Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser
        515                 520                 525

Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser Arg Trp Gln Gln
    530                 535                 540

Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn His
545                 550                 555                 560

Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly
                565                 570
```

<210> 35
<211> 571
<212> PRT
<213> Artificial Sequence

<220>
<223> Heavy chain sequence for cross over dual V-Ig having code HC13

<400> 35

```
Gln Val Gln Leu Gln Glu Ser Gly Pro Gly Leu Val Lys Pro Ser Gln
1               5                  10                  15

Thr Leu Ser Leu Thr Cys Thr Val Ser Gly Gly Ser Ile Ser Ser Gly
            20                  25                  30

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

Trp Ile Gly Tyr Ile Tyr Tyr Ser Gly Ser Thr Asp Tyr Asn Pro Ser
    50                  55                  60

Leu Lys Ser Arg Val Thr Met Ser Val Asp Thr Ser Lys Asn Gln Phe
65                  70                  75                  80

Ser Leu Lys Val Asn Ser Val Thr Ala Ala Asp Thr Ala Val Tyr Tyr
                85                  90                  95

Cys Ala Arg Val Ser Ile Phe Gly Val Gly Thr Phe Asp Tyr Trp Gly
            100                 105                 110

Gln Gly Thr Leu Val Thr Val Ser Ser Gly Glu Val Gln Leu Val Gln
        115                 120                 125

Ser Gly Gly Gly Leu Val Lys Pro Gly Gly Ser Leu Arg Leu Ser Cys
    130                 135                 140

Ala Ala Ser Gly Phe Thr Phe Ser Ser Phe Ala Met His Trp Val Arg
145                 150                 155                 160

Gln Ala Pro Gly Lys Gly Leu Glu Trp Ile Ser Val Ile Asp Thr Arg
                165                 170                 175

Gly Ala Thr Tyr Tyr Ala Asp Ser Val Lys Gly Arg Phe Thr Ile Ser
            180                 185                 190

Arg Asp Asn Ala Lys Asn Ser Leu Tyr Leu Gln Met Asn Ser Leu Arg
        195                 200                 205

Ala Glu Asp Thr Ala Val Tyr Tyr Cys Ala Arg Leu Gly Asn Phe Tyr
    210                 215                 220

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

Gly Gly Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser
                245                 250                 255

Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val Lys
```

260 265 270

Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly Ala Leu
275 280 285

Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln Ser Ser Gly Leu
290 295 300

Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser Ser Leu Gly Thr
305 310 315 320

Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser Asn Thr Lys Val
325 330 335

Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr His Thr Cys Pro
340 345 350

Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser Val Phe Leu Phe
355 360 365

Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val
370 375 380

Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro Glu Val Lys Phe
385 390 395 400

Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala Lys Thr Lys Pro
405 410 415

Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr
420 425 430

Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val
435 440 445

Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala
450 455 460

Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg
465 470 475 480

Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly
485 490 495

Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro
500 505 510

Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser
515 520 525

Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser Arg Trp Gln Gln

530 535 540

Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn His
545 550 555 560

Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly
565 570

<210> 36
<211> 572
<212> PRT
<213> Artificial Sequence

<220>
<223> Heavy chain sequence for cross over dual V-Ig having code HC14

<400> 36

Glu Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Arg
1 5 10 15

Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Asp Asp Tyr
20 25 30

Ala Met His Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val
35 40 45

Ser Ala Ile Thr Trp Asn Ser Gly His Ile Asp Tyr Ala Asp Ser Val
50 55 60

Glu Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Ser Leu Tyr
65 70 75 80

Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys
85 90 95

Ala Lys Val Ser Tyr Leu Ser Thr Ala Ser Ser Leu Asp Tyr Trp Gly
100 105 110

Gln Gly Thr Leu Val Thr Val Ser Ser Gly Glu Val Gln Leu Val Gln
115 120 125

Ser Gly Ala Glu Val Lys Lys Pro Gly Glu Ser Leu Lys Ile Ser Cys
130 135 140

Lys Gly Ser Gly Tyr Ser Phe Thr Thr Tyr Trp Leu Gly Trp Val Arg
145 150 155 160

Gln Met Pro Gly Lys Gly Leu Asp Trp Ile Gly Ile Met Ser Pro Val
165 170 175

Asp Ser Asp Ile Arg Tyr Ser Pro Ser Phe Gln Gly Gln Val Thr Met
180 185 190

```
Ser Val Asp Lys Ser Ile Thr Thr Ala Tyr Leu Gln Trp Asn Ser Leu
        195                 200                 205

Lys Ala Ser Asp Thr Ala Met Tyr Tyr Cys Ala Arg Arg Arg Pro Gly
    210                 215                 220

Gln Gly Tyr Phe Asp Phe Trp Gly Gln Gly Thr Leu Val Thr Val Ser
225                 230                 235                 240

Ser Gly Gly Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro
                245                 250                 255

Ser Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val
            260                 265                 270

Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly Ala
        275                 280                 285

Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln Ser Ser Gly
    290                 295                 300

Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser Ser Leu Gly
305                 310                 315                 320

Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser Asn Thr Lys
                325                 330                 335

Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr His Thr Cys
            340                 345                 350

Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser Val Phe Leu
        355                 360                 365

Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro Glu
    370                 375                 380

Val Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro Glu Val Lys
385                 390                 395                 400

Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala Lys Thr Lys
                405                 410                 415

Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val Ser Val Leu
            420                 425                 430

Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys
        435                 440                 445

Val Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr Ile Ser Lys
    450                 455                 460
```

```
Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser
465                 470                 475                 480

Arg Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys
                485                 490                 495

Gly Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln
            500                 505                 510

Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly
        515                 520                 525

Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser Arg Trp Gln
    530                 535                 540

Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn
545                 550                 555                 560

His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly
                565                 570
```

<210> 37
<211> 572
<212> PRT
<213> Artificial Sequence

<220>
<223> Heavy chain sequence for cross over dual V-Ig having code HC15

<400> 37

```
Glu Val Gln Leu Val Gln Ser Gly Ala Glu Val Lys Lys Pro Gly Glu
1               5                   10                  15

Ser Leu Lys Ile Ser Cys Lys Gly Ser Gly Tyr Ser Phe Thr Thr Tyr
            20                  25                  30

Trp Leu Gly Trp Val Arg Gln Met Pro Gly Lys Gly Leu Asp Trp Ile
        35                  40                  45

Gly Ile Met Ser Pro Val Asp Ser Asp Ile Arg Tyr Ser Pro Ser Phe
    50                  55                  60

Gln Gly Gln Val Thr Met Ser Val Asp Lys Ser Ile Thr Thr Ala Tyr
65                  70                  75                  80

Leu Gln Trp Asn Ser Leu Lys Ala Ser Asp Thr Ala Met Tyr Tyr Cys
                85                  90                  95

Ala Arg Arg Arg Pro Gly Gln Gly Tyr Phe Asp Phe Trp Gly Gln Gly
            100                 105                 110

Thr Leu Val Thr Val Ser Ser Gly Glu Val Gln Leu Val Glu Ser Gly
```

115 120 125

Gly Gly Leu Val Gln Pro Gly Arg Ser Leu Arg Leu Ser Cys Ala Ala
130 135 140

Ser Gly Phe Thr Phe Asp Asp Tyr Ala Met His Trp Val Arg Gln Ala
145 150 155 160

Pro Gly Lys Gly Leu Glu Trp Val Ser Ala Ile Thr Trp Asn Ser Gly
165 170 175

His Ile Asp Tyr Ala Asp Ser Val Glu Gly Arg Phe Thr Ile Ser Arg
180 185 190

Asp Asn Ala Lys Asn Ser Leu Tyr Leu Gln Met Asn Ser Leu Arg Ala
195 200 205

Glu Asp Thr Ala Val Tyr Tyr Cys Ala Lys Val Ser Tyr Leu Ser Thr
210 215 220

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

Ser Gly Gly Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro
245 250 255

Ser Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val
260 265 270

Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly Ala
275 280 285

Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln Ser Ser Gly
290 295 300

Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser Ser Leu Gly
305 310 315 320

Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser Asn Thr Lys
325 330 335

Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr His Thr Cys
340 345 350

Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser Val Phe Leu
355 360 365

Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro Glu
370 375 380

Val Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro Glu Val Lys

385 390 395 400

Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala Lys Thr Lys
405 410 415

Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val Ser Val Leu
420 425 430

Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys
435 440 445

Val Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr Ile Ser Lys
450 455 460

Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser
465 470 475 480

Arg Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys
485 490 495

Gly Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln
500 505 510

Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly
515 520 525

Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser Arg Trp Gln
530 535 540

Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn
545 550 555 560

His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly
565 570

<210> 38
<211> 571
<212> PRT
<213> Artificial Sequence

<220>
<223> Heavy chain sequence for cross over dual V-Ig having code HC16

<400> 38

Glu Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Arg
1 5 10 15

Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Asp Asp Tyr
20 25 30

Ala Met His Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val
35 40 45

```
Ser Ala Ile Thr Trp Asn Ser Gly His Ile Asp Tyr Ala Asp Ser Val
    50                  55                  60

Glu Gly Arg Phe Thr Ile Ser Arg Asp Asn Ala Lys Asn Ser Leu Tyr
65                  70                  75                  80

Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys
                85                  90                  95

Ala Lys Val Ser Tyr Leu Ser Thr Ala Ser Ser Leu Asp Tyr Trp Gly
            100                 105                 110

Gln Gly Thr Leu Val Thr Val Ser Ser Gly Gln Val Gln Leu Val Glu
        115                 120                 125

Ser Gly Gly Gly Val Val Gln Pro Gly Arg Ser Leu Arg Leu Ser Cys
    130                 135                 140

Ala Ala Ser Gly Phe Thr Phe Ser Val Tyr Gly Met Asn Trp Val Arg
145                 150                 155                 160

Gln Ala Pro Gly Lys Gly Leu Glu Trp Val Ala Ile Ile Trp Tyr Asp
                165                 170                 175

Gly Asp Asn Gln Tyr Tyr Ala Asp Ser Val Lys Gly Arg Phe Thr Ile
            180                 185                 190

Ser Arg Asp Asn Ser Lys Asn Thr Leu Tyr Leu Gln Met Asn Gly Leu
        195                 200                 205

Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys Ala Arg Asp Leu Arg Thr
    210                 215                 220

Gly Pro Phe Asp Tyr Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser
225                 230                 235                 240

Gly Gly Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser
                245                 250                 255

Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val Lys
            260                 265                 270

Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly Ala Leu
        275                 280                 285

Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln Ser Ser Gly Leu
    290                 295                 300

Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser Ser Leu Gly Thr
305                 310                 315                 320
```

```
Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser Asn Thr Lys Val
                325                 330                 335

Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr His Thr Cys Pro
            340                 345                 350

Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser Val Phe Leu Phe
        355                 360                 365

Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val
    370                 375                 380

Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro Glu Val Lys Phe
385                 390                 395                 400

Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala Lys Thr Lys Pro
                405                 410                 415

Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr
            420                 425                 430

Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val
        435                 440                 445

Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala
    450                 455                 460

Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg
465                 470                 475                 480

Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly
                485                 490                 495

Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro
            500                 505                 510

Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser
        515                 520                 525

Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser Arg Trp Gln Gln
    530                 535                 540

Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn His
545                 550                 555                 560

Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly
                565                 570
```

<210> 39
<211> 571
<212> PRT

<213> Artificial Sequence

<220>
<223> Heavy chain sequence for cross over dual V-Ig having code HC17

<400> 39

```
Gln Val Gln Leu Val Glu Ser Gly Gly Gly Val Val Gln Pro Gly Arg
1               5                   10                  15

Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Val Tyr
            20                  25                  30

Gly Met Asn Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val
        35                  40                  45

Ala Ile Ile Trp Tyr Asp Gly Asp Asn Gln Tyr Tyr Ala Asp Ser Val
    50                  55                  60

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

Leu Gln Met Asn Gly Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys
                85                  90                  95

Ala Arg Asp Leu Arg Thr Gly Pro Phe Asp Tyr Trp Gly Gln Gly Thr
            100                 105                 110

Leu Val Thr Val Ser Ser Gly Glu Val Gln Leu Val Glu Ser Gly Gly
        115                 120                 125

Gly Leu Val Gln Pro Gly Arg Ser Leu Arg Leu Ser Cys Ala Ala Ser
    130                 135                 140

Gly Phe Thr Phe Asp Asp Tyr Ala Met His Trp Val Arg Gln Ala Pro
145                 150                 155                 160

Gly Lys Gly Leu Glu Trp Val Ser Ala Ile Thr Trp Asn Ser Gly His
                165                 170                 175

Ile Asp Tyr Ala Asp Ser Val Glu Gly Arg Phe Thr Ile Ser Arg Asp
            180                 185                 190

Asn Ala Lys Asn Ser Leu Tyr Leu Gln Met Asn Ser Leu Arg Ala Glu
        195                 200                 205

Asp Thr Ala Val Tyr Tyr Cys Ala Lys Val Ser Tyr Leu Ser Thr Ala
    210                 215                 220

Ser Ser Leu Asp Tyr Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser
225                 230                 235                 240

Gly Gly Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala Pro Ser
```

245 250 255

Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu Val Lys
260 265 270

Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly Ala Leu
275 280 285

Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln Ser Ser Gly Leu
290 295 300

Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser Ser Leu Gly Thr
305 310 315 320

Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser Asn Thr Lys Val
325 330 335

Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr His Thr Cys Pro
340 345 350

Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser Val Phe Leu Phe
355 360 365

Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro Glu Val
370 375 380

Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro Glu Val Lys Phe
385 390 395 400

Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala Lys Thr Lys Pro
405 410 415

Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val Ser Val Leu Thr
420 425 430

Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys Val
435 440 445

Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr Ile Ser Lys Ala
450 455 460

Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser Arg
465 470 475 480

Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys Gly
485 490 495

Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln Pro
500 505 510

Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly Ser

515 520 525

Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser Arg Trp Gln Gln
530 535 540

Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn His
545 550 555 560

Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly
565 570

<210> 40
<211> 334
<212> PRT
<213> Artificial Sequence

<220>
<223> Light chain sequence for cross over dual V-Ig having code LC10

<400> 40

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

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

Val Ala Trp Tyr Gln Gln Lys Pro Gly Lys Ala Pro Lys Leu Leu Ile
35 40 45

Tyr Ser Ala Ser Phe Leu Tyr Ser Gly Val Pro Ser Arg Phe Ser Gly
50 55 60

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

Glu Asp Phe Ala Thr Tyr Tyr Cys Gln Gln His Tyr Thr Thr Pro Pro
85 90 95

Thr Phe Gly Gln Gly Thr Lys Val Glu Ile Lys Gly Gly Gly Gly Gly
100 105 110

Gly Gly Ser Ser Glu Leu Thr Gln Asp Pro Ala Val Ser Val Ala Leu
115 120 125

Gly Gln Thr Val Arg Ile Thr Cys Gln Gly Asp Ser Leu Arg Ser Tyr
130 135 140

Tyr Ala Thr Trp Tyr Gln Gln Lys Pro Gly Gln Ala Pro Ile Leu Val
145 150 155 160

Ile Tyr Gly Glu Asn Lys Arg Pro Ser Gly Ile Pro Asp Arg Phe Ser
165 170 175

```
Gly Ser Ser Ser Gly Asn Thr Ala Ser Leu Thr Ile Thr Gly Ala Gln
            180                 185                 190

Ala Glu Asp Glu Ala Asp Tyr Tyr Cys Lys Ser Arg Asp Gly Ser Gly
        195                 200                 205

Gln His Leu Val Phe Gly Gly Gly Thr Lys Leu Thr Val Leu Gly Gly
    210                 215                 220

Gly Gly Gly Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro Pro
225                 230                 235                 240

Ser Asp Glu Gln Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu
                245                 250                 255

Asn Asn Phe Tyr Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn
            260                 265                 270

Ala Leu Gln Ser Gly Asn Ser Gln Glu Ser Val Thr Glu Gln Asp Ser
        275                 280                 285

Lys Asp Ser Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala
    290                 295                 300

Asp Tyr Glu Lys His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly
305                 310                 315                 320

Leu Ser Ser Pro Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
                325                 330
```

<210> 41
<211> 334
<212> PRT
<213> Artificial Sequence

<220>
<223> Light chain sequence for cross over dual V-Ig having code LC11

<400> 41

```
Ser Ser Glu Leu Thr Gln Asp Pro Ala Val Ser Val Ala Leu Gly Gln
1               5                   10                  15

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

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

Gly Glu Asn Lys Arg Pro Ser Gly Ile Pro Asp Arg Phe Ser Gly Ser
    50                  55                  60

Ser Ser Gly Asn Thr Ala Ser Leu Thr Ile Thr Gly Ala Gln Ala Glu
```

65 70 75 80

Asp Glu Ala Asp Tyr Tyr Cys Lys Ser Arg Asp Gly Ser Gly Gln His
85 90 95

Leu Val Phe Gly Gly Gly Thr Lys Leu Thr Val Leu Gly Gly Gly Gly
100 105 110

Gly Gly Gly Asp Ile Gln Met Thr Gln Ser Pro Ser Ser Leu Ser Ala
115 120 125

Ser Val Gly Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gln Asp Val
130 135 140

Asn Thr Ala Val Ala Trp Tyr Gln Gln Lys Pro Gly Lys Ala Pro Lys
145 150 155 160

Leu Leu Ile Tyr Ser Ala Ser Phe Leu Tyr Ser Gly Val Pro Ser Arg
165 170 175

Phe Ser Gly Ser Arg Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser
180 185 190

Leu Gln Pro Glu Asp Phe Ala Thr Tyr Tyr Cys Gln Gln His Tyr Thr
195 200 205

Thr Pro Pro Thr Phe Gly Gln Gly Thr Lys Val Glu Ile Lys Gly Gly
210 215 220

Gly Gly Gly Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro Pro
225 230 235 240

Ser Asp Glu Gln Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu
245 250 255

Asn Asn Phe Tyr Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn
260 265 270

Ala Leu Gln Ser Gly Asn Ser Gln Glu Ser Val Thr Glu Gln Asp Ser
275 280 285

Lys Asp Ser Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala
290 295 300

Asp Tyr Glu Lys His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly
305 310 315 320

Leu Ser Ser Pro Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
325 330

<210> 42

<211> 333
<212> PRT
<213> Artificial Sequence

<220>
<223> Light chain sequence for cross over dual V-Ig having code LC12

<400> 42

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

Glu Arg Ala Thr Leu Ser Cys Arg Ala Ser Gln Ser Val Ser Ser Tyr
20 25 30

Leu Ala Trp Tyr Gln Gln Lys Pro Gly Gln Ala Pro Arg Leu Leu Ile
35 40 45

Tyr Asp Ala Ser Asn Arg Ala Thr Gly Ile Pro Ala Arg Phe Ser Gly
50 55 60

Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu Glu Pro
65 70 75 80

Glu Asp Phe Ala Val Tyr Tyr Cys His Gln Tyr Gly Ser Thr Pro Leu
85 90 95

Thr Phe Gly Gly Gly Thr Lys Ala Glu Ile Lys Gly Gly Gly Gly Gly
100 105 110

Gly Gly Glu Ile Val Leu Thr Gln Ser Pro Gly Thr Leu Ser Val Ser
115 120 125

Pro Gly Glu Arg Ala Thr Leu Ser Cys Arg Ala Ser Gln Ser Ile Gly
130 135 140

Ser Ser Leu His Trp Tyr Gln Gln Lys Pro Gly Gln Ala Pro Arg Leu
145 150 155 160

Leu Ile Lys Tyr Ala Ser Gln Ser Leu Ser Gly Ile Pro Asp Arg Phe
165 170 175

Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Arg Leu
180 185 190

Glu Pro Glu Asp Phe Ala Val Tyr Tyr Cys His Gln Ser Ser Arg Leu
195 200 205

Pro His Thr Phe Gly Gln Gly Thr Lys Val Glu Ile Lys Gly Gly Gly
210 215 220

Gly Gly Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro Pro Ser
225 230 235 240

```
Asp Glu Gln Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn
                245                 250                 255

Asn Phe Tyr Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala
            260                 265                 270

Leu Gln Ser Gly Asn Ser Gln Glu Ser Val Thr Glu Gln Asp Ser Lys
        275                 280                 285

Asp Ser Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp
    290                 295                 300

Tyr Glu Lys His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu
305                 310                 315                 320

Ser Ser Pro Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
                325                 330
```

<210> 43
<211> 333
<212> PRT
<213> Artificial Sequence

<220>
<223> Light chain sequence for cross over dual V-Ig having code LC13

<400> 43

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

Glu Arg Ala Thr Leu Ser Cys Arg Ala Ser Gln Ser Ile Gly Ser Ser
            20                  25                  30

Leu His Trp Tyr Gln Gln Lys Pro Gly Gln Ala Pro Arg Leu Leu Ile
        35                  40                  45

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

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

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

Thr Phe Gly Gln Gly Thr Lys Val Glu Ile Lys Gly Gly Gly Gly Gly
            100                 105                 110

Gly Gly Glu Ile Val Met Thr Gln Ser Pro Ala Thr Leu Ser Leu Ser
        115                 120                 125

Pro Gly Glu Arg Ala Thr Leu Ser Cys Arg Ala Ser Gln Ser Val Ser
```

130 135 140

Ser Tyr Leu Ala Trp Tyr Gln Gln Lys Pro Gly Gln Ala Pro Arg Leu
145 150 155 160

Leu Ile Tyr Asp Ala Ser Asn Arg Ala Thr Gly Ile Pro Ala Arg Phe
165 170 175

Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu
180 185 190

Glu Pro Glu Asp Phe Ala Val Tyr Tyr Cys His Gln Tyr Gly Ser Thr
195 200 205

Pro Leu Thr Phe Gly Gly Gly Thr Lys Ala Glu Ile Lys Gly Gly Gly
210 215 220

Gly Gly Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro Pro Ser
225 230 235 240

Asp Glu Gln Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn
245 250 255

Asn Phe Tyr Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala
260 265 270

Leu Gln Ser Gly Asn Ser Gln Glu Ser Val Thr Glu Gln Asp Ser Lys
275 280 285

Asp Ser Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp
290 295 300

Tyr Glu Lys His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu
305 310 315 320

Ser Ser Pro Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
325 330

<210> 44
<211> 333
<212> PRT
<213> Artificial Sequence

<220>
<223> Light chain sequence for cross over dual V-Ig having code LC14

<400> 44

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

Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gln Gly Ile Ser Ser Trp
20 25 30

```
Leu Ala Trp Tyr Gln Gln Lys Pro Glu Lys Ala Pro Lys Ser Leu Ile
        35                  40                  45

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

Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
65                  70                  75                  80

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

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

Gly Gly Asp Ile Gln Met Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser
        115                 120                 125

Val Gly Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gln Gly Ile Arg
    130                 135                 140

Asn Tyr Leu Ala Trp Tyr Gln Gln Lys Pro Gly Lys Ala Pro Lys Leu
145                 150                 155                 160

Leu Ile Tyr Ala Ala Ser Thr Leu Gln Ser Gly Val Pro Ser Arg Phe
                165                 170                 175

Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu
            180                 185                 190

Gln Pro Glu Asp Val Ala Thr Tyr Tyr Cys Gln Arg Tyr Asn Arg Ala
        195                 200                 205

Pro Tyr Thr Phe Gly Gln Gly Thr Lys Val Glu Ile Lys Gly Gly Gly
    210                 215                 220

Gly Gly Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro Pro Ser
225                 230                 235                 240

Asp Glu Gln Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn
                245                 250                 255

Asn Phe Tyr Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala
            260                 265                 270

Leu Gln Ser Gly Asn Ser Gln Glu Ser Val Thr Glu Gln Asp Ser Lys
        275                 280                 285

Asp Ser Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp
    290                 295                 300
```

```
Tyr Glu Lys His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu
305                 310                 315                 320


Ser Ser Pro Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
                325                 330


<210>  45
<211>  333
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Light chain sequence for cross over dual V-Ig having code LC15

<400>  45

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


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


Leu Ala Trp Tyr Gln Gln Lys Pro Gly Lys Ala Pro Lys Leu Leu Ile
        35                  40                  45


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


Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
65                  70                  75                  80


Glu Asp Val Ala Thr Tyr Tyr Cys Gln Arg Tyr Asn Arg Ala Pro Tyr
                85                  90                  95


Thr Phe Gly Gln Gly Thr Lys Val Glu Ile Lys Gly Gly Gly Gly Gly
            100                 105                 110


Gly Gly Asp Ile Gln Met Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser
        115                 120                 125


Val Gly Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gln Gly Ile Ser
    130                 135                 140


Ser Trp Leu Ala Trp Tyr Gln Gln Lys Pro Glu Lys Ala Pro Lys Ser
145                 150                 155                 160


Leu Ile Tyr Ala Ala Ser Ser Leu Gln Ser Gly Val Pro Ser Arg Phe
                165                 170                 175


Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu
            180                 185                 190


Gln Pro Glu Asp Phe Ala Thr Tyr Tyr Cys Gln Gln Tyr Asn Ile Tyr
```

195 200 205

Pro Tyr Thr Phe Gly Gln Gly Thr Lys Leu Glu Ile Lys Gly Gly Gly
210 215 220

Gly Gly Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro Pro Ser
225 230 235 240

Asp Glu Gln Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn
245 250 255

Asn Phe Tyr Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala
260 265 270

Leu Gln Ser Gly Asn Ser Gln Glu Ser Val Thr Glu Gln Asp Ser Lys
275 280 285

Asp Ser Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp
290 295 300

Tyr Glu Lys His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu
305 310 315 320

Ser Ser Pro Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
325 330

<210> 46
<211> 333
<212> PRT
<213> Artificial Sequence

<220>
<223> Light chain sequence for cross over dual V-Ig having code LC16

<400> 46

Glu Ile Val Leu Thr Gln Ser Pro Asp Phe Gln Ser Val Thr Pro Lys
1 5 10 15

Glu Lys Val Thr Ile Thr Cys Arg Ala Ser Gln Ser Ile Gly Ser Ser
20 25 30

Leu His Trp Tyr Gln Gln Lys Pro Asp Gln Ser Pro Lys Leu Leu Ile
35 40 45

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

Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Asn Ser Leu Glu Ala
65 70 75 80

Glu Asp Ala Ala Ala Tyr Tyr Cys His Gln Ser Ser Ser Leu Pro Phe
85 90 95

```
Thr Phe Gly Pro Gly Thr Lys Val Asp Ile Lys Gly Gly Gly Gly Gly
            100                 105                 110

Gly Gly Asp Ile Gln Met Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser
        115                 120                 125

Val Gly Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gln Gly Ile Arg
    130                 135                 140

Asn Tyr Leu Ala Trp Tyr Gln Gln Lys Pro Gly Lys Ala Pro Lys Leu
145                 150                 155                 160

Leu Ile Tyr Ala Ala Ser Thr Leu Gln Ser Gly Val Pro Ser Arg Phe
                165                 170                 175

Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu
            180                 185                 190

Gln Pro Glu Asp Val Ala Thr Tyr Tyr Cys Gln Arg Tyr Asn Arg Ala
        195                 200                 205

Pro Tyr Thr Phe Gly Gln Gly Thr Lys Val Glu Ile Lys Gly Gly Gly
    210                 215                 220

Gly Gly Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro Pro Ser
225                 230                 235                 240

Asp Glu Gln Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn
                245                 250                 255

Asn Phe Tyr Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala
            260                 265                 270

Leu Gln Ser Gly Asn Ser Gln Glu Ser Val Thr Glu Gln Asp Ser Lys
        275                 280                 285

Asp Ser Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp
    290                 295                 300

Tyr Glu Lys His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu
305                 310                 315                 320

Ser Ser Pro Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
                325                 330
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Asp Ile Gln Met Thr Gln Ser Pro Ser Ser Leu Ser Ala Ser Val Gly
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Asp Arg Val Thr Ile Thr Cys Arg Ala Ser Gln Gly Ile Arg Asn Tyr
            20                  25                  30

Leu Ala Trp Tyr Gln Gln Lys Pro Gly Lys Ala Pro Lys Leu Leu Ile
        35                  40                  45

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

Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
65                  70                  75                  80

Glu Asp Val Ala Thr Tyr Tyr Cys Gln Arg Tyr Asn Arg Ala Pro Tyr
                85                  90                  95

Thr Phe Gly Gln Gly Thr Lys Val Glu Ile Lys Gly Gly Gly Gly Gly
            100                 105                 110

Gly Gly Glu Ile Val Leu Thr Gln Ser Pro Asp Phe Gln Ser Val Thr
        115                 120                 125

Pro Lys Glu Lys Val Thr Ile Thr Cys Arg Ala Ser Gln Ser Ile Gly
    130                 135                 140

Ser Ser Leu His Trp Tyr Gln Gln Lys Pro Asp Gln Ser Pro Lys Leu
145                 150                 155                 160

Leu Ile Lys Tyr Ala Ser Gln Ser Phe Ser Gly Val Pro Ser Arg Phe
                165                 170                 175

Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Asn Ser Leu
            180                 185                 190

Glu Ala Glu Asp Ala Ala Ala Tyr Tyr Cys His Gln Ser Ser Ser Leu
        195                 200                 205

Pro Phe Thr Phe Gly Pro Gly Thr Lys Val Asp Ile Lys Gly Gly Gly
    210                 215                 220

Gly Gly Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro Pro Ser
225                 230                 235                 240

Asp Glu Gln Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn
                245                 250                 255

Asn Phe Tyr Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala
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260 265 270

Leu Gln Ser Gly Asn Ser Gln Glu Ser Val Thr Glu Gln Asp Ser Lys
275 280 285

Asp Ser Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp
290 295 300

Tyr Glu Lys His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu
305 310 315 320

Ser Ser Pro Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
325 330

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Ala Ser Thr Lys Gly Pro Ser
1 5

<210> 49
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Arg Thr Val Ala Ala Pro Ser
1 5

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Gly Gln Pro Lys Ala Ala Pro
1 5

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His Ile Asp Ser Pro Asn Lys
1 5

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Thr Lys Gly Pro Ser
1 5

<210> 53
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Thr Val Ala Ala Pro
1 5

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Gln Pro Lys Ala Ala
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Gln Arg Ile Glu Gly
1 5

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Gly Gly Cys Gly Gly Gly Gly
1 5

<210> 57
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<400> 57

Gly Gly Gly Cys Gly Gly Gly
1 5

<210> 58
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Gly Gly Gly Gly Cys Gly Gly
1 5

<210> 59
<211> 7
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<400> 59

Gly Gly Gly Gly Gly Cys Gly
1 5