SEQUENCE LISTING

<110> bluebird bio, Inc.
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<120> BCMA CHIMERIC ANTIGEN RECEPTORS

<130> BLBD-037/03WO

<150> US 62/028,664
<151> 2014-07-24

<150> US 62/044,103
<151> 2014-08-29

<150> US 62/152,575
<151> 2015-04-24

<160> 73

<170> PatentIn version 3.5

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Arg Ala Ser Glu Ser Val Ser Val Ile Gly Ala His Leu Ile His
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Leu Ala Ser Asn Leu Glu Thr
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Leu Gln Ser Arg Ile Phe Pro Arg Thr
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Trp Ile Asn Thr Glu Thr Arg Glu Pro Ala Tyr Ala Tyr Asp Phe Arg
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Gly

<210> 6
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<400> 6

Asp Tyr Ser Tyr Ala Met Asp Tyr
1 5

<210> 7
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<213> Artificial Sequence

<220>
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<400> 7

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

Glu Arg Ala Thr Ile Asn Cys Arg Ala Ser Glu Ser Val Ser Val Ile
20 25 30

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

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

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

Ser Leu Gln Ala Glu Asp Ala Ala Ile Tyr Tyr Cys Leu Gln Ser Arg
85 90 95

Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys Leu Glu Ile Lys
100 105 110

<210> 8
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<213> Artificial Sequence

<220>
<223> humanized anti-BCMA antibody Light Chain

<400> 8

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

Glu Arg Ala Thr Ile Asn Cys Arg Ala Ser Glu Ser Val Ser Val Ile
20 25 30

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

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

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

Ser Leu Gln Ala Glu Asp Ala Ala Ile Tyr Ser Cys Leu Gln Ser Arg
85 90 95

Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys Leu Glu Ile Lys
100 105 110

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

<220>
<223> humanized anti-BCMA antibody Light Chain

<400> 9

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

Glu Arg Ala Thr Ile Ser Cys Arg Ala Ser Glu Ser Val Ser Val Ile
20 25 30

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

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

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

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

Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys Leu Glu Ile Lys
100 105 110

<210> 10
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<213> Artificial Sequence

<220>
<223> humanized anti-BCMA antibody Heavy Chain

<400> 10

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

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

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

Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro Ala Tyr Ala Tyr Asp Phe
50 55 60

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

Leu Gln Ile Ser Ser Leu Lys Ala Glu Asp Thr Ala Val Tyr Tyr Cys
85 90 95

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

Val Thr Val Ser Ser
115

<210> 11
<211> 117
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-BCMA antibody Heavy Chain

<400> 11

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

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

Ser Ile Asn Trp Val Arg Gln Ala Pro Gly Gln Gly Leu Glu Trp Met

```
        35                  40                  45

Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro Ala Tyr Ala Tyr Asp Phe
    50                  55                  60

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

Leu Gln Ile Ser Ser Leu Lys Ala Glu Asp Thr Ala Val Tyr Tyr Cys
                85                  90                  95

Ala Leu Asp Tyr Ser Tyr Ala Met Asp Tyr Trp Gly Gln Gly Thr Leu
            100                 105                 110

Val Thr Val Ser Ser
        115


<210>  12
<211>  117
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  humanized anti-BCMA antibody Heavy Chain

<400>  12

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

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

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

Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro Ala Tyr Ala Tyr Asp Phe
    50                  55                  60

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

Leu Gln Ile Ser Ser Leu Lys Ala Glu Asp Thr Ala Val Tyr Phe Cys
                85                  90                  95

Ala Leu Asp Tyr Ser Tyr Ala Met Asp Tyr Trp Gly Gln Gly Thr Leu
            100                 105                 110

Val Thr Val Ser Ser
        115


<210>  13
<211>  117
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<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-BCMA antibody Heavy Chain

<400> 13

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

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

Ser Ile Asn Trp Val Lys Gln Ala Pro Gly Gln Gly Leu Lys Trp Met
35 40 45

Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro Ala Tyr Ala Tyr Asp Phe
50 55 60

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

Leu Gln Ile Ser Ser Leu Lys Ala Glu Asp Thr Ala Val Tyr Phe Cys
85 90 95

Ala Leu Asp Tyr Ser Tyr Ala Met Asp Tyr Trp Gly Gln Gly Thr Leu
100 105 110

Val Thr Val Ser Ser
115

<210> 14
<211> 117
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-BCMA antibody Heavy Chain

<400> 14

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

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

Ser Ile Asn Trp Val Lys Gln Ala Pro Gly Gln Gly Leu Lys Trp Met
35 40 45

Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro Ala Tyr Ala Tyr Asp Phe
50 55 60

Arg Gly Arg Phe Val Phe Ser Leu Asp Thr Ser Ala Ser Thr Ala Tyr

65 70 75 80

Leu Gln Ile Ser Ser Leu Lys Ala Glu Asp Thr Ala Val Tyr Phe Cys
85 90 95

Ala Leu Asp Tyr Ser Tyr Ala Met Asp Tyr Trp Gly Gln Gly Thr Leu
100 105 110

Val Thr Val Ser Ser
115

<210> 15
<211> 493
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-BCMA-10-CAR

<400> 15

Met Ala Leu Pro Val Thr Ala Leu Leu Leu Pro Leu Ala Leu Leu Leu
1 5 10 15

His Ala Ala Arg Pro Asp Ile Val Leu Thr Gln Ser Pro Ala Ser Leu
20 25 30

Ala Val Ser Leu Gly Glu Arg Ala Thr Ile Asn Cys Arg Ala Ser Glu
35 40 45

Ser Val Ser Val Ile Gly Ala His Leu Ile His Trp Tyr Gln Gln Lys
50 55 60

Pro Gly Gln Pro Pro Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu
65 70 75 80

Thr Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
85 90 95

Thr Leu Thr Ile Ser Ser Leu Gln Ala Glu Asp Ala Ala Ile Tyr Tyr
100 105 110

Cys Leu Gln Ser Arg Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys
115 120 125

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

Glu Gly Ser Thr Lys Gly Gln Val Gln Leu Val Gln Ser Gly Ser Glu
145 150 155 160

Leu Lys Lys Pro Gly Ala Ser Val Lys Val Ser Cys Lys Ala Ser Gly
165 170 175

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Tyr Thr Phe Thr Asp Tyr Ser Ile Asn Trp Val Arg Gln Ala Pro Gly
            180                 185                 190

Gln Gly Leu Glu Trp Met Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro
        195                 200                 205

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

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

Thr Ala Val Tyr Tyr Cys Ala Arg Asp Tyr Ser Tyr Ala Met Asp Tyr
                245                 250                 255

Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser Ala Ala Ala Thr Thr
            260                 265                 270

Thr Pro Ala Pro Arg Pro Pro Thr Pro Ala Pro Thr Ile Ala Ser Gln
        275                 280                 285

Pro Leu Ser Leu Arg Pro Glu Ala Cys Arg Pro Ala Ala Gly Gly Ala
    290                 295                 300

Val His Thr Arg Gly Leu Asp Phe Ala Cys Asp Ile Tyr Ile Trp Ala
305                 310                 315                 320

Pro Leu Ala Gly Thr Cys Gly Val Leu Leu Leu Ser Leu Val Ile Thr
                325                 330                 335

Leu Tyr Cys Lys Arg Gly Arg Lys Lys Leu Leu Tyr Ile Phe Lys Gln
            340                 345                 350

Pro Phe Met Arg Pro Val Gln Thr Thr Gln Glu Glu Asp Gly Cys Ser
        355                 360                 365

Cys Arg Phe Pro Glu Glu Glu Glu Gly Gly Cys Glu Leu Arg Val Lys
    370                 375                 380

Phe Ser Arg Ser Ala Asp Ala Pro Ala Tyr Gln Gln Gly Gln Asn Gln
385                 390                 395                 400

Leu Tyr Asn Glu Leu Asn Leu Gly Arg Arg Glu Glu Tyr Asp Val Leu
                405                 410                 415

Asp Lys Arg Arg Gly Arg Asp Pro Glu Met Gly Gly Lys Pro Arg Arg
            420                 425                 430

Lys Asn Pro Gln Glu Gly Leu Tyr Asn Glu Leu Gln Lys Asp Lys Met
```

```
        435                 440                 445

Ala Glu Ala Tyr Ser Glu Ile Gly Met Lys Gly Glu Arg Arg Arg Gly
    450                 455                 460

Lys Gly His Asp Gly Leu Tyr Gln Gly Leu Ser Thr Ala Thr Lys Asp
465                 470                 475                 480

Thr Tyr Asp Ala Leu His Met Gln Ala Leu Pro Pro Arg
                485                 490

<210>  16
<211>  493
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  humanized anti-BCMA-11-CAR

<400>  16

Met Ala Leu Pro Val Thr Ala Leu Leu Leu Pro Leu Ala Leu Leu Leu
1               5                   10                  15

His Ala Ala Arg Pro Asp Ile Val Leu Thr Gln Ser Pro Ala Ser Leu
            20                  25                  30

Ala Val Ser Leu Gly Glu Arg Ala Thr Ile Asn Cys Arg Ala Ser Glu
        35                  40                  45

Ser Val Ser Val Ile Gly Ala His Leu Ile His Trp Tyr Gln Gln Lys
    50                  55                  60

Pro Gly Gln Pro Pro Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu
65                  70                  75                  80

Thr Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                85                  90                  95

Thr Leu Thr Ile Ser Ser Leu Gln Ala Glu Asp Ala Ala Ile Tyr Tyr
            100                 105                 110

Cys Leu Gln Ser Arg Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys
        115                 120                 125

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

Glu Gly Ser Thr Lys Gly Gln Val Gln Leu Val Gln Ser Gly Ser Glu
145                 150                 155                 160

Leu Lys Lys Pro Gly Glu Ser Val Lys Val Ser Cys Lys Ala Ser Gly
                165                 170                 175
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Tyr Thr Phe Thr Asp Tyr Ser Ile Asn Trp Val Arg Gln Ala Pro Gly
            180                 185                 190

Gln Gly Leu Glu Trp Met Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro
        195                 200                 205

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

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

Thr Ala Val Tyr Tyr Cys Ala Leu Asp Tyr Ser Tyr Ala Met Asp Tyr
                245                 250                 255

Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser Ala Ala Ala Thr Thr
            260                 265                 270

Thr Pro Ala Pro Arg Pro Pro Thr Pro Ala Pro Thr Ile Ala Ser Gln
        275                 280                 285

Pro Leu Ser Leu Arg Pro Glu Ala Cys Arg Pro Ala Ala Gly Gly Ala
    290                 295                 300

Val His Thr Arg Gly Leu Asp Phe Ala Cys Asp Ile Tyr Ile Trp Ala
305                 310                 315                 320

Pro Leu Ala Gly Thr Cys Gly Val Leu Leu Leu Ser Leu Val Ile Thr
                325                 330                 335

Leu Tyr Cys Lys Arg Gly Arg Lys Lys Leu Leu Tyr Ile Phe Lys Gln
            340                 345                 350

Pro Phe Met Arg Pro Val Gln Thr Thr Gln Glu Glu Asp Gly Cys Ser
        355                 360                 365

Cys Arg Phe Pro Glu Glu Glu Glu Gly Gly Cys Glu Leu Arg Val Lys
    370                 375                 380

Phe Ser Arg Ser Ala Asp Ala Pro Ala Tyr Gln Gln Gly Gln Asn Gln
385                 390                 395                 400

Leu Tyr Asn Glu Leu Asn Leu Gly Arg Arg Glu Glu Tyr Asp Val Leu
                405                 410                 415

Asp Lys Arg Arg Gly Arg Asp Pro Glu Met Gly Gly Lys Pro Arg Arg
            420                 425                 430

Lys Asn Pro Gln Glu Gly Leu Tyr Asn Glu Leu Gln Lys Asp Lys Met
```

```
        435                 440                 445

Ala Glu Ala Tyr Ser Glu Ile Gly Met Lys Gly Glu Arg Arg Arg Gly
    450                 455                 460

Lys Gly His Asp Gly Leu Tyr Gln Gly Leu Ser Thr Ala Thr Lys Asp
465                 470                 475                 480

Thr Tyr Asp Ala Leu His Met Gln Ala Leu Pro Pro Arg
                485                 490

<210>  17
<211>  493
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  humanized anti-BCMA-12-CAR

<400>  17

Met Ala Leu Pro Val Thr Ala Leu Leu Leu Pro Leu Ala Leu Leu Leu
1               5                   10                  15

His Ala Ala Arg Pro Asp Ile Val Leu Thr Gln Ser Pro Ala Ser Leu
            20                  25                  30

Ala Val Ser Leu Gly Glu Arg Ala Thr Ile Asn Cys Arg Ala Ser Glu
        35                  40                  45

Ser Val Ser Val Ile Gly Ala His Leu Ile His Trp Tyr Gln Gln Lys
    50                  55                  60

Pro Gly Gln Pro Pro Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu
65                  70                  75                  80

Thr Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                85                  90                  95

Thr Leu Thr Ile Ser Ser Leu Gln Ala Glu Asp Ala Ala Ile Tyr Tyr
            100                 105                 110

Cys Leu Gln Ser Arg Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys
        115                 120                 125

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

Glu Gly Ser Thr Lys Gly Gln Val Gln Leu Val Gln Ser Gly Ser Glu
145                 150                 155                 160

Leu Lys Lys Pro Gly Glu Ser Val Lys Ile Ser Cys Lys Ala Ser Gly
                165                 170                 175
```

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Tyr Thr Phe Thr Asp Tyr Ser Ile Asn Trp Val Arg Gln Ala Pro Gly
            180                 185                 190

Gln Gly Leu Glu Trp Met Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro
        195                 200                 205

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

Ser Ala Ser Thr Ala Tyr Leu Gln Ile Ser Ser Leu Lys Ala Glu Asp
225                 230                 235                 240

Thr Ala Val Tyr Phe Cys Ala Leu Asp Tyr Ser Tyr Ala Met Asp Tyr
                245                 250                 255

Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser Ala Ala Ala Thr Thr
            260                 265                 270

Thr Pro Ala Pro Arg Pro Pro Thr Pro Ala Pro Thr Ile Ala Ser Gln
        275                 280                 285

Pro Leu Ser Leu Arg Pro Glu Ala Cys Arg Pro Ala Ala Gly Gly Ala
    290                 295                 300

Val His Thr Arg Gly Leu Asp Phe Ala Cys Asp Ile Tyr Ile Trp Ala
305                 310                 315                 320

Pro Leu Ala Gly Thr Cys Gly Val Leu Leu Leu Ser Leu Val Ile Thr
                325                 330                 335

Leu Tyr Cys Lys Arg Gly Arg Lys Lys Leu Leu Tyr Ile Phe Lys Gln
            340                 345                 350

Pro Phe Met Arg Pro Val Gln Thr Thr Gln Glu Glu Asp Gly Cys Ser
        355                 360                 365

Cys Arg Phe Pro Glu Glu Glu Glu Gly Gly Cys Glu Leu Arg Val Lys
    370                 375                 380

Phe Ser Arg Ser Ala Asp Ala Pro Ala Tyr Gln Gln Gly Gln Asn Gln
385                 390                 395                 400

Leu Tyr Asn Glu Leu Asn Leu Gly Arg Arg Glu Glu Tyr Asp Val Leu
                405                 410                 415

Asp Lys Arg Arg Gly Arg Asp Pro Glu Met Gly Gly Lys Pro Arg Arg
            420                 425                 430

Lys Asn Pro Gln Glu Gly Leu Tyr Asn Glu Leu Gln Lys Asp Lys Met
```

```
        435                 440                 445

Ala Glu Ala Tyr Ser Glu Ile Gly Met Lys Gly Glu Arg Arg Arg Gly
    450                 455                 460

Lys Gly His Asp Gly Leu Tyr Gln Gly Leu Ser Thr Ala Thr Lys Asp
465                 470                 475                 480

Thr Tyr Asp Ala Leu His Met Gln Ala Leu Pro Pro Arg
                485                 490

<210>  18
<211>  493
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  humanized anti-BCMA-13-CAR

<400>  18

Met Ala Leu Pro Val Thr Ala Leu Leu Leu Pro Leu Ala Leu Leu Leu
1               5                   10                  15

His Ala Ala Arg Pro Asp Ile Val Leu Thr Gln Ser Pro Ala Ser Leu
            20                  25                  30

Ala Val Ser Leu Gly Glu Arg Ala Thr Ile Asn Cys Arg Ala Ser Glu
        35                  40                  45

Ser Val Ser Val Ile Gly Ala His Leu Ile His Trp Tyr Gln Gln Lys
    50                  55                  60

Pro Gly Gln Pro Pro Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu
65                  70                  75                  80

Thr Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                85                  90                  95

Thr Leu Thr Ile Ser Ser Leu Gln Ala Glu Asp Ala Ala Ile Tyr Tyr
            100                 105                 110

Cys Leu Gln Ser Arg Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys
        115                 120                 125

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

Glu Gly Ser Thr Lys Gly Gln Val Gln Leu Val Gln Ser Gly Ser Glu
145                 150                 155                 160

Leu Lys Lys Pro Gly Glu Ser Val Lys Ile Ser Cys Lys Ala Ser Gly
                165                 170                 175
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```
Tyr Thr Phe Thr Asp Tyr Ser Ile Asn Trp Val Lys Gln Ala Pro Gly
            180                 185                 190

Gln Gly Leu Lys Trp Met Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro
        195                 200                 205

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

Ser Ala Ser Thr Ala Tyr Leu Gln Ile Ser Ser Leu Lys Ala Glu Asp
225                 230                 235                 240

Thr Ala Val Tyr Phe Cys Ala Leu Asp Tyr Ser Tyr Ala Met Asp Tyr
                245                 250                 255

Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser Ala Ala Ala Thr Thr
            260                 265                 270

Thr Pro Ala Pro Arg Pro Pro Thr Pro Ala Pro Thr Ile Ala Ser Gln
        275                 280                 285

Pro Leu Ser Leu Arg Pro Glu Ala Cys Arg Pro Ala Ala Gly Gly Ala
    290                 295                 300

Val His Thr Arg Gly Leu Asp Phe Ala Cys Asp Ile Tyr Ile Trp Ala
305                 310                 315                 320

Pro Leu Ala Gly Thr Cys Gly Val Leu Leu Leu Ser Leu Val Ile Thr
                325                 330                 335

Leu Tyr Cys Lys Arg Gly Arg Lys Lys Leu Leu Tyr Ile Phe Lys Gln
            340                 345                 350

Pro Phe Met Arg Pro Val Gln Thr Thr Gln Glu Glu Asp Gly Cys Ser
        355                 360                 365

Cys Arg Phe Pro Glu Glu Glu Glu Gly Gly Cys Glu Leu Arg Val Lys
    370                 375                 380

Phe Ser Arg Ser Ala Asp Ala Pro Ala Tyr Gln Gln Gly Gln Asn Gln
385                 390                 395                 400

Leu Tyr Asn Glu Leu Asn Leu Gly Arg Arg Glu Glu Tyr Asp Val Leu
                405                 410                 415

Asp Lys Arg Arg Gly Arg Asp Pro Glu Met Gly Gly Lys Pro Arg Arg
            420                 425                 430

Lys Asn Pro Gln Glu Gly Leu Tyr Asn Glu Leu Gln Lys Asp Lys Met
```

```
        435                 440                 445

Ala Glu Ala Tyr Ser Glu Ile Gly Met Lys Gly Glu Arg Arg Arg Gly
    450                 455                 460

Lys Gly His Asp Gly Leu Tyr Gln Gly Leu Ser Thr Ala Thr Lys Asp
465                 470                 475                 480

Thr Tyr Asp Ala Leu His Met Gln Ala Leu Pro Pro Arg
                485                 490

<210>  19
<211>  493
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  humanized anti-BCMA-14-CAR

<400>  19

Met Ala Leu Pro Val Thr Ala Leu Leu Leu Pro Leu Ala Leu Leu Leu
1               5                   10                  15

His Ala Ala Arg Pro Asp Ile Val Leu Thr Gln Ser Pro Ala Ser Leu
            20                  25                  30

Ala Val Ser Leu Gly Glu Arg Ala Thr Ile Asn Cys Arg Ala Ser Glu
        35                  40                  45

Ser Val Ser Val Ile Gly Ala His Leu Ile His Trp Tyr Gln Gln Lys
    50                  55                  60

Pro Gly Gln Pro Pro Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu
65                  70                  75                  80

Thr Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                85                  90                  95

Thr Leu Thr Ile Ser Ser Leu Gln Ala Glu Asp Ala Ala Ile Tyr Tyr
            100                 105                 110

Cys Leu Gln Ser Arg Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys
        115                 120                 125

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

Glu Gly Ser Thr Lys Gly Gln Ile Gln Leu Val Gln Ser Gly Ser Glu
145                 150                 155                 160

Leu Lys Lys Pro Gly Glu Ser Val Lys Ile Ser Cys Lys Ala Ser Gly
                165                 170                 175
```

```
Tyr Thr Phe Thr Asp Tyr Ser Ile Asn Trp Val Lys Gln Ala Pro Gly
            180                 185                 190

Gln Gly Leu Lys Trp Met Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro
        195                 200                 205

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

Ser Ala Ser Thr Ala Tyr Leu Gln Ile Ser Ser Leu Lys Ala Glu Asp
225                 230                 235                 240

Thr Ala Val Tyr Phe Cys Ala Leu Asp Tyr Ser Tyr Ala Met Asp Tyr
                245                 250                 255

Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser Ala Ala Ala Thr Thr
            260                 265                 270

Thr Pro Ala Pro Arg Pro Pro Thr Pro Ala Pro Thr Ile Ala Ser Gln
        275                 280                 285

Pro Leu Ser Leu Arg Pro Glu Ala Cys Arg Pro Ala Ala Gly Gly Ala
    290                 295                 300

Val His Thr Arg Gly Leu Asp Phe Ala Cys Asp Ile Tyr Ile Trp Ala
305                 310                 315                 320

Pro Leu Ala Gly Thr Cys Gly Val Leu Leu Leu Ser Leu Val Ile Thr
                325                 330                 335

Leu Tyr Cys Lys Arg Gly Arg Lys Lys Leu Leu Tyr Ile Phe Lys Gln
            340                 345                 350

Pro Phe Met Arg Pro Val Gln Thr Thr Gln Glu Glu Asp Gly Cys Ser
        355                 360                 365

Cys Arg Phe Pro Glu Glu Glu Glu Gly Gly Cys Glu Leu Arg Val Lys
    370                 375                 380

Phe Ser Arg Ser Ala Asp Ala Pro Ala Tyr Gln Gln Gly Gln Asn Gln
385                 390                 395                 400

Leu Tyr Asn Glu Leu Asn Leu Gly Arg Arg Glu Glu Tyr Asp Val Leu
                405                 410                 415

Asp Lys Arg Arg Gly Arg Asp Pro Glu Met Gly Gly Lys Pro Arg Arg
            420                 425                 430

Lys Asn Pro Gln Glu Gly Leu Tyr Asn Glu Leu Gln Lys Asp Lys Met
```

```
        435                 440                 445

Ala Glu Ala Tyr Ser Glu Ile Gly Met Lys Gly Glu Arg Arg Arg Gly
    450                 455                 460

Lys Gly His Asp Gly Leu Tyr Gln Gly Leu Ser Thr Ala Thr Lys Asp
465                 470                 475                 480

Thr Tyr Asp Ala Leu His Met Gln Ala Leu Pro Pro Arg
                485                 490

<210>  20
<211>  493
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  humanized anti-BCMA-20-CAR

<400>  20

Met Ala Leu Pro Val Thr Ala Leu Leu Leu Pro Leu Ala Leu Leu Leu
1               5                   10                  15

His Ala Ala Arg Pro Asp Ile Val Leu Thr Gln Ser Pro Ala Ser Leu
            20                  25                  30

Ala Val Ser Leu Gly Glu Arg Ala Thr Ile Asn Cys Arg Ala Ser Glu
        35                  40                  45

Ser Val Ser Val Ile Gly Ala His Leu Ile His Trp Tyr Gln Gln Lys
    50                  55                  60

Pro Gly Gln Pro Pro Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu
65                  70                  75                  80

Thr Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                85                  90                  95

Thr Leu Thr Ile Ser Ser Leu Gln Ala Glu Asp Ala Ala Ile Tyr Ser
            100                 105                 110

Cys Leu Gln Ser Arg Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys
        115                 120                 125

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

Glu Gly Ser Thr Lys Gly Gln Val Gln Leu Val Gln Ser Gly Ser Glu
145                 150                 155                 160

Leu Lys Lys Pro Gly Ala Ser Val Lys Val Ser Cys Lys Ala Ser Gly
                165                 170                 175
```

```
Tyr Thr Phe Thr Asp Tyr Ser Ile Asn Trp Val Arg Gln Ala Pro Gly
            180                 185                 190

Gln Gly Leu Glu Trp Met Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro
        195                 200                 205

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

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

Thr Ala Val Tyr Tyr Cys Ala Arg Asp Tyr Ser Tyr Ala Met Asp Tyr
                245                 250                 255

Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser Ala Ala Ala Thr Thr
            260                 265                 270

Thr Pro Ala Pro Arg Pro Pro Thr Pro Ala Pro Thr Ile Ala Ser Gln
        275                 280                 285

Pro Leu Ser Leu Arg Pro Glu Ala Cys Arg Pro Ala Ala Gly Gly Ala
    290                 295                 300

Val His Thr Arg Gly Leu Asp Phe Ala Cys Asp Ile Tyr Ile Trp Ala
305                 310                 315                 320

Pro Leu Ala Gly Thr Cys Gly Val Leu Leu Leu Ser Leu Val Ile Thr
                325                 330                 335

Leu Tyr Cys Lys Arg Gly Arg Lys Lys Leu Leu Tyr Ile Phe Lys Gln
            340                 345                 350

Pro Phe Met Arg Pro Val Gln Thr Thr Gln Glu Glu Asp Gly Cys Ser
        355                 360                 365

Cys Arg Phe Pro Glu Glu Glu Glu Gly Gly Cys Glu Leu Arg Val Lys
    370                 375                 380

Phe Ser Arg Ser Ala Asp Ala Pro Ala Tyr Gln Gln Gly Gln Asn Gln
385                 390                 395                 400

Leu Tyr Asn Glu Leu Asn Leu Gly Arg Arg Glu Glu Tyr Asp Val Leu
                405                 410                 415

Asp Lys Arg Arg Gly Arg Asp Pro Glu Met Gly Gly Lys Pro Arg Arg
            420                 425                 430

Lys Asn Pro Gln Glu Gly Leu Tyr Asn Glu Leu Gln Lys Asp Lys Met
```

```
        435                 440                 445

Ala Glu Ala Tyr Ser Glu Ile Gly Met Lys Gly Glu Arg Arg Arg Gly
    450                 455                 460

Lys Gly His Asp Gly Leu Tyr Gln Gly Leu Ser Thr Ala Thr Lys Asp
465                 470                 475                 480

Thr Tyr Asp Ala Leu His Met Gln Ala Leu Pro Pro Arg
                485                 490

<210>  21
<211>  493
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  humanized anti-BCMA-21-CAR

<400>  21

Met Ala Leu Pro Val Thr Ala Leu Leu Leu Pro Leu Ala Leu Leu Leu
1               5                   10                  15

His Ala Ala Arg Pro Asp Ile Val Leu Thr Gln Ser Pro Ala Ser Leu
            20                  25                  30

Ala Val Ser Leu Gly Glu Arg Ala Thr Ile Asn Cys Arg Ala Ser Glu
        35                  40                  45

Ser Val Ser Val Ile Gly Ala His Leu Ile His Trp Tyr Gln Gln Lys
    50                  55                  60

Pro Gly Gln Pro Pro Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu
65                  70                  75                  80

Thr Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                85                  90                  95

Thr Leu Thr Ile Ser Ser Leu Gln Ala Glu Asp Ala Ala Ile Tyr Ser
            100                 105                 110

Cys Leu Gln Ser Arg Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys
        115                 120                 125

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

Glu Gly Ser Thr Lys Gly Gln Val Gln Leu Val Gln Ser Gly Ser Glu
145                 150                 155                 160

Leu Lys Lys Pro Gly Glu Ser Val Lys Val Ser Cys Lys Ala Ser Gly
                165                 170                 175
```

```
Tyr Thr Phe Thr Asp Tyr Ser Ile Asn Trp Val Arg Gln Ala Pro Gly
            180                 185                 190

Gln Gly Leu Glu Trp Met Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro
        195                 200                 205

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

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

Thr Ala Val Tyr Tyr Cys Ala Leu Asp Tyr Ser Tyr Ala Met Asp Tyr
                245                 250                 255

Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser Ala Ala Ala Thr Thr
            260                 265                 270

Thr Pro Ala Pro Arg Pro Pro Thr Pro Ala Pro Thr Ile Ala Ser Gln
        275                 280                 285

Pro Leu Ser Leu Arg Pro Glu Ala Cys Arg Pro Ala Ala Gly Gly Ala
    290                 295                 300

Val His Thr Arg Gly Leu Asp Phe Ala Cys Asp Ile Tyr Ile Trp Ala
305                 310                 315                 320

Pro Leu Ala Gly Thr Cys Gly Val Leu Leu Leu Ser Leu Val Ile Thr
                325                 330                 335

Leu Tyr Cys Lys Arg Gly Arg Lys Lys Leu Leu Tyr Ile Phe Lys Gln
            340                 345                 350

Pro Phe Met Arg Pro Val Gln Thr Thr Gln Glu Glu Asp Gly Cys Ser
        355                 360                 365

Cys Arg Phe Pro Glu Glu Glu Glu Gly Gly Cys Glu Leu Arg Val Lys
    370                 375                 380

Phe Ser Arg Ser Ala Asp Ala Pro Ala Tyr Gln Gln Gly Gln Asn Gln
385                 390                 395                 400

Leu Tyr Asn Glu Leu Asn Leu Gly Arg Arg Glu Glu Tyr Asp Val Leu
                405                 410                 415

Asp Lys Arg Arg Gly Arg Asp Pro Glu Met Gly Gly Lys Pro Arg Arg
            420                 425                 430

Lys Asn Pro Gln Glu Gly Leu Tyr Asn Glu Leu Gln Lys Asp Lys Met
```

```
        435                 440                 445

Ala Glu Ala Tyr Ser Glu Ile Gly Met Lys Gly Glu Arg Arg Arg Gly
    450                 455                 460

Lys Gly His Asp Gly Leu Tyr Gln Gly Leu Ser Thr Ala Thr Lys Asp
465                 470                 475                 480

Thr Tyr Asp Ala Leu His Met Gln Ala Leu Pro Pro Arg
                485                 490

<210>  22
<211>  493
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  humanized anti-BCMA-22-CAR

<400>  22

Met Ala Leu Pro Val Thr Ala Leu Leu Leu Pro Leu Ala Leu Leu Leu
1               5                   10                  15

His Ala Ala Arg Pro Asp Ile Val Leu Thr Gln Ser Pro Ala Ser Leu
            20                  25                  30

Ala Val Ser Leu Gly Glu Arg Ala Thr Ile Asn Cys Arg Ala Ser Glu
        35                  40                  45

Ser Val Ser Val Ile Gly Ala His Leu Ile His Trp Tyr Gln Gln Lys
    50                  55                  60

Pro Gly Gln Pro Pro Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu
65                  70                  75                  80

Thr Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                85                  90                  95

Thr Leu Thr Ile Ser Ser Leu Gln Ala Glu Asp Ala Ala Ile Tyr Ser
            100                 105                 110

Cys Leu Gln Ser Arg Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys
        115                 120                 125

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

Glu Gly Ser Thr Lys Gly Gln Val Gln Leu Val Gln Ser Gly Ser Glu
145                 150                 155                 160

Leu Lys Lys Pro Gly Glu Ser Val Lys Ile Ser Cys Lys Ala Ser Gly
                165                 170                 175
```

```
Tyr Thr Phe Thr Asp Tyr Ser Ile Asn Trp Val Arg Gln Ala Pro Gly
            180                 185                 190

Gln Gly Leu Glu Trp Met Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro
        195                 200                 205

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

Ser Ala Ser Thr Ala Tyr Leu Gln Ile Ser Ser Leu Lys Ala Glu Asp
225                 230                 235                 240

Thr Ala Val Tyr Phe Cys Ala Leu Asp Tyr Ser Tyr Ala Met Asp Tyr
                245                 250                 255

Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser Ala Ala Ala Thr Thr
            260                 265                 270

Thr Pro Ala Pro Arg Pro Pro Thr Pro Ala Pro Thr Ile Ala Ser Gln
        275                 280                 285

Pro Leu Ser Leu Arg Pro Glu Ala Cys Arg Pro Ala Ala Gly Gly Ala
    290                 295                 300

Val His Thr Arg Gly Leu Asp Phe Ala Cys Asp Ile Tyr Ile Trp Ala
305                 310                 315                 320

Pro Leu Ala Gly Thr Cys Gly Val Leu Leu Leu Ser Leu Val Ile Thr
                325                 330                 335

Leu Tyr Cys Lys Arg Gly Arg Lys Lys Leu Leu Tyr Ile Phe Lys Gln
            340                 345                 350

Pro Phe Met Arg Pro Val Gln Thr Thr Gln Glu Glu Asp Gly Cys Ser
        355                 360                 365

Cys Arg Phe Pro Glu Glu Glu Glu Gly Gly Cys Glu Leu Arg Val Lys
    370                 375                 380

Phe Ser Arg Ser Ala Asp Ala Pro Ala Tyr Gln Gln Gly Gln Asn Gln
385                 390                 395                 400

Leu Tyr Asn Glu Leu Asn Leu Gly Arg Arg Glu Glu Tyr Asp Val Leu
                405                 410                 415

Asp Lys Arg Arg Gly Arg Asp Pro Glu Met Gly Gly Lys Pro Arg Arg
            420                 425                 430

Lys Asn Pro Gln Glu Gly Leu Tyr Asn Glu Leu Gln Lys Asp Lys Met
```

```
        435                 440                 445

Ala Glu Ala Tyr Ser Glu Ile Gly Met Lys Gly Glu Arg Arg Arg Gly
    450                 455                 460

Lys Gly His Asp Gly Leu Tyr Gln Gly Leu Ser Thr Ala Thr Lys Asp
465                 470                 475                 480

Thr Tyr Asp Ala Leu His Met Gln Ala Leu Pro Pro Arg
                485                 490

<210>  23
<211>  493
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  humanized anti-BCMA-23-CAR

<400>  23

Met Ala Leu Pro Val Thr Ala Leu Leu Leu Pro Leu Ala Leu Leu Leu
1               5                   10                  15

His Ala Ala Arg Pro Asp Ile Val Leu Thr Gln Ser Pro Ala Ser Leu
            20                  25                  30

Ala Val Ser Leu Gly Glu Arg Ala Thr Ile Asn Cys Arg Ala Ser Glu
        35                  40                  45

Ser Val Ser Val Ile Gly Ala His Leu Ile His Trp Tyr Gln Gln Lys
    50                  55                  60

Pro Gly Gln Pro Pro Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu
65                  70                  75                  80

Thr Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                85                  90                  95

Thr Leu Thr Ile Ser Ser Leu Gln Ala Glu Asp Ala Ala Ile Tyr Ser
            100                 105                 110

Cys Leu Gln Ser Arg Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys
        115                 120                 125

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

Glu Gly Ser Thr Lys Gly Gln Val Gln Leu Val Gln Ser Gly Ser Glu
145                 150                 155                 160

Leu Lys Lys Pro Gly Glu Ser Val Lys Ile Ser Cys Lys Ala Ser Gly
                165                 170                 175
```

```
Tyr Thr Phe Thr Asp Tyr Ser Ile Asn Trp Val Lys Gln Ala Pro Gly
            180                 185                 190

Gln Gly Leu Lys Trp Met Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro
        195                 200                 205

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

Ser Ala Ser Thr Ala Tyr Leu Gln Ile Ser Ser Leu Lys Ala Glu Asp
225                 230                 235                 240

Thr Ala Val Tyr Phe Cys Ala Leu Asp Tyr Ser Tyr Ala Met Asp Tyr
                245                 250                 255

Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser Ala Ala Ala Thr Thr
            260                 265                 270

Thr Pro Ala Pro Arg Pro Pro Thr Pro Ala Pro Thr Ile Ala Ser Gln
        275                 280                 285

Pro Leu Ser Leu Arg Pro Glu Ala Cys Arg Pro Ala Ala Gly Gly Ala
    290                 295                 300

Val His Thr Arg Gly Leu Asp Phe Ala Cys Asp Ile Tyr Ile Trp Ala
305                 310                 315                 320

Pro Leu Ala Gly Thr Cys Gly Val Leu Leu Leu Ser Leu Val Ile Thr
                325                 330                 335

Leu Tyr Cys Lys Arg Gly Arg Lys Lys Leu Leu Tyr Ile Phe Lys Gln
            340                 345                 350

Pro Phe Met Arg Pro Val Gln Thr Thr Gln Glu Glu Asp Gly Cys Ser
        355                 360                 365

Cys Arg Phe Pro Glu Glu Glu Glu Gly Gly Cys Glu Leu Arg Val Lys
    370                 375                 380

Phe Ser Arg Ser Ala Asp Ala Pro Ala Tyr Gln Gln Gly Gln Asn Gln
385                 390                 395                 400

Leu Tyr Asn Glu Leu Asn Leu Gly Arg Arg Glu Glu Tyr Asp Val Leu
                405                 410                 415

Asp Lys Arg Arg Gly Arg Asp Pro Glu Met Gly Gly Lys Pro Arg Arg
            420                 425                 430

Lys Asn Pro Gln Glu Gly Leu Tyr Asn Glu Leu Gln Lys Asp Lys Met
```

```
        435                 440                 445

Ala Glu Ala Tyr Ser Glu Ile Gly Met Lys Gly Glu Arg Arg Arg Gly
    450                 455                 460

Lys Gly His Asp Gly Leu Tyr Gln Gly Leu Ser Thr Ala Thr Lys Asp
465                 470                 475                 480

Thr Tyr Asp Ala Leu His Met Gln Ala Leu Pro Pro Arg
                485                 490

<210>  24
<211>  493
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  humanized anti-BCMA-24-CAR

<400>  24

Met Ala Leu Pro Val Thr Ala Leu Leu Leu Pro Leu Ala Leu Leu Leu
1               5                   10                  15

His Ala Ala Arg Pro Asp Ile Val Leu Thr Gln Ser Pro Ala Ser Leu
            20                  25                  30

Ala Val Ser Leu Gly Glu Arg Ala Thr Ile Asn Cys Arg Ala Ser Glu
        35                  40                  45

Ser Val Ser Val Ile Gly Ala His Leu Ile His Trp Tyr Gln Gln Lys
    50                  55                  60

Pro Gly Gln Pro Pro Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu
65                  70                  75                  80

Thr Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                85                  90                  95

Thr Leu Thr Ile Ser Ser Leu Gln Ala Glu Asp Ala Ala Ile Tyr Ser
            100                 105                 110

Cys Leu Gln Ser Arg Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys
        115                 120                 125

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

Glu Gly Ser Thr Lys Gly Gln Ile Gln Leu Val Gln Ser Gly Ser Glu
145                 150                 155                 160

Leu Lys Lys Pro Gly Glu Ser Val Lys Ile Ser Cys Lys Ala Ser Gly
                165                 170                 175
```

```
Tyr Thr Phe Thr Asp Tyr Ser Ile Asn Trp Val Lys Gln Ala Pro Gly
            180                 185                 190

Gln Gly Leu Lys Trp Met Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro
        195                 200                 205

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

Ser Ala Ser Thr Ala Tyr Leu Gln Ile Ser Ser Leu Lys Ala Glu Asp
225                 230                 235                 240

Thr Ala Val Tyr Phe Cys Ala Leu Asp Tyr Ser Tyr Ala Met Asp Tyr
                245                 250                 255

Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser Ala Ala Ala Thr Thr
            260                 265                 270

Thr Pro Ala Pro Arg Pro Pro Thr Pro Ala Pro Thr Ile Ala Ser Gln
        275                 280                 285

Pro Leu Ser Leu Arg Pro Glu Ala Cys Arg Pro Ala Ala Gly Gly Ala
    290                 295                 300

Val His Thr Arg Gly Leu Asp Phe Ala Cys Asp Ile Tyr Ile Trp Ala
305                 310                 315                 320

Pro Leu Ala Gly Thr Cys Gly Val Leu Leu Leu Ser Leu Val Ile Thr
                325                 330                 335

Leu Tyr Cys Lys Arg Gly Arg Lys Lys Leu Leu Tyr Ile Phe Lys Gln
            340                 345                 350

Pro Phe Met Arg Pro Val Gln Thr Thr Gln Glu Glu Asp Gly Cys Ser
        355                 360                 365

Cys Arg Phe Pro Glu Glu Glu Glu Gly Gly Cys Glu Leu Arg Val Lys
    370                 375                 380

Phe Ser Arg Ser Ala Asp Ala Pro Ala Tyr Gln Gln Gly Gln Asn Gln
385                 390                 395                 400

Leu Tyr Asn Glu Leu Asn Leu Gly Arg Arg Glu Glu Tyr Asp Val Leu
                405                 410                 415

Asp Lys Arg Arg Gly Arg Asp Pro Glu Met Gly Gly Lys Pro Arg Arg
            420                 425                 430

Lys Asn Pro Gln Glu Gly Leu Tyr Asn Glu Leu Gln Lys Asp Lys Met
```

```
        435                 440                 445

Ala Glu Ala Tyr Ser Glu Ile Gly Met Lys Gly Glu Arg Arg Arg Gly
    450                 455                 460

Lys Gly His Asp Gly Leu Tyr Gln Gly Leu Ser Thr Ala Thr Lys Asp
465                 470                 475                 480

Thr Tyr Asp Ala Leu His Met Gln Ala Leu Pro Pro Arg
                485                 490

<210>  25
<211>  493
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  humanized anti-BCMA-30-CAR

<400>  25

Met Ala Leu Pro Val Thr Ala Leu Leu Leu Pro Leu Ala Leu Leu Leu
1               5                   10                  15

His Ala Ala Arg Pro Asp Ile Val Leu Thr Gln Ser Pro Ala Ser Leu
            20                  25                  30

Ala Met Ser Leu Gly Glu Arg Ala Thr Ile Ser Cys Arg Ala Ser Glu
        35                  40                  45

Ser Val Ser Val Ile Gly Ala His Leu Ile His Trp Tyr Gln Gln Lys
    50                  55                  60

Pro Gly Gln Pro Pro Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu
65                  70                  75                  80

Thr Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                85                  90                  95

Thr Leu Thr Ile Ser Arg Val Gln Ala Glu Asp Ala Ala Ile Tyr Ser
            100                 105                 110

Cys Leu Gln Ser Arg Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys
        115                 120                 125

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

Glu Gly Ser Thr Lys Gly Gln Val Gln Leu Val Gln Ser Gly Ser Glu
145                 150                 155                 160

Leu Lys Lys Pro Gly Ala Ser Val Lys Val Ser Cys Lys Ala Ser Gly
                165                 170                 175
```

```
Tyr Thr Phe Thr Asp Tyr Ser Ile Asn Trp Val Arg Gln Ala Pro Gly
            180                 185                 190

Gln Gly Leu Glu Trp Met Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro
        195                 200                 205

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

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

Thr Ala Val Tyr Tyr Cys Ala Arg Asp Tyr Ser Tyr Ala Met Asp Tyr
                245                 250                 255

Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser Ala Ala Ala Thr Thr
            260                 265                 270

Thr Pro Ala Pro Arg Pro Pro Thr Pro Ala Pro Thr Ile Ala Ser Gln
        275                 280                 285

Pro Leu Ser Leu Arg Pro Glu Ala Cys Arg Pro Ala Ala Gly Gly Ala
    290                 295                 300

Val His Thr Arg Gly Leu Asp Phe Ala Cys Asp Ile Tyr Ile Trp Ala
305                 310                 315                 320

Pro Leu Ala Gly Thr Cys Gly Val Leu Leu Leu Ser Leu Val Ile Thr
                325                 330                 335

Leu Tyr Cys Lys Arg Gly Arg Lys Lys Leu Leu Tyr Ile Phe Lys Gln
            340                 345                 350

Pro Phe Met Arg Pro Val Gln Thr Thr Gln Glu Glu Asp Gly Cys Ser
        355                 360                 365

Cys Arg Phe Pro Glu Glu Glu Glu Gly Gly Cys Glu Leu Arg Val Lys
    370                 375                 380

Phe Ser Arg Ser Ala Asp Ala Pro Ala Tyr Gln Gln Gly Gln Asn Gln
385                 390                 395                 400

Leu Tyr Asn Glu Leu Asn Leu Gly Arg Arg Glu Glu Tyr Asp Val Leu
                405                 410                 415

Asp Lys Arg Arg Gly Arg Asp Pro Glu Met Gly Gly Lys Pro Arg Arg
            420                 425                 430

Lys Asn Pro Gln Glu Gly Leu Tyr Asn Glu Leu Gln Lys Asp Lys Met
```

```
        435                 440                 445

Ala Glu Ala Tyr Ser Glu Ile Gly Met Lys Gly Glu Arg Arg Arg Gly
    450                 455                 460

Lys Gly His Asp Gly Leu Tyr Gln Gly Leu Ser Thr Ala Thr Lys Asp
465                 470                 475                 480

Thr Tyr Asp Ala Leu His Met Gln Ala Leu Pro Pro Arg
                485                 490

<210>  26
<211>  493
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  humanized anti-BCMA-31-CAR

<400>  26

Met Ala Leu Pro Val Thr Ala Leu Leu Leu Pro Leu Ala Leu Leu Leu
1               5                   10                  15

His Ala Ala Arg Pro Asp Ile Val Leu Thr Gln Ser Pro Ala Ser Leu
            20                  25                  30

Ala Met Ser Leu Gly Glu Arg Ala Thr Ile Ser Cys Arg Ala Ser Glu
        35                  40                  45

Ser Val Ser Val Ile Gly Ala His Leu Ile His Trp Tyr Gln Gln Lys
    50                  55                  60

Pro Gly Gln Pro Pro Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu
65                  70                  75                  80

Thr Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                85                  90                  95

Thr Leu Thr Ile Ser Arg Val Gln Ala Glu Asp Ala Ala Ile Tyr Ser
            100                 105                 110

Cys Leu Gln Ser Arg Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys
        115                 120                 125

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

Glu Gly Ser Thr Lys Gly Gln Val Gln Leu Val Gln Ser Gly Ser Glu
145                 150                 155                 160

Leu Lys Lys Pro Gly Glu Ser Val Lys Val Ser Cys Lys Ala Ser Gly
                165                 170                 175
```

```
Tyr Thr Phe Thr Asp Tyr Ser Ile Asn Trp Val Arg Gln Ala Pro Gly
            180                 185                 190

Gln Gly Leu Glu Trp Met Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro
        195                 200                 205

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

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

Thr Ala Val Tyr Tyr Cys Ala Leu Asp Tyr Ser Tyr Ala Met Asp Tyr
                245                 250                 255

Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser Ala Ala Ala Thr Thr
            260                 265                 270

Thr Pro Ala Pro Arg Pro Pro Thr Pro Ala Pro Thr Ile Ala Ser Gln
        275                 280                 285

Pro Leu Ser Leu Arg Pro Glu Ala Cys Arg Pro Ala Ala Gly Gly Ala
    290                 295                 300

Val His Thr Arg Gly Leu Asp Phe Ala Cys Asp Ile Tyr Ile Trp Ala
305                 310                 315                 320

Pro Leu Ala Gly Thr Cys Gly Val Leu Leu Leu Ser Leu Val Ile Thr
                325                 330                 335

Leu Tyr Cys Lys Arg Gly Arg Lys Lys Leu Leu Tyr Ile Phe Lys Gln
            340                 345                 350

Pro Phe Met Arg Pro Val Gln Thr Thr Gln Glu Glu Asp Gly Cys Ser
        355                 360                 365

Cys Arg Phe Pro Glu Glu Glu Glu Gly Gly Cys Glu Leu Arg Val Lys
    370                 375                 380

Phe Ser Arg Ser Ala Asp Ala Pro Ala Tyr Gln Gln Gly Gln Asn Gln
385                 390                 395                 400

Leu Tyr Asn Glu Leu Asn Leu Gly Arg Arg Glu Glu Tyr Asp Val Leu
                405                 410                 415

Asp Lys Arg Arg Gly Arg Asp Pro Glu Met Gly Gly Lys Pro Arg Arg
            420                 425                 430

Lys Asn Pro Gln Glu Gly Leu Tyr Asn Glu Leu Gln Lys Asp Lys Met
```

```
        435                 440                 445

Ala Glu Ala Tyr Ser Glu Ile Gly Met Lys Gly Glu Arg Arg Arg Gly
    450                 455                 460

Lys Gly His Asp Gly Leu Tyr Gln Gly Leu Ser Thr Ala Thr Lys Asp
465                 470                 475                 480

Thr Tyr Asp Ala Leu His Met Gln Ala Leu Pro Pro Arg
                485                 490

<210>  27
<211>  493
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  humanized anti-BCMA-32-CAR

<400>  27

Met Ala Leu Pro Val Thr Ala Leu Leu Leu Pro Leu Ala Leu Leu Leu
1               5                   10                  15

His Ala Ala Arg Pro Asp Ile Val Leu Thr Gln Ser Pro Ala Ser Leu
            20                  25                  30

Ala Met Ser Leu Gly Glu Arg Ala Thr Ile Ser Cys Arg Ala Ser Glu
        35                  40                  45

Ser Val Ser Val Ile Gly Ala His Leu Ile His Trp Tyr Gln Gln Lys
    50                  55                  60

Pro Gly Gln Pro Pro Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu
65                  70                  75                  80

Thr Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                85                  90                  95

Thr Leu Thr Ile Ser Arg Val Gln Ala Glu Asp Ala Ala Ile Tyr Ser
            100                 105                 110

Cys Leu Gln Ser Arg Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys
        115                 120                 125

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

Glu Gly Ser Thr Lys Gly Gln Val Gln Leu Val Gln Ser Gly Ser Glu
145                 150                 155                 160

Leu Lys Lys Pro Gly Glu Ser Val Lys Ile Ser Cys Lys Ala Ser Gly
                165                 170                 175
```

```
Tyr Thr Phe Thr Asp Tyr Ser Ile Asn Trp Val Arg Gln Ala Pro Gly
            180                 185                 190

Gln Gly Leu Glu Trp Met Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro
        195                 200                 205

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

Ser Ala Ser Thr Ala Tyr Leu Gln Ile Ser Ser Leu Lys Ala Glu Asp
225                 230                 235                 240

Thr Ala Val Tyr Phe Cys Ala Leu Asp Tyr Ser Tyr Ala Met Asp Tyr
                245                 250                 255

Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser Ala Ala Ala Thr Thr
            260                 265                 270

Thr Pro Ala Pro Arg Pro Pro Thr Pro Ala Pro Thr Ile Ala Ser Gln
        275                 280                 285

Pro Leu Ser Leu Arg Pro Glu Ala Cys Arg Pro Ala Ala Gly Gly Ala
    290                 295                 300

Val His Thr Arg Gly Leu Asp Phe Ala Cys Asp Ile Tyr Ile Trp Ala
305                 310                 315                 320

Pro Leu Ala Gly Thr Cys Gly Val Leu Leu Leu Ser Leu Val Ile Thr
                325                 330                 335

Leu Tyr Cys Lys Arg Gly Arg Lys Lys Leu Leu Tyr Ile Phe Lys Gln
            340                 345                 350

Pro Phe Met Arg Pro Val Gln Thr Thr Gln Glu Glu Asp Gly Cys Ser
        355                 360                 365

Cys Arg Phe Pro Glu Glu Glu Glu Gly Gly Cys Glu Leu Arg Val Lys
    370                 375                 380

Phe Ser Arg Ser Ala Asp Ala Pro Ala Tyr Gln Gln Gly Gln Asn Gln
385                 390                 395                 400

Leu Tyr Asn Glu Leu Asn Leu Gly Arg Arg Glu Glu Tyr Asp Val Leu
                405                 410                 415

Asp Lys Arg Arg Gly Arg Asp Pro Glu Met Gly Gly Lys Pro Arg Arg
            420                 425                 430

Lys Asn Pro Gln Glu Gly Leu Tyr Asn Glu Leu Gln Lys Asp Lys Met
```

```
        435                 440                 445

Ala Glu Ala Tyr Ser Glu Ile Gly Met Lys Gly Glu Arg Arg Arg Gly
    450                 455                 460

Lys Gly His Asp Gly Leu Tyr Gln Gly Leu Ser Thr Ala Thr Lys Asp
465                 470                 475                 480

Thr Tyr Asp Ala Leu His Met Gln Ala Leu Pro Pro Arg
                485                 490

<210>  28
<211>  493
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  humanized anti-BCMA-33-CAR

<400>  28

Met Ala Leu Pro Val Thr Ala Leu Leu Leu Pro Leu Ala Leu Leu Leu
1               5                   10                  15

His Ala Ala Arg Pro Asp Ile Val Leu Thr Gln Ser Pro Ala Ser Leu
            20                  25                  30

Ala Met Ser Leu Gly Glu Arg Ala Thr Ile Ser Cys Arg Ala Ser Glu
        35                  40                  45

Ser Val Ser Val Ile Gly Ala His Leu Ile His Trp Tyr Gln Gln Lys
    50                  55                  60

Pro Gly Gln Pro Pro Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu
65                  70                  75                  80

Thr Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                85                  90                  95

Thr Leu Thr Ile Ser Arg Val Gln Ala Glu Asp Ala Ala Ile Tyr Ser
            100                 105                 110

Cys Leu Gln Ser Arg Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys
        115                 120                 125

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

Glu Gly Ser Thr Lys Gly Gln Val Gln Leu Val Gln Ser Gly Ser Glu
145                 150                 155                 160

Leu Lys Lys Pro Gly Glu Ser Val Lys Ile Ser Cys Lys Ala Ser Gly
                165                 170                 175
```

```
Tyr Thr Phe Thr Asp Tyr Ser Ile Asn Trp Val Lys Gln Ala Pro Gly
            180                 185                 190

Gln Gly Leu Lys Trp Met Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro
        195                 200                 205

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

Ser Ala Ser Thr Ala Tyr Leu Gln Ile Ser Ser Leu Lys Ala Glu Asp
225                 230                 235                 240

Thr Ala Val Tyr Phe Cys Ala Leu Asp Tyr Ser Tyr Ala Met Asp Tyr
                245                 250                 255

Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser Ala Ala Ala Thr Thr
            260                 265                 270

Thr Pro Ala Pro Arg Pro Pro Thr Pro Ala Pro Thr Ile Ala Ser Gln
        275                 280                 285

Pro Leu Ser Leu Arg Pro Glu Ala Cys Arg Pro Ala Ala Gly Gly Ala
    290                 295                 300

Val His Thr Arg Gly Leu Asp Phe Ala Cys Asp Ile Tyr Ile Trp Ala
305                 310                 315                 320

Pro Leu Ala Gly Thr Cys Gly Val Leu Leu Leu Ser Leu Val Ile Thr
                325                 330                 335

Leu Tyr Cys Lys Arg Gly Arg Lys Lys Leu Leu Tyr Ile Phe Lys Gln
            340                 345                 350

Pro Phe Met Arg Pro Val Gln Thr Thr Gln Glu Glu Asp Gly Cys Ser
        355                 360                 365

Cys Arg Phe Pro Glu Glu Glu Glu Gly Gly Cys Glu Leu Arg Val Lys
    370                 375                 380

Phe Ser Arg Ser Ala Asp Ala Pro Ala Tyr Gln Gln Gly Gln Asn Gln
385                 390                 395                 400

Leu Tyr Asn Glu Leu Asn Leu Gly Arg Arg Glu Glu Tyr Asp Val Leu
                405                 410                 415

Asp Lys Arg Arg Gly Arg Asp Pro Glu Met Gly Gly Lys Pro Arg Arg
            420                 425                 430

Lys Asn Pro Gln Glu Gly Leu Tyr Asn Glu Leu Gln Lys Asp Lys Met
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        435                 440                 445

Ala Glu Ala Tyr Ser Glu Ile Gly Met Lys Gly Glu Arg Arg Arg Gly
    450                 455                 460

Lys Gly His Asp Gly Leu Tyr Gln Gly Leu Ser Thr Ala Thr Lys Asp
465                 470                 475                 480

Thr Tyr Asp Ala Leu His Met Gln Ala Leu Pro Pro Arg
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His Ala Ala Arg Pro Asp Ile Val Leu Thr Gln Ser Pro Ala Ser Leu
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Ala Met Ser Leu Gly Glu Arg Ala Thr Ile Ser Cys Arg Ala Ser Glu
        35                  40                  45

Ser Val Ser Val Ile Gly Ala His Leu Ile His Trp Tyr Gln Gln Lys
    50                  55                  60

Pro Gly Gln Pro Pro Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu
65                  70                  75                  80

Thr Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                85                  90                  95

Thr Leu Thr Ile Ser Arg Val Gln Ala Glu Asp Ala Ala Ile Tyr Ser
            100                 105                 110

Cys Leu Gln Ser Arg Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys
        115                 120                 125

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

Glu Gly Ser Thr Lys Gly Gln Ile Gln Leu Val Gln Ser Gly Ser Glu
145                 150                 155                 160

Leu Lys Lys Pro Gly Glu Ser Val Lys Ile Ser Cys Lys Ala Ser Gly
                165                 170                 175
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Tyr Thr Phe Thr Asp Tyr Ser Ile Asn Trp Val Lys Gln Ala Pro Gly
            180                 185                 190

Gln Gly Leu Lys Trp Met Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro
        195                 200                 205

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

Ser Ala Ser Thr Ala Tyr Leu Gln Ile Ser Ser Leu Lys Ala Glu Asp
225                 230                 235                 240

Thr Ala Val Tyr Phe Cys Ala Leu Asp Tyr Ser Tyr Ala Met Asp Tyr
                245                 250                 255

Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser Ala Ala Ala Thr Thr
            260                 265                 270

Thr Pro Ala Pro Arg Pro Pro Thr Pro Ala Pro Thr Ile Ala Ser Gln
        275                 280                 285

Pro Leu Ser Leu Arg Pro Glu Ala Cys Arg Pro Ala Ala Gly Gly Ala
    290                 295                 300

Val His Thr Arg Gly Leu Asp Phe Ala Cys Asp Ile Tyr Ile Trp Ala
305                 310                 315                 320

Pro Leu Ala Gly Thr Cys Gly Val Leu Leu Leu Ser Leu Val Ile Thr
                325                 330                 335

Leu Tyr Cys Lys Arg Gly Arg Lys Lys Leu Leu Tyr Ile Phe Lys Gln
            340                 345                 350

Pro Phe Met Arg Pro Val Gln Thr Thr Gln Glu Glu Asp Gly Cys Ser
        355                 360                 365

Cys Arg Phe Pro Glu Glu Glu Glu Gly Gly Cys Glu Leu Arg Val Lys
    370                 375                 380

Phe Ser Arg Ser Ala Asp Ala Pro Ala Tyr Gln Gln Gly Gln Asn Gln
385                 390                 395                 400

Leu Tyr Asn Glu Leu Asn Leu Gly Arg Arg Glu Glu Tyr Asp Val Leu
                405                 410                 415

Asp Lys Arg Arg Gly Arg Asp Pro Glu Met Gly Gly Lys Pro Arg Arg
            420                 425                 430

Lys Asn Pro Gln Glu Gly Leu Tyr Asn Glu Leu Gln Lys Asp Lys Met
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        435                 440                 445

Ala Glu Ala Tyr Ser Glu Ile Gly Met Lys Gly Glu Arg Arg Arg Gly
    450                 455                 460

Lys Gly His Asp Gly Leu Tyr Gln Gly Leu Ser Thr Ala Thr Lys Asp
465                 470                 475                 480

Thr Tyr Asp Ala Leu His Met Gln Ala Leu Pro Pro Arg
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<210> 45
<211> 184
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<213> Homo sapiens

<400> 45

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35 40 45

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

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Ile Ile Ser Leu Ala Val Phe Val Leu Met Phe Leu Leu Arg Lys Ile
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Asn Ser Glu Pro Leu Lys Asp Glu Phe Lys Asn Thr Gly Ser Gly Leu
                85                  90                  95

Leu Gly Met Ala Asn Ile Asp Leu Glu Lys Ser Arg Thr Gly Asp Glu
            100                 105                 110

Ile Ile Leu Pro Arg Gly Leu Glu Tyr Thr Val Glu Glu Cys Thr Cys
        115                 120                 125

Glu Asp Cys Ile Lys Ser Lys Pro Lys Val Asp Ser Asp His Cys Phe
    130                 135                 140

Pro Leu Pro Ala Met Glu Glu Gly Ala Thr Ile Leu Val Thr Thr Lys
145                 150                 155                 160

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Ile Glu Lys Ser Ile Ser Ala Arg
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<400>  46

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<210>  47
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<220>
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<400> 49

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<400> 50

Glu Gly Lys Ser Ser Gly Ser Gly Ser Glu Ser Lys Val Asp
1 5 10

<210> 51
<211> 18
<212> PRT
<213> Artificial Sequence

<220>
<223> linker sequence

<400> 51

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

Leu Asp

<210> 52
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> linker sequence

<400> 52

Gly Gly Arg Arg Gly Gly Gly Ser
1   5

<210> 53
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> linker sequence

<400> 53

Leu Arg Gln Arg Asp Gly Glu Arg Pro
1   5

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

<220>
<223> linker sequence

<400> 54

Leu Arg Gln Lys Asp Gly Gly Gly Ser Glu Arg Pro
1   5   10

<210> 55
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> linker sequence

<400> 55

Leu Arg Gln Lys Asp Gly Gly Gly Ser Gly Gly Gly Ser Glu Arg Pro
1   5   10   15

<210> 56
<211> 18
<212> PRT
<213> Artificial Sequence

<220>
<223> linker sequence

<400> 56

Gly Ser Thr Ser Gly Ser Gly Lys Pro Gly Ser Gly Glu Gly Ser Thr
1   5   10   15

Lys Gly

<210> 57
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> protease cleavage site

<220>
<221> misc_feature
<222> (2)..(3)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (5)..(5)
<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (7)..(7)
<223> Xaa may be Gly or Ser

<400> 57

Glu Xaa Xaa Tyr Xaa Gln Xaa
1 5

<210> 58
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> protease cleavage site

<400> 58

Glu Asn Leu Tyr Phe Gln Gly
1 5

<210> 59
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> protease cleavage site

<400> 59

Glu Asn Leu Tyr Phe Gln Ser
1 5

<210> 60
<211> 19
<212> PRT
<213> Artificial Sequence

<220>

<223> protease cleavage site

<400> 60

Leu Leu Asn Phe Asp Leu Leu Lys Leu Ala Gly Asp Val Glu Ser Asn
1 5 10 15

Pro Gly Pro

<210> 61
<211> 19
<212> PRT
<213> Artificial Sequence

<220>
<223> protease cleavage site

<400> 61

Thr Leu Asn Phe Asp Leu Leu Lys Leu Ala Gly Asp Val Glu Ser Asn
1 5 10 15

Pro Gly Pro

<210> 62
<211> 14
<212> PRT
<213> Artificial Sequence

<220>
<223> protease cleavage site

<400> 62

Leu Leu Lys Leu Ala Gly Asp Val Glu Ser Asn Pro Gly Pro
1 5 10

<210> 63
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> protease cleavage site

<400> 63

Asn Phe Asp Leu Leu Lys Leu Ala Gly Asp Val Glu Ser Asn Pro Gly
1 5 10 15

Pro

<210> 64
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> protease cleavage site

<400> 64

Gln Leu Leu Asn Phe Asp Leu Leu Lys Leu Ala Gly Asp Val Glu Ser
1   5   10   15

Asn Pro Gly Pro
            20

<210> 65
<211> 24
<212> PRT
<213> Artificial Sequence

<220>
<223> protease cleavage site

<400> 65

Ala Pro Val Lys Gln Thr Leu Asn Phe Asp Leu Leu Lys Leu Ala Gly
1   5   10   15

Asp Val Glu Ser Asn Pro Gly Pro
            20

<210> 66
<211> 40
<212> PRT
<213> Artificial Sequence

<220>
<223> protease cleavage site

<400> 66

Val Thr Glu Leu Leu Tyr Arg Met Lys Arg Ala Glu Thr Tyr Cys Pro
1   5   10   15

Arg Pro Leu Leu Ala Ile His Pro Thr Glu Ala Arg His Lys Gln Lys
            20   25   30

Ile Val Ala Pro Val Lys Gln Thr
        35   40

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

<220>
<223> protease cleavage site

<400> 67

Leu Asn Phe Asp Leu Leu Lys Leu Ala Gly Asp Val Glu Ser Asn Pro
1   5   10   15

Gly Pro

<210> 68
<211> 40
<212> PRT
<213> Artificial Sequence

<220>
<223> protease cleavage site

<400> 68

Leu Leu Ala Ile His Pro Thr Glu Ala Arg His Lys Gln Lys Ile Val
1 5 10 15

Ala Pro Val Lys Gln Thr Leu Asn Phe Asp Leu Leu Lys Leu Ala Gly
20 25 30

Asp Val Glu Ser Asn Pro Gly Pro
35 40

<210> 69
<211> 33
<212> PRT
<213> Artificial Sequence

<220>
<223> protease cleavage site

<400> 69

Glu Ala Arg His Lys Gln Lys Ile Val Ala Pro Val Lys Gln Thr Leu
1 5 10 15

Asn Phe Asp Leu Leu Lys Leu Ala Gly Asp Val Glu Ser Asn Pro Gly
20 25 30

Pro

<210> 70
<211> 1467
<212> DNA
<213> Artificial Sequence

<220>
<223> humanized anti-BCMA-10.2-CAR

<400> 70
atggccctgc ctgtgaccgc cctgctgctg cctctggctc tgctgctgca tgccgccaga 60

cccgacatcg tgctgacaca gagccctgcc agcctggccg tgagcctggg agaaagggcc 120

accatcaact gcagggcctc cgaaagcgtg agcgtgatcg gcgcccacct gatccactgg 180

tatcagcaga agcccggcca gcctcccaag ctgctgatct acctggccag caacctggaa 240

accggcgtgc ctgccaggtt tagcgggagc ggcagcggca ccgatttcac cctgaccatc 300

agcagcctgc aggccgagga cgctgccatc tactactgcc tgcagtccag gatcttcccc 360

aggaccttcg gccagggcac caagctggag atcaagggca gcaccagcgg cagcggcaag 420

cccggctccg gagagggcag caccaagggc caggtgcagc tggtgcagag cggcagcgag 480

ctgaagaaac ccggcgccag cgtgaaggtg agctgcaagg ccagcggcta caccttcacc 540

gactacagca tcaactgggt gaggcaggcc cctggacagg gactggagtg gatgggctgg 600

atcaacaccg agaccaggga gcccgcctac gcctacgact tcaggggcag gttcgtgttc 660

agcctggaca ccagcgtgag caccgcctac ctgcagatca gcagcctgaa ggccgaggac 720

accgccgtgt actactgcgc cagggactac agctacgcca tggactactg gggccagggc 780

accctggtga cagtgtccag cgcggccgca gacaccggcc tctatatctg caaggtggaa 840

ctgatgtatc ccccacccta ttacctgggc attggaaatg gaacacagat atatgtgatt 900

gaccctgaac cttgtcctga ctctgacttc ctgttgtgga tactcgctgc agtctccagc 960

ggtctcttct tctactcctt cctgctgact gccgtctcta aacgcggccg aaagaagctt 1020

ctgtacatct tcaagcagcc ttttatgcga cctgtgcaaa ccactcagga agaagatggg 1080

tgttcatgcc gcttccccga ggaggaagaa ggagggtgtg aactgagggt gaaattttct 1140

agaagcgccg atgctcccgc atatcagcag ggtcagaatc agctctacaa tgaattgaat 1200

ctcggcaggc gagaagagta cgatgttctg gacaagagac ggggcaggga tcccgagatg 1260

gggggaaagc cccggagaaa aaatcctcag gaggggttgt ataatgagct gcagaaggac 1320

aagatggctg aagcctatag cgagatcgga atgaaaggcg aaagacgcag aggcaagggg 1380

catgacggtc tgtaccaggg tctctctaca gccaccaagg acacttatga tgcgttgcat 1440

atgcaagcct tgccaccccg ctaatga 1467

<210> 71
<211> 487
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-BCMA-10.2-CAR

<400> 71

Met Ala Leu Pro Val Thr Ala Leu Leu Leu Pro Leu Ala Leu Leu Leu
1 5 10 15

His Ala Ala Arg Pro Asp Ile Val Leu Thr Gln Ser Pro Ala Ser Leu
20 25 30

Ala Val Ser Leu Gly Glu Arg Ala Thr Ile Asn Cys Arg Ala Ser Glu
35 40 45

Ser Val Ser Val Ile Gly Ala His Leu Ile His Trp Tyr Gln Gln Lys
50 55 60

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Pro Gly Gln Pro Pro Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu
65                  70                  75                  80

Thr Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
                85                  90                  95

Thr Leu Thr Ile Ser Ser Leu Gln Ala Glu Asp Ala Ala Ile Tyr Tyr
            100                 105                 110

Cys Leu Gln Ser Arg Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys
        115                 120                 125

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

Glu Gly Ser Thr Lys Gly Gln Val Gln Leu Val Gln Ser Gly Ser Glu
145                 150                 155                 160

Leu Lys Lys Pro Gly Ala Ser Val Lys Val Ser Cys Lys Ala Ser Gly
                165                 170                 175

Tyr Thr Phe Thr Asp Tyr Ser Ile Asn Trp Val Arg Gln Ala Pro Gly
            180                 185                 190

Gln Gly Leu Glu Trp Met Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro
        195                 200                 205

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

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

Thr Ala Val Tyr Tyr Cys Ala Arg Asp Tyr Ser Tyr Ala Met Asp Tyr
                245                 250                 255

Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser Ala Ala Ala Asp Thr
            260                 265                 270

Gly Leu Tyr Ile Cys Lys Val Glu Leu Met Tyr Pro Pro Pro Tyr Tyr
        275                 280                 285

Leu Gly Ile Gly Asn Gly Thr Gln Ile Tyr Val Ile Asp Pro Glu Pro
    290                 295                 300

Cys Pro Asp Ser Asp Phe Leu Leu Trp Ile Leu Ala Ala Val Ser Ser
305                 310                 315                 320

Gly Leu Phe Phe Tyr Ser Phe Leu Leu Thr Ala Val Ser Lys Arg Gly
                325                 330                 335
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Arg Lys Lys Leu Leu Tyr Ile Phe Lys Gln Pro Phe Met Arg Pro Val
            340                 345                 350

Gln Thr Thr Gln Glu Glu Asp Gly Cys Ser Cys Arg Phe Pro Glu Glu
        355                 360                 365

Glu Glu Gly Gly Cys Glu Leu Arg Val Lys Phe Ser Arg Ser Ala Asp
    370                 375                 380

Ala Pro Ala Tyr Gln Gln Gly Gln Asn Gln Leu Tyr Asn Glu Leu Asn
385                 390                 395                 400

Leu Gly Arg Arg Glu Glu Tyr Asp Val Leu Asp Lys Arg Arg Gly Arg
                405                 410                 415

Asp Pro Glu Met Gly Gly Lys Pro Arg Arg Lys Asn Pro Gln Glu Gly
            420                 425                 430

Leu Tyr Asn Glu Leu Gln Lys Asp Lys Met Ala Glu Ala Tyr Ser Glu
        435                 440                 445

Ile Gly Met Lys Gly Glu Arg Arg Arg Gly Lys Gly His Asp Gly Leu
    450                 455                 460

Tyr Gln Gly Leu Ser Thr Ala Thr Lys Asp Thr Tyr Asp Ala Leu His
465                 470                 475                 480

Met Gln Ala Leu Pro Pro Arg
                485
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<210> 72
<211> 1461
<212> DNA
<213> Artificial Sequence

<220>
<223> humanized anti-BCMA-10.5-CAR

<400> 72
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cccgacatcg tgctgacaca gagccctgcc agcctggccg tgagcctggg agaaagggcc 120

accatcaact gcagggcctc cgaaagcgtg agcgtgatcg gcgcccacct gatccactgg 180

tatcagcaga agcccggcca gcctcccaag ctgctgatct acctggccag caacctggaa 240

accggcgtgc ctgccaggtt tagcgggagc ggcagcggca ccgatttcac cctgaccatc 300

agcagcctgc aggccgagga cgctgccatc tactactgcc tgcagtccag gatcttcccc 360

aggaccttcg gccagggcac caagctggag atcaagggca gcaccagcgg cagcggcaag 420

cccggctccg gagagggcag caccaagggc caggtgcagc tggtgcagag cggcagcgag 480

ctgaagaaac ccggcgccag cgtgaaggtg agctgcaagg ccagcggcta caccttcacc 540

gactacagca tcaactgggt gaggcaggcc cctggacagg gactggagtg gatgggctgg 600

atcaacaccg agaccaggga gcccgcctac gcctacgact tcaggggcag gttcgtgttc 660

agcctggaca ccagcgtgag caccgcctac ctgcagatca gcagcctgaa ggccgaggac 720

accgccgtgt actactgcgc cagggactac agctacgcca tggactactg gggccagggc 780

accctggtga cagtgtccag cgcggccgca caaataaagg agtctctccg ggccgaattg 840

cgggtcactg agagaagagc tgaagtccct actgcccacc ccagtccttc tccccggcca 900

gccggccaat tccagaccct ggttgttggc gttgtgggtg gcctcctggg cagtctggtt 960

ttgctggtat gggtcctggc cgtgatctgc tccaagcgcg ggagaaagaa acttctgtac 1020

atcttcaagc agcctttat gcgacctgtg caaaccactc aggaagaaga tgggtgttca 1080

tgccgcttcc ccgaggagga agaaggaggg tgtgaactga gggtgaaatt ttctagaagc 1140

gccgatgctc ccgcatatca gcagggtcag aatcagctct acaatgaatt gaatctcggc 1200

aggcgagaag agtacgatgt tctggacaag agacggggca gggatcccga gatgggggga 1260

aagccccgga gaaaaaatcc tcaggagggg ttgtataatg agctgcagaa ggacaagatg 1320

gctgaagcct atagcgagat cggaatgaaa ggcgaaagac gcagaggcaa ggggcatgac 1380

ggtctgtacc agggtctctc tacagccacc aaggacactt atgatgcgtt gcatatgcaa 1440

gccttgccac cccgctaatg a 1461

<210> 73
<211> 485
<212> PRT
<213> Artificial Sequence

<220>
<223> humanized anti-BCMA-10.5-CAR

<400> 73

Met Ala Leu Pro Val Thr Ala Leu Leu Leu Pro Leu Ala Leu Leu Leu
1 5 10 15

His Ala Ala Arg Pro Asp Ile Val Leu Thr Gln Ser Pro Ala Ser Leu
20 25 30

Ala Val Ser Leu Gly Glu Arg Ala Thr Ile Asn Cys Arg Ala Ser Glu
35 40 45

Ser Val Ser Val Ile Gly Ala His Leu Ile His Trp Tyr Gln Gln Lys
50 55 60

Pro Gly Gln Pro Pro Lys Leu Leu Ile Tyr Leu Ala Ser Asn Leu Glu
65 70 75 80

Thr Gly Val Pro Ala Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe
85 90 95

```
Thr Leu Thr Ile Ser Ser Leu Gln Ala Glu Asp Ala Ala Ile Tyr Tyr
            100                 105                 110

Cys Leu Gln Ser Arg Ile Phe Pro Arg Thr Phe Gly Gln Gly Thr Lys
        115                 120                 125

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

Glu Gly Ser Thr Lys Gly Gln Val Gln Leu Val Gln Ser Gly Ser Glu
145                 150                 155                 160

Leu Lys Lys Pro Gly Ala Ser Val Lys Val Ser Cys Lys Ala Ser Gly
                165                 170                 175

Tyr Thr Phe Thr Asp Tyr Ser Ile Asn Trp Val Arg Gln Ala Pro Gly
            180                 185                 190

Gln Gly Leu Glu Trp Met Gly Trp Ile Asn Thr Glu Thr Arg Glu Pro
        195                 200                 205

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

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

Thr Ala Val Tyr Tyr Cys Ala Arg Asp Tyr Ser Tyr Ala Met Asp Tyr
                245                 250                 255

Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser Ala Ala Ala Gln Ile
            260                 265                 270

Lys Glu Ser Leu Arg Ala Glu Leu Arg Val Thr Glu Arg Arg Ala Glu
        275                 280                 285

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

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

Leu Leu Val Trp Val Leu Ala Val Ile Cys Ser Lys Arg Gly Arg Lys
                325                 330                 335

Lys Leu Leu Tyr Ile Phe Lys Gln Pro Phe Met Arg Pro Val Gln Thr
            340                 345                 350

Thr Gln Glu Glu Asp Gly Cys Ser Cys Arg Phe Pro Glu Glu Glu Glu
        355                 360                 365
```

```
Gly Gly Cys Glu Leu Arg Val Lys Phe Ser Arg Ser Ala Asp Ala Pro
    370                 375                 380

Ala Tyr Gln Gln Gly Gln Asn Gln Leu Tyr Asn Glu Leu Asn Leu Gly
385                 390                 395                 400

Arg Arg Glu Glu Tyr Asp Val Leu Asp Lys Arg Arg Gly Arg Asp Pro
                405                 410                 415

Glu Met Gly Gly Lys Pro Arg Arg Lys Asn Pro Gln Glu Gly Leu Tyr
            420                 425                 430

Asn Glu Leu Gln Lys Asp Lys Met Ala Glu Ala Tyr Ser Glu Ile Gly
        435                 440                 445

Met Lys Gly Glu Arg Arg Arg Gly Lys Gly His Asp Gly Leu Tyr Gln
    450                 455                 460

Gly Leu Ser Thr Ala Thr Lys Asp Thr Tyr Asp Ala Leu His Met Gln
465                 470                 475                 480

Ala Leu Pro Pro Arg
                485
```