SEQUENCE LISTING

<110> Chamberlain, Jeffrey S.
Ramos, Julian
Hauschka, Stephen D.

<120> Novel Micro-Dystrophins and Related Methods of Use

<130> 53433/900

<160> 22

<170> PatentIn version 3.5

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ttatcaggat tctcaagagg gacagctggt ttatgttgca tgactgttcc ctgcatatct 240

gctctggttt taaatagctt atctgagcag ctggaggacc acatgggctt atatggggca 300

cctgccaaaa tagcagccaa caccccccc tgtcgcacat tcctccctgg ctcaccaggc 360

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gactgagcag acgcctccag gatctgtcgg cagct 455

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caggcctggg ttgctggcct ctgctttatc aggattctca agagggacag ctggtttatg 180

ttgcatgact gttccctgca tatctgctct ggttttaaat agcttatctg agcagctgga 240

ggaccacatg ggcttatatg gcgtggggta catgttcctg tagccttgtc cctggcacct 300

gccaaaatag cagccaacac cccccacccc caccgccatc cccctgcccc acccgtcccc 360

tgtcgcacat tcctccctcc gcagggctgg ctcaccaggc cccagcccac atgcctgctt 420

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Gln Lys Lys Thr Phe Thr Lys Trp Val Asn Ala Gln Phe Ser Lys Phe
            20                  25                  30

Gly Lys Gln His Ile Glu Asn Leu Phe Ser Asp Leu Gln Asp Gly Arg
        35                  40                  45

Arg Leu Leu Asp Leu Leu Glu Gly Leu Thr Gly Gln Lys Leu Pro Lys
    50                  55                  60

Glu Lys Gly Ser Thr Arg Val His Ala Leu Asn Asn Val Asn Lys Ala
65                  70                  75                  80

Leu Arg Val Leu Gln Asn Asn Asn Val Asp Leu Val Asn Ile Gly Ser
                85                  90                  95

Thr Asp Ile Val Asp Gly Asn His Lys Leu Thr Leu Gly Leu Ile Trp
            100                 105                 110

Asn Ile Ile Leu His Trp Gln Val Lys Asn Val Met Lys Asn Ile Met
        115                 120                 125

Ala Gly Leu Gln Gln Thr Asn Ser Glu Lys Ile Leu Leu Ser Trp Val
    130                 135                 140

Arg Gln Ser Thr Arg Asn Tyr Pro Gln Val Asn Val Ile Asn Phe Thr
145                 150                 155                 160

Thr Ser Trp Ser Asp Gly Leu Ala Leu Asn Ala Leu Ile His Ser His
                165                 170                 175

Arg Pro Asp Leu Phe Asp Trp Asn Ser Val Val Cys Gln Gln Ser Ala
            180                 185                 190

Thr Gln Arg Leu Glu His Ala Phe Asn Ile Ala Arg Tyr Gln Leu Gly
        195                 200                 205
```

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Ile Glu Lys Leu Leu Asp Pro Glu Asp Val Asp Thr Thr Tyr Pro Asp
    210                 215                 220

Lys Lys Ser Ile Leu Met Tyr Ile Thr Ser Leu Phe Gln Val Leu Pro
225                 230                 235                 240

Gln Gln Val Ser Ile Glu Ala Ile Gln Glu Val Glu Met Leu Pro Arg
                245                 250                 255

Pro Pro Lys Val Thr Lys Glu Glu His Phe Gln Leu His His Gln Met
            260                 265                 270

His Tyr Ser Gln Gln Ile Thr Val Ser Leu Ala Gln Gly Tyr Glu Arg
        275                 280                 285

Thr Ser Ser Pro Lys Pro Arg Phe Lys Ser Tyr Ala Tyr Thr Gln Ala
    290                 295                 300

Ala Tyr Val Thr Thr Ser Asp Pro Thr Arg Ser Pro Phe Pro Ser Gln
305                 310                 315                 320

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

Ser Glu Val Asn Leu Asp Arg Tyr Gln Thr Ala Leu Glu Glu Val Leu
            340                 345                 350

Ser Trp Leu Leu Ser Ala Glu Asp Thr Leu Gln Ala Gln Gly Glu Ile
        355                 360                 365

Ser Asn Asp Val Glu Val Val Lys Asp Gln Phe His Thr His Glu Gly
    370                 375                 380

Tyr Met Met Asp Leu Thr Ala His Gln Gly Arg Val Gly Asn Ile Leu
385                 390                 395                 400

Gln Leu Gly Ser Lys Leu Ile Gly Thr Gly Lys Leu Ser Glu Asp Glu
                405                 410                 415

Glu Thr Glu Val Gln Glu Gln Met Asn Leu Leu Asn Ser Arg Trp Glu
            420                 425                 430

Cys Leu Arg Val Ala Ser Met Glu Lys Gln Ser Asn Leu His Arg Val
        435                 440                 445

Leu Met Asp Leu Gln Asn Gln Lys Leu Lys Glu Leu Asn Asp Trp Leu
    450                 455                 460
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```
Thr Lys Thr Glu Glu Arg Thr Arg Lys Met Glu Glu Glu Pro Leu Gly
465                 470                 475                 480

Pro Asp Leu Glu Asp Leu Lys Arg Gln Val Gln Gln His Lys Val Leu
                485                 490                 495

Gln Glu Asp Leu Glu Gln Glu Gln Val Arg Val Asn Ser Leu Thr His
            500                 505                 510

Met Val Val Val Val Asp Glu Ser Ser Gly Asp His Ala Thr Ala Ala
        515                 520                 525

Leu Glu Glu Gln Leu Lys Val Leu Gly Asp Arg Trp Ala Asn Ile Cys
    530                 535                 540

Arg Trp Thr Glu Asp Arg Trp Val Leu Leu Gln Asp Ile Leu Leu Lys
545                 550                 555                 560

Trp Gln Arg Leu Thr Glu Glu Gln Cys Leu Phe Ser Ala Trp Leu Ser
                565                 570                 575

Glu Lys Glu Asp Ala Val Asn Lys Ile His Thr Thr Gly Phe Lys Asp
            580                 585                 590

Gln Asn Glu Met Leu Ser Ser Leu Gln Lys Leu Ala Val Leu Lys Ala
        595                 600                 605

Asp Leu Glu Lys Lys Lys Gln Ser Met Gly Lys Leu Tyr Ser Leu Lys
    610                 615                 620

Gln Asp Leu Leu Ser Thr Leu Lys Asn Lys Ser Val Thr Gln Lys Thr
625                 630                 635                 640

Glu Ala Trp Leu Asp Asn Phe Ala Arg Cys Trp Asp Asn Leu Val Gln
                645                 650                 655

Lys Leu Glu Lys Ser Thr Ala Gln Ile Ser Gln Ala Ala Pro Gly Leu
            660                 665                 670

Thr Thr Ile Gly Ala Ser Pro Thr Gln Thr Val Thr Leu Val Thr Gln
        675                 680                 685

Pro Val Val Thr Lys Glu Thr Ala Ile Ser Lys Leu Glu Met Pro Ser
    690                 695                 700

Ser Leu Met Leu Glu Leu Glu Arg Leu Gln Glu Leu Gln Glu Ala Thr
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705 710 715 720

Asp Glu Leu Asp Leu Lys Leu Arg Gln Ala Glu Val Ile Lys Gly Ser
725 730 735

Trp Gln Pro Val Gly Asp Leu Leu Ile Asp Ser Leu Gln Asp His Leu
740 745 750

Glu Lys Val Lys Ala Leu Arg Gly Glu Ile Ala Pro Leu Lys Glu Asn
755 760 765

Val Ser His Val Asn Asp Leu Ala Arg Gln Leu Thr Thr Leu Gly Ile
770 775 780

Gln Leu Ser Pro Tyr Asn Leu Ser Thr Leu Glu Asp Leu Asn Thr Arg
785 790 795 800

Trp Lys Leu Leu Gln Val Ala Val Glu Asp Arg Val Arg Gln Leu His
805 810 815

Glu Ala His Arg Asp Phe Gly Pro Ala Ser Gln His Phe Leu Ser Thr
820 825 830

Ser Val Gln Gly Pro Trp Glu Arg Ala Ile Ser Pro Asn Lys Val Pro
835 840 845

Tyr Tyr Ile Asn His Glu Thr Gln Thr Thr Cys Trp Asp His Pro Lys
850 855 860

Met Thr Glu Leu Tyr Gln Ser Leu Ala Asp Leu Asn Asn Val Arg Phe
865 870 875 880

Ser Ala Tyr Arg Thr Ala Met Lys Leu Arg Arg Leu Gln Lys Ala Leu
885 890 895

Cys Leu Asp Leu Leu Ser Leu Ser Ala Ala Cys Asp Ala Leu Asp Gln
900 905 910

His Asn Leu Lys Gln Asn Asp Gln Pro Met Asp Ile Leu Gln Ile Ile
915 920 925

Asn Cys Leu Thr Thr Ile Tyr Asp Arg Leu Glu Gln Glu His Asn Asn
930 935 940

Leu Val Asn Val Pro Leu Cys Val Asp Met Cys Leu Asn Trp Leu Leu
945 950 955 960

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Asn Val Tyr Asp Thr Gly Arg Thr Gly Arg Ile Arg Val Leu Ser Phe
                965                 970                 975

Lys Thr Gly Ile Ile Ser Leu Cys Lys Ala His Leu Glu Asp Lys Tyr
            980                 985                 990

Arg Tyr Leu Phe Lys Gln Val Ala  Ser Ser Thr Gly Phe  Cys Asp Gln
        995                 1000                1005

Arg Arg  Leu Gly Leu Leu Leu  His Asp Ser Ile Gln  Ile Pro Arg
    1010                1015                1020

Gln Leu  Gly Glu Val Ala Ser  Phe Gly Gly Ser Asn  Ile Glu Pro
    1025                1030                1035

Ser Val  Arg Ser Cys Phe Gln  Phe Ala Asn Asn Lys  Pro Glu Ile
    1040                1045                1050

Glu Ala  Ala Leu Phe Leu Asp  Trp Met Arg Leu Glu  Pro Gln Ser
    1055                1060                1065

Met Val  Trp Leu Pro Val Leu  His Arg Val Ala Ala  Ala Glu Thr
    1070                1075                1080

Ala Lys  His Gln Ala Lys Cys  Asn Ile Cys Lys Glu  Cys Pro Ile
    1085                1090                1095

Ile Gly  Phe Arg Tyr Arg Ser  Leu Lys His Phe Asn  Tyr Asp Ile
    1100                1105                1110

Cys Gln  Ser Cys Phe Phe Ser  Gly Arg Val Ala Lys  Gly His Lys
    1115                1120                1125

Met His  Tyr Pro Met Val Glu  Tyr Cys Thr Pro Thr  Thr Ser Gly
    1130                1135                1140

Glu Asp  Val Arg Asp Phe Ala  Lys Val Leu Lys Asn  Lys Phe Arg
    1145                1150                1155

Thr Lys  Arg Tyr Phe Ala Lys  His Pro Arg Met Gly  Tyr Leu Pro
    1160                1165                1170

Val Gln  Thr Val Leu Glu Gly  Asp Asn Met Glu Thr  Asp Thr Met
    1175                1180                1185
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Gln Lys Lys Thr Phe Thr Lys Trp Val Asn Ala Gln Phe Ser Lys Phe
            20                  25                  30

Gly Lys Gln His Ile Glu Asn Leu Phe Ser Asp Leu Gln Asp Gly Arg
        35                  40                  45

Arg Leu Leu Asp Leu Leu Glu Gly Leu Thr Gly Gln Lys Leu Pro Lys
    50                  55                  60

Glu Lys Gly Ser Thr Arg Val His Ala Leu Asn Asn Val Asn Lys Ala
65                  70                  75                  80

Leu Arg Val Leu Gln Asn Asn Asn Val Asp Leu Val Asn Ile Gly Ser
                85                  90                  95

Thr Asp Ile Val Asp Gly Asn His Lys Leu Thr Leu Gly Leu Ile Trp
            100                 105                 110

Asn Ile Ile Leu His Trp Gln Val Lys Asn Val Met Lys Asn Ile Met
        115                 120                 125

Ala Gly Leu Gln Gln Thr Asn Ser Glu Lys Ile Leu Leu Ser Trp Val
    130                 135                 140

Arg Gln Ser Thr Arg Asn Tyr Pro Gln Val Asn Val Ile Asn Phe Thr
145                 150                 155                 160

Thr Ser Trp Ser Asp Gly Leu Ala Leu Asn Ala Leu Ile His Ser His
                165                 170                 175

Arg Pro Asp Leu Phe Asp Trp Asn Ser Val Val Cys Gln Gln Ser Ala
            180                 185                 190

Thr Gln Arg Leu Glu His Ala Phe Asn Ile Ala Arg Tyr Gln Leu Gly
        195                 200                 205

Ile Glu Lys Leu Leu Asp Pro Glu Asp Val Asp Thr Thr Tyr Pro Asp
    210                 215                 220
```

```
Lys Lys Ser Ile Leu Met Tyr Ile Thr Ser Leu Phe Gln Val Leu Pro
225                 230                 235                 240

Gln Gln Val Ser Ile Glu Ala Ile Gln Glu Val Glu Met Leu Pro Arg
                245                 250                 255

Pro Pro Lys Val Thr Lys Glu Glu His Phe Gln Leu His His Gln Met
            260                 265                 270

His Tyr Ser Gln Gln Ile Thr Val Ser Leu Ala Gln Gly Tyr Glu Arg
        275                 280                 285

Thr Ser Ser Pro Lys Pro Arg Phe Lys Ser Tyr Ala Tyr Thr Gln Ala
    290                 295                 300

Ala Tyr Val Thr Thr Ser Asp Pro Thr Arg Ser Pro Phe Pro Ser Gln
305                 310                 315                 320

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

Ser Glu Val Asn Leu Asp Arg Tyr Gln Thr Ala Leu Glu Glu Val Leu
            340                 345                 350

Ser Trp Leu Leu Ser Ala Glu Asp Thr Leu Gln Ala Gln Gly Glu Ile
        355                 360                 365

Ser Asn Asp Val Glu Val Val Lys Asp Gln Phe His Thr His Glu Gly
    370                 375                 380

Tyr Met Met Asp Leu Thr Ala His Gln Gly Arg Val Gly Asn Ile Leu
385                 390                 395                 400

Gln Leu Gly Ser Lys Leu Ile Gly Thr Gly Lys Leu Ser Glu Asp Glu
                405                 410                 415

Glu Thr Glu Val Gln Glu Gln Met Asn Leu Leu Asn Ser Arg Trp Glu
            420                 425                 430

Cys Leu Arg Val Ala Ser Met Glu Lys Gln Ser Asn Leu His Ser Tyr
        435                 440                 445

Val Pro Ser Thr Tyr Leu Thr Glu Ile Thr His Val Ser Gln Ala Leu
    450                 455                 460

Leu Glu Val Glu Gln Leu Leu Asn Ala Pro Asp Leu Cys Ala Lys Asp
465                 470                 475                 480
```

```
Phe Glu Asp Leu Phe Lys Gln Glu Glu Ser Leu Lys Asn Ile Lys Asp
                485                 490                 495

Ser Leu Gln Gln Ser Ser Gly Arg Ile Asp Ile Ile His Ser Lys Lys
            500                 505                 510

Thr Ala Ala Leu Gln Ser Ala Thr Pro Val Glu Arg Val Lys Leu Gln
        515                 520                 525

Glu Ala Leu Ser Gln Leu Asp Phe Gln Trp Glu Lys Val Asn Lys Met
    530                 535                 540

Tyr Lys Asp Arg Gln Gly Arg Phe Asp Arg Ser Val Glu Lys Trp Arg
545                 550                 555                 560

Arg Phe His Tyr Asp Ile Lys Ile Phe Asn Gln Trp Leu Thr Glu Ala
                565                 570                 575

Glu Gln Phe Leu Arg Lys Thr Gln Ile Pro Glu Asn Trp Glu His Ala
            580                 585                 590

Lys Tyr Lys Trp Tyr Leu Lys Glu Leu Gln Asp Gly Ile Gly Gln Arg
        595                 600                 605

Gln Thr Val Val Arg Thr Leu Asn Ala Thr Gly Glu Glu Ile Ile Gln
    610                 615                 620

Gln Ser Ser Lys Thr Asp Ala Ser Ile Leu Gln Glu Lys Leu Gly Ser
625                 630                 635                 640

Leu Asn Leu Arg Trp Gln Glu Val Cys Lys Gln Leu Ser Asp Arg Lys
                645                 650                 655

Lys Arg Leu Glu Glu Gln Ser Asp Gln Trp Lys Arg Leu His Leu Ser
            660                 665                 670

Leu Gln Glu Leu Leu Val Trp Leu Gln Leu Lys Asp Asp Glu Leu Ser
        675                 680                 685

Arg Gln Ala Pro Ile Gly Gly Asp Phe Pro Ala Val Gln Lys Gln Asn
    690                 695                 700

Asp Val His Arg Ala Phe Lys Arg Glu Leu Lys Thr Lys Glu Pro Val
705                 710                 715                 720

Ile Met Ser Thr Leu Glu Thr Val Arg Ile Phe Leu Thr Glu Gln Pro
                725                 730                 735
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```
Leu Glu Gly Leu Glu Lys Leu Tyr Gln Glu Pro Arg Glu Leu Pro Pro
            740                 745                 750

Glu Glu Arg Ala Gln Asn Val Thr Arg Leu Leu Arg Lys Gln Ala Glu
        755                 760                 765

Glu Val Asn Thr Glu Trp Glu Lys Leu Asn Leu His Ser Ala Asp Trp
    770                 775                 780

Gln Arg Lys Ile Asp Glu Thr Leu Glu Arg Leu Gln Glu Leu Gln Glu
785                 790                 795                 800

Ala Thr Asp Glu Leu Asp Leu Lys Leu Arg Gln Ala Glu Val Ile Lys
                805                 810                 815

Gly Ser Trp Gln Pro Val Gly Asp Leu Leu Ile Asp Ser Leu Gln Asp
            820                 825                 830

His Leu Glu Lys Val Lys Ala Leu Arg Gly Glu Ile Ala Pro Leu Lys
        835                 840                 845

Glu Asn Val Ser His Val Asn Asp Leu Ala Arg Gln Leu Thr Thr Leu
    850                 855                 860

Gly Ile Gln Leu Ser Pro Tyr Asn Leu Ser Thr Leu Glu Asp Leu Asn
865                 870                 875                 880

Thr Arg Trp Lys Leu Leu Gln Val Ala Val Glu Asp Arg Val Arg Gln
                885                 890                 895

Leu His Glu Ala His Arg Asp Phe Gly Pro Ala Ser Gln His Phe Leu
            900                 905                 910

Ser Thr Ser Val Gln Gly Pro Trp Glu Arg Ala Ile Ser Pro Asn Lys
        915                 920                 925

Val Pro Tyr Tyr Ile Asn His Glu Thr Gln Thr Thr Cys Trp Asp His
    930                 935                 940

Pro Lys Met Thr Glu Leu Tyr Gln Ser Leu Ala Asp Leu Asn Asn Val
945                 950                 955                 960

Arg Phe Ser Ala Tyr Arg Thr Ala Met Lys Leu Arg Arg Leu Gln Lys
                965                 970                 975

Ala Leu Cys Leu Asp Leu Leu Ser Leu Ser Ala Ala Cys Asp Ala Leu
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980 985 990

Asp Gln His Asn Leu Lys Gln Asn Asp Gln Pro Met Asp Ile Leu Gln
995 1000 1005

Ile Ile Asn Cys Leu Thr Thr Ile Tyr Asp Arg Leu Glu Gln Glu
1010 1015 1020

His Asn Asn Leu Val Asn Val Pro Leu Cys Val Asp Met Cys Leu
1025 1030 1035

Asn Trp Leu Leu Asn Val Tyr Asp Thr Gly Arg Thr Gly Arg Ile
1040 1045 1050

Arg Val Leu Ser Phe Lys Thr Gly Ile Ile Ser Leu Cys Lys Ala
1055 1060 1065

His Leu Glu Asp Lys Tyr Arg Tyr Leu Phe Lys Gln Val Ala Ser
1070 1075 1080

Ser Thr Gly Phe Cys Asp Gln Arg Arg Leu Gly Leu Leu Leu His
1085 1090 1095

Asp Ser Ile Gln Ile Pro Arg Gln Leu Gly Glu Val Ala Ser Phe
1100 1105 1110

Gly Gly Ser Asn Ile Glu Pro Ser Val Arg Ser Cys Phe Gln Phe
1115 1120 1125

Ala Asn Asn Lys Pro Glu Ile Glu Ala Ala Leu Phe Leu Asp Trp
1130 1135 1140

Met Arg Leu Glu Pro Gln Ser Met Val Trp Leu Pro Val Leu His
1145 1150 1155

Arg Val Ala Ala Ala Glu Thr Ala Lys His Gln Ala Lys Cys Asn
1160 1165 1170

Ile Cys Lys Glu Cys Pro Ile Ile Gly Phe Arg Tyr Arg Ser Leu
1175 1180 1185

Lys His Phe Asn Tyr Asp Ile Cys Gln Ser Cys Phe Phe Ser Gly
1190 1195 1200

Arg Val Ala Lys Gly His Lys Met His Tyr Pro Met Val Glu Tyr
1205 1210 1215

```
Cys Thr  Pro Thr Thr Ser Gly  Glu Asp Val Arg Asp  Phe Ala Lys
    1220                 1225                 1230


Val Leu  Lys Asn Lys Phe Arg  Thr Lys Arg Tyr Phe  Ala Lys His
    1235                 1240                 1245


Pro Arg  Met Gly Tyr Leu Pro  Val Gln Thr Val Leu  Glu Gly Asp
    1250                 1255                 1260


Asn Met  Glu Thr Asp Thr Met
    1265                 1270


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<212>  PRT
<213>  Artificial Sequence

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<223>  µDys7

<400>  5

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            20                  25                  30


Gly Lys Gln His Ile Glu Asn Leu Phe Ser Asp Leu Gln Asp Gly Arg
        35                  40                  45


Arg Leu Leu Asp Leu Leu Glu Gly Leu Thr Gly Gln Lys Leu Pro Lys
    50                  55                  60


Glu Lys Gly Ser Thr Arg Val His Ala Leu Asn Asn Val Asn Lys Ala
65                  70                  75                  80


Leu Arg Val Leu Gln Asn Asn Asn Val Asp Leu Val Asn Ile Gly Ser
                85                  90                  95


Thr Asp Ile Val Asp Gly Asn His Lys Leu Thr Leu Gly Leu Ile Trp
            100                 105                 110


Asn Ile Ile Leu His Trp Gln Val Lys Asn Val Met Lys Asn Ile Met
        115                 120                 125


Ala Gly Leu Gln Gln Thr Asn Ser Glu Lys Ile Leu Leu Ser Trp Val
    130                 135                 140


Arg Gln Ser Thr Arg Asn Tyr Pro Gln Val Asn Val Ile Asn Phe Thr
```

145 150 155 160

Thr Ser Trp Ser Asp Gly Leu Ala Leu Asn Ala Leu Ile His Ser His
165 170 175

Arg Pro Asp Leu Phe Asp Trp Asn Ser Val Val Cys Gln Gln Ser Ala
180 185 190

Thr Gln Arg Leu Glu His Ala Phe Asn Ile Ala Arg Tyr Gln Leu Gly
195 200 205

Ile Glu Lys Leu Leu Asp Pro Glu Asp Val Asp Thr Thr Tyr Pro Asp
210 215 220

Lys Lys Ser Ile Leu Met Tyr Ile Thr Ser Leu Phe Gln Val Leu Pro
225 230 235 240

Gln Gln Val Ser Ile Glu Ala Ile Gln Glu Val Glu Met Leu Pro Arg
245 250 255

Pro Pro Lys Val Thr Lys Glu Glu His Phe Gln Leu His His Gln Met
260 265 270

His Tyr Ser Gln Gln Ile Thr Val Ser Leu Ala Gln Gly Tyr Glu Arg
275 280 285

Thr Ser Ser Pro Lys Pro Arg Phe Lys Ser Tyr Ala Tyr Thr Gln Ala
290 295 300

Ala Tyr Val Thr Thr Ser Asp Pro Thr Arg Ser Pro Phe Pro Ser Gln
305 310 315 320

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

Ser Glu Val Asn Leu Asp Arg Tyr Gln Thr Ala Leu Glu Glu Val Leu
340 345 350

Ser Trp Leu Leu Ser Ala Glu Asp Thr Leu Gln Ala Gln Gly Glu Ile
355 360 365

Ser Asn Asp Val Glu Val Val Lys Asp Gln Phe His Thr His Glu Gly
370 375 380

Tyr Met Met Asp Leu Thr Ala His Gln Gly Arg Val Gly Asn Ile Leu
385 390 395 400

```
Gln Leu Gly Ser Lys Leu Ile Gly Thr Gly Lys Leu Ser Glu Asp Glu
                405                 410                 415

Glu Thr Glu Val Gln Glu Gln Met Asn Leu Leu Asn Ser Arg Trp Glu
            420                 425                 430

Cys Leu Arg Val Ala Ser Met Glu Lys Gln Ser Asn Leu His Arg Val
        435                 440                 445

Leu Met Asp Leu Gln Asn Gln Lys Leu Lys Glu Leu Asn Asp Trp Leu
    450                 455                 460

Thr Lys Thr Glu Glu Arg Thr Arg Lys Met Glu Glu Glu Pro Leu Gly
465                 470                 475                 480

Pro Asp Leu Glu Asp Leu Lys Arg Gln Val Gln Gln His Lys Val Leu
                485                 490                 495

Gln Glu Asp Leu Glu Gln Glu Gln Val Arg Val Asn Ser Leu Thr His
            500                 505                 510

Met Val Val Val Val Asp Glu Ser Ser Gly Asp His Ala Thr Ala Ala
        515                 520                 525

Leu Glu Glu Gln Leu Lys Val Leu Gly Asp Arg Trp Ala Asn Ile Cys
    530                 535                 540

Arg Trp Thr Glu Asp Arg Trp Val Leu Leu Gln Asp Ile Leu Leu Lys
545                 550                 555                 560

Trp Gln Arg Leu Thr Glu Glu Gln Cys Leu Phe Ser Ala Trp Leu Ser
                565                 570                 575

Glu Lys Glu Asp Ala Val Asn Lys Ile His Thr Thr Gly Phe Lys Asp
            580                 585                 590

Gln Asn Glu Met Leu Ser Ser Leu Gln Lys Leu Ala Val Leu Lys Ala
        595                 600                 605

Asp Leu Glu Lys Lys Lys Gln Ser Met Gly Lys Leu Tyr Ser Leu Lys
    610                 615                 620

Gln Asp Leu Leu Ser Thr Leu Lys Asn Lys Ser Val Thr Gln Lys Thr
625                 630                 635                 640

Glu Ala Trp Leu Asp Asn Phe Ala Arg Cys Trp Asp Asn Leu Val Gln
                645                 650                 655
```

```
Lys Leu Glu Lys Ser Thr Ala Gln Ile Ser Gln Ala Ala Pro Gly Leu
            660                 665                 670

Thr Thr Ile Gly Ala Ser Pro Thr Gln Thr Val Thr Leu Val Thr Gln
        675                 680                 685

Pro Val Val Thr Lys Glu Thr Ala Ile Ser Lys Leu Glu Met Pro Ser
    690                 695                 700

Ser Leu Met Leu Glu Ser Tyr Val Pro Ser Thr Tyr Leu Thr Glu Ile
705                 710                 715                 720

Thr His Val Ser Gln Ala Leu Leu Glu Val Glu Gln Leu Leu Asn Ala
                725                 730                 735

Pro Asp Leu Cys Ala Lys Asp Phe Glu Asp Leu Phe Lys Gln Glu Glu
            740                 745                 750

Ser Leu Lys Asn Ile Lys Asp Ser Leu Gln Gln Ser Ser Gly Arg Ile
        755                 760                 765

Asp Ile Ile His Ser Lys Lys Thr Ala Ala Leu Gln Ser Ala Thr Pro
    770                 775                 780

Val Glu Arg Val Lys Leu Gln Glu Ala Leu Ser Gln Leu Asp Phe Gln
785                 790                 795                 800

Trp Glu Lys Val Asn Lys Met Tyr Lys Asp Arg Gln Gly Arg Phe Asp
                805                 810                 815

Arg Ser Val Glu Lys Trp Arg Arg Phe His Tyr Asp Ile Lys Ile Phe
            820                 825                 830

Asn Gln Trp Leu Thr Glu Ala Glu Gln Phe Leu Arg Lys Thr Gln Ile
        835                 840                 845

Pro Glu Asn Trp Glu His Ala Lys Tyr Lys Trp Tyr Leu Lys Glu Leu
    850                 855                 860

Gln Asp Gly Ile Gly Gln Arg Gln Thr Val Val Arg Thr Leu Asn Ala
865                 870                 875                 880

Thr Gly Glu Glu Ile Ile Gln Gln Ser Ser Lys Thr Asp Ala Ser Ile
                885                 890                 895

Leu Gln Glu Lys Leu Gly Ser Leu Asn Leu Arg Trp Gln Glu Val Cys
            900                 905                 910
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Lys Gln Leu Ser Asp Arg Lys Lys Arg Leu Glu Glu Gln Leu Glu Arg
        915                 920                 925

Leu Gln Glu Leu Gln Glu Ala Thr Asp Glu Leu Asp Leu Lys Leu Arg
    930                 935                 940

Gln Ala Glu Val Ile Lys Gly Ser Trp Gln Pro Val Gly Asp Leu Leu
945                 950                 955                 960

Ile Asp Ser Leu Gln Asp His Leu Glu Lys Val Lys Ala Leu Arg Gly
                965                 970                 975

Glu Ile Ala Pro Leu Lys Glu Asn Val Ser His Val Asn Asp Leu Ala
            980                 985                 990

Arg Gln Leu Thr Thr Leu Gly Ile  Gln Leu Ser Pro Tyr  Asn Leu Ser
        995                 1000                1005

Thr Leu  Glu Asp Leu Asn Thr  Arg Trp Lys Leu Leu  Gln Val Ala
    1010                1015                1020

Val Glu  Asp Arg Val Arg Gln  Leu His Glu Ala His  Arg Asp Phe
    1025                1030                1035

Gly Pro  Ala Ser Gln His Phe  Leu Ser Thr Ser Val  Gln Gly Pro
    1040                1045                1050

Trp Glu  Arg Ala Ile Ser Pro  Asn Lys Val Pro Tyr  Tyr Ile Asn
    1055                1060                1065

His Glu  Thr Gln Thr Thr Cys  Trp Asp His Pro Lys  Met Thr Glu
    1070                1075                1080

Leu Tyr  Gln Ser Leu Ala Asp  Leu Asn Asn Val Arg  Phe Ser Ala
    1085                1090                1095

Tyr Arg  Thr Ala Met Lys Leu  Arg Arg Leu Gln Lys  Ala Leu Cys
    1100                1105                1110

Leu Asp  Leu Leu Ser Leu Ser  Ala Ala Cys Asp Ala  Leu Asp Gln
    1115                1120                1125

His Asn  Leu Lys Gln Asn Asp  Gln Pro Met Asp Ile  Leu Gln Ile
    1130                1135                1140

Ile Asn  Cys Leu Thr Thr Ile  Tyr Asp Arg Leu Glu  Gln Glu His
```

```
1145                1150                1155

Asn Asn Leu Val Asn Val Pro Leu Cys Val Asp Met Cys Leu Asn
1160                1165                1170

Trp Leu Leu Asn Val Tyr Asp Thr Gly Arg Thr Gly Arg Ile Arg
1175                1180                1185

Val Leu Ser Phe Lys Thr Gly Ile Ile Ser Leu Cys Lys Ala His
1190                1195                1200

Leu Glu Asp Lys Tyr Arg Tyr Leu Phe Lys Gln Val Ala Ser Ser
1205                1210                1215

Thr Gly Phe Cys Asp Gln Arg Arg Leu Gly Leu Leu Leu His Asp
1220                1225                1230

Ser Ile Gln Ile Pro Arg Gln Leu Gly Glu Val Ala Ser Phe Gly
1235                1240                1245

Gly Ser Asn Ile Glu Pro Ser Val Arg Ser Cys Phe Gln Phe Ala
1250                1255                1260

Asn Asn Lys Pro Glu Ile Glu Ala Ala Leu Phe Leu Asp Trp Met
1265                1270                1275

Arg Leu Glu Pro Gln Ser Met Val Trp Leu Pro Val Leu His Arg
1280                1285                1290

Val Ala Ala Ala Glu Thr Ala Lys His Gln Ala Lys Cys Asn Ile
1295                1300                1305

Cys Lys Glu Cys Pro Ile Ile Gly Phe Arg Tyr Arg Ser Leu Lys
1310                1315                1320

His Phe Asn Tyr Asp Ile Cys Gln Ser Cys Phe Phe Ser Gly Arg
1325                1330                1335

Val Ala Lys Gly His Lys Met His Tyr Pro Met Val Glu Tyr Cys
1340                1345                1350

Thr Pro Thr Thr Ser Gly Glu Asp Val Arg Asp Phe Ala Lys Val
1355                1360                1365

Leu Lys Asn Lys Phe Arg Thr Lys Arg Tyr Phe Ala Lys His Pro
1370                1375                1380
```

```
Arg Met  Gly Tyr Leu Pro Val  Gln Thr Val Leu Glu  Gly Asp Asn
    1385                1390                1395


Met Glu  Thr Asp Thr Met
    1400


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

<220>
<223>  µDys1

<400>  6

Met Leu Trp Trp Glu Glu Val Glu Asp Cys Tyr Glu Arg Glu Asp Val
1               5                  10                  15


Gln Lys Lys Thr Phe Thr Lys Trp Val Asn Ala Gln Phe Ser Lys Phe
            20                  25                  30


Gly Lys Gln His Ile Glu Asn Leu Phe Ser Asp Leu Gln Asp Gly Arg
        35                  40                  45


Arg Leu Leu Asp Leu Leu Glu Gly Leu Thr Gly Gln Lys Leu Pro Lys
    50                  55                  60


Glu Lys Gly Ser Thr Arg Val His Ala Leu Asn Asn Val Asn Lys Ala
65                  70                  75                  80


Leu Arg Val Leu Gln Asn Asn Asn Val Asp Leu Val Asn Ile Gly Ser
                85                  90                  95


Thr Asp Ile Val Asp Gly Asn His Lys Leu Thr Leu Gly Leu Ile Trp
            100                 105                 110


Asn Ile Ile Leu His Trp Gln Val Lys Asn Val Met Lys Asn Ile Met
        115                 120                 125


Ala Gly Leu Gln Gln Thr Asn Ser Glu Lys Ile Leu Leu Ser Trp Val
    130                 135                 140


Arg Gln Ser Thr Arg Asn Tyr Pro Gln Val Asn Val Ile Asn Phe Thr
145                 150                 155                 160


Thr Ser Trp Ser Asp Gly Leu Ala Leu Asn Ala Leu Ile His Ser His
                165                 170                 175


Arg Pro Asp Leu Phe Asp Trp Asn Ser Val Val Cys Gln Gln Ser Ala
```

```
            180                 185                 190

Thr Gln Arg Leu Glu His Ala Phe Asn Ile Ala Arg Tyr Gln Leu Gly
        195                 200                 205

Ile Glu Lys Leu Leu Asp Pro Glu Asp Val Asp Thr Thr Tyr Pro Asp
    210                 215                 220

Lys Lys Ser Ile Leu Met Tyr Ile Thr Ser Leu Phe Gln Val Leu Pro
225                 230                 235                 240

Gln Gln Val Ser Ile Glu Ala Ile Gln Glu Val Glu Met Leu Pro Arg
                245                 250                 255

Pro Pro Lys Val Thr Lys Glu Glu His Phe Gln Leu His His Gln Met
            260                 265                 270

His Tyr Ser Gln Gln Ile Thr Val Ser Leu Ala Gln Gly Tyr Glu Arg
        275                 280                 285

Thr Ser Ser Pro Lys Pro Arg Phe Lys Ser Tyr Ala Tyr Thr Gln Ala
    290                 295                 300

Ala Tyr Val Thr Thr Ser Asp Pro Thr Arg Ser Pro Phe Pro Ser Gln
305                 310                 315                 320

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

Ser Glu Val Asn Leu Asp Arg Tyr Gln Thr Ala Leu Glu Glu Val Leu
            340                 345                 350

Ser Trp Leu Leu Ser Ala Glu Asp Thr Leu Gln Ala Gln Gly Glu Ile
        355                 360                 365

Ser Asn Asp Val Glu Val Val Lys Asp Gln Phe His Thr His Glu Gly
    370                 375                 380

Tyr Met Met Asp Leu Thr Ala His Gln Gly Arg Val Gly Asn Ile Leu
385                 390                 395                 400

Gln Leu Gly Ser Lys Leu Ile Gly Thr Gly Lys Leu Ser Glu Asp Glu
                405                 410                 415

Glu Thr Glu Val Gln Glu Gln Met Asn Leu Leu Asn Ser Arg Trp Glu
            420                 425                 430
```

```
Cys Leu Arg Val Ala Ser Met Glu Lys Gln Ser Asn Leu His Arg Val
        435                 440                 445

Leu Met Asp Leu Gln Asn Gln Lys Leu Lys Glu Leu Asn Asp Trp Leu
    450                 455                 460

Thr Lys Thr Glu Glu Arg Thr Arg Lys Met Glu Glu Glu Pro Leu Gly
465                 470                 475                 480

Pro Asp Leu Glu Asp Leu Lys Arg Gln Val Gln Gln His Lys Val Leu
                485                 490                 495

Gln Glu Asp Leu Glu Gln Glu Gln Val Arg Val Asn Ser Leu Thr His
            500                 505                 510

Met Val Val Val Val Asp Glu Ser Ser Gly Asp His Ala Thr Ala Ala
        515                 520                 525

Leu Glu Glu Gln Leu Lys Val Leu Gly Asp Arg Trp Ala Asn Ile Cys
    530                 535                 540

Arg Trp Thr Glu Asp Arg Trp Val Leu Leu Gln Asp Ile Leu Leu Lys
545                 550                 555                 560

Trp Gln Arg Leu Thr Glu Glu Gln Cys Leu Phe Ser Ala Trp Leu Ser
                565                 570                 575

Glu Lys Glu Asp Ala Val Asn Lys Ile His Thr Thr Gly Phe Lys Asp
            580                 585                 590

Gln Asn Glu Met Leu Ser Ser Leu Gln Lys Leu Ala Val Leu Lys Ala
        595                 600                 605

Asp Leu Glu Lys Lys Lys Gln Ser Met Gly Lys Leu Tyr Ser Leu Lys
    610                 615                 620

Gln Asp Leu Leu Ser Thr Leu Lys Asn Lys Ser Val Thr Gln Lys Thr
625                 630                 635                 640

Glu Ala Trp Leu Asp Asn Phe Ala Arg Cys Trp Asp Asn Leu Val Gln
                645                 650                 655

Lys Leu Glu Lys Ser Thr Ala Gln Ile Ser Gln Ala Glu Leu Pro Pro
            660                 665                 670

Glu Glu Arg Ala Gln Asn Val Thr Arg Leu Leu Arg Lys Gln Ala Glu
        675                 680                 685
```

```
Glu Val Asn Thr Glu Trp Glu Lys Leu Asn Leu His Ser Ala Asp Trp
    690                 695                 700

Gln Arg Lys Ile Asp Glu Thr Leu Glu Arg Leu Gln Glu Leu Gln Glu
705                 710                 715                 720

Ala Thr Asp Glu Leu Asp Leu Lys Leu Arg Gln Ala Glu Val Ile Lys
                725                 730                 735

Gly Ser Trp Gln Pro Val Gly Asp Leu Leu Ile Asp Ser Leu Gln Asp
            740                 745                 750

His Leu Glu Lys Val Lys Ala Leu Arg Gly Glu Ile Ala Pro Leu Lys
        755                 760                 765

Glu Asn Val Ser His Val Asn Asp Leu Ala Arg Gln Leu Thr Thr Leu
    770                 775                 780

Gly Ile Gln Leu Ser Pro Tyr Asn Leu Ser Thr Leu Glu Asp Leu Asn
785                 790                 795                 800

Thr Arg Trp Lys Leu Leu Gln Val Ala Val Glu Asp Arg Val Arg Gln
                805                 810                 815

Leu His Glu Ala His Arg Asp Phe Gly Pro Ala Ser Gln His Phe Leu
            820                 825                 830

Ser Thr Ser Val Gln Gly Pro Trp Glu Arg Ala Ile Ser Pro Asn Lys
        835                 840                 845

Val Pro Tyr Tyr Ile Asn His Glu Thr Gln Thr Thr Cys Trp Asp His
    850                 855                 860

Pro Lys Met Thr Glu Leu Tyr Gln Ser Leu Ala Asp Leu Asn Asn Val
865                 870                 875                 880

Arg Phe Ser Ala Tyr Arg Thr Ala Met Lys Leu Arg Arg Leu Gln Lys
                885                 890                 895

Ala Leu Cys Leu Asp Leu Leu Ser Leu Ser Ala Ala Cys Asp Ala Leu
            900                 905                 910

Asp Gln His Asn Leu Lys Gln Asn Asp Gln Pro Met Asp Ile Leu Gln
        915                 920                 925

Ile Ile Asn Cys Leu Thr Thr Ile Tyr Asp Arg Leu Glu Gln Glu His
    930                 935                 940
```

```
Asn Asn Leu Val Asn Val Pro Leu Cys Val Asp Met Cys Leu Asn Trp
945                 950                 955                 960

Leu Leu Asn Val Tyr Asp Thr Gly Arg Thr Gly Arg Ile Arg Val Leu
                965                 970                 975

Ser Phe Lys Thr Gly Ile Ile Ser Leu Cys Lys Ala His Leu Glu Asp
            980                 985                 990

Lys Tyr Arg Tyr Leu Phe Lys Gln  Val Ala Ser Ser Thr  Gly Phe Cys
        995                 1000                1005

Asp Gln  Arg Arg Leu Gly Leu  Leu Leu His Asp Ser  Ile Gln Ile
    1010                1015                1020

Pro Arg  Gln Leu Gly Glu Val  Ala Ser Phe Gly Gly  Ser Asn Ile
    1025                1030                1035

Glu Pro  Ser Val Arg Ser Cys  Phe Gln Phe Ala Asn  Asn Lys Pro
    1040                1045                1050

Glu Ile  Glu Ala Ala Leu Phe  Leu Asp Trp Met Arg  Leu Glu Pro
    1055                1060                1065

Gln Ser  Met Val Trp Leu Pro  Val Leu His Arg Val  Ala Ala Ala
    1070                1075                1080

Glu Thr  Ala Lys His Gln Ala  Lys Cys Asn Ile Cys  Lys Glu Cys
    1085                1090                1095

Pro Ile  Ile Gly Phe Arg Tyr  Arg Ser Leu Lys His  Phe Asn Tyr
    1100                1105                1110

Asp Ile  Cys Gln Ser Cys Phe  Phe Ser Gly Arg Val  Ala Lys Gly
    1115                1120                1125

His Lys  Met His Tyr Pro Met  Val Glu Tyr Cys Thr  Pro Thr Thr
    1130                1135                1140

Ser Gly  Glu Asp Val Arg Asp  Phe Ala Lys Val Leu  Lys Asn Lys
    1145                1150                1155

Phe Arg  Thr Lys Arg Tyr Phe  Ala Lys His Pro Arg  Met Gly Tyr
    1160                1165                1170

Leu Pro  Val Gln Thr Val Leu  Glu Gly Asp Asn Met  Glu Thr Asp
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1175 1180 1185

Thr Met
1190

<210> 7
<211> 1184
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<213> Artificial Sequence

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<400> 7

Met Leu Trp Trp Glu Glu Val Glu Asp Cys Tyr Glu Arg Glu Asp Val
1 5 10 15

Gln Lys Lys Thr Phe Thr Lys Trp Val Asn Ala Gln Phe Ser Lys Phe
20 25 30

Gly Lys Gln His Ile Glu Asn Leu Phe Ser Asp Leu Gln Asp Gly Arg
35 40 45

Arg Leu Leu Asp Leu Leu Glu Gly Leu Thr Gly Gln Lys Leu Pro Lys
50 55 60

Glu Lys Gly Ser Thr Arg Val His Ala Leu Asn Asn Val Asn Lys Ala
65 70 75 80

Leu Arg Val Leu Gln Asn Asn Asn Val Asp Leu Val Asn Ile Gly Ser
85 90 95

Thr Asp Ile Val Asp Gly Asn His Lys Leu Thr Leu Gly Leu Ile Trp
100 105 110

Asn Ile Ile Leu His Trp Gln Val Lys Asn Val Met Lys Asn Ile Met
115 120 125

Ala Gly Leu Gln Gln Thr Asn Ser Glu Lys Ile Leu Leu Ser Trp Val
130 135 140

Arg Gln Ser Thr Arg Asn Tyr Pro Gln Val Asn Val Ile Asn Phe Thr
145 150 155 160

Thr Ser Trp Ser Asp Gly Leu Ala Leu Asn Ala Leu Ile His Ser His
165 170 175

Arg Pro Asp Leu Phe Asp Trp Asn Ser Val Val Cys Gln Gln Ser Ala
180 185 190

```
Thr Gln Arg Leu Glu His Ala Phe Asn Ile Ala Arg Tyr Gln Leu Gly
        195                 200                 205

Ile Glu Lys Leu Leu Asp Pro Glu Asp Val Asp Thr Thr Tyr Pro Asp
    210                 215                 220

Lys Lys Ser Ile Leu Met Tyr Ile Thr Ser Leu Phe Gln Val Leu Pro
225                 230                 235                 240

Gln Gln Val Ser Ile Glu Ala Ile Gln Glu Val Glu Met Leu Pro Arg
                245                 250                 255

Pro Pro Lys Val Thr Lys Glu Glu His Phe Gln Leu His His Gln Met
            260                 265                 270

His Tyr Ser Gln Gln Ile Thr Val Ser Leu Ala Gln Gly Tyr Glu Arg
        275                 280                 285

Thr Ser Ser Pro Lys Pro Arg Phe Lys Ser Tyr Ala Tyr Thr Gln Ala
    290                 295                 300

Ala Tyr Val Thr Thr Ser Asp Pro Thr Arg Ser Pro Phe Pro Ser Gln
305                 310                 315                 320

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

Ser Glu Val Asn Leu Asp Arg Tyr Gln Thr Ala Leu Glu Glu Val Leu
            340                 345                 350

Ser Trp Leu Leu Ser Ala Glu Asp Thr Leu Gln Ala Gln Gly Glu Ile
        355                 360                 365

Ser Asn Asp Val Glu Val Val Lys Asp Gln Phe His Thr His Glu Gly
    370                 375                 380

Tyr Met Met Asp Leu Thr Ala His Gln Gly Arg Val Gly Asn Ile Leu
385                 390                 395                 400

Gln Leu Gly Ser Lys Leu Ile Gly Thr Gly Lys Leu Ser Glu Asp Glu
                405                 410                 415

Glu Thr Glu Val Gln Glu Gln Met Asn Leu Leu Asn Ser Arg Trp Glu
            420                 425                 430

Cys Leu Arg Val Ala Ser Met Glu Lys Gln Ser Asn Leu His Ser Tyr
```

```
        435                 440                 445

Val Pro Ser Thr Tyr Leu Thr Glu Ile Thr His Val Ser Gln Ala Leu
    450                 455                 460

Leu Glu Val Glu Gln Leu Leu Asn Ala Pro Asp Leu Cys Ala Lys Asp
465                 470                 475                 480

Phe Glu Asp Leu Phe Lys Gln Glu Glu Ser Leu Lys Asn Ile Lys Asp
                485                 490                 495

Ser Leu Gln Gln Ser Ser Gly Arg Ile Asp Ile Ile His Ser Lys Lys
            500                 505                 510

Thr Ala Ala Leu Gln Ser Ala Thr Pro Val Glu Arg Val Lys Leu Gln
        515                 520                 525

Glu Ala Leu Ser Gln Leu Asp Phe Gln Trp Glu Lys Val Asn Lys Met
    530                 535                 540

Tyr Lys Asp Arg Gln Gly Arg Phe Asp Arg Ser Val Glu Lys Trp Arg
545                 550                 555                 560

Arg Phe His Tyr Asp Ile Lys Ile Phe Asn Gln Trp Leu Thr Glu Ala
                565                 570                 575

Glu Gln Phe Leu Arg Lys Thr Gln Ile Pro Glu Asn Trp Glu His Ala
            580                 585                 590

Lys Tyr Lys Trp Tyr Leu Lys Glu Leu Gln Asp Gly Ile Gly Gln Arg
        595                 600                 605

Gln Thr Val Val Arg Thr Leu Asn Ala Thr Gly Glu Glu Ile Ile Gln
    610                 615                 620

Gln Ser Ser Lys Thr Asp Ala Ser Ile Leu Gln Glu Lys Leu Gly Ser
625                 630                 635                 640

Leu Asn Leu Arg Trp Gln Glu Val Cys Lys Gln Leu Ser Asp Arg Lys
                645                 650                 655

Lys Arg Leu Glu Glu Gln Glu Leu Pro Pro Glu Glu Arg Ala Gln Asn
            660                 665                 670

Val Thr Arg Leu Leu Arg Lys Gln Ala Glu Glu Val Asn Thr Glu Trp
        675                 680                 685
```

```
Glu Lys Leu Asn Leu His Ser Ala Asp Trp Gln Arg Lys Ile Asp Glu
    690                 695                 700

Thr Leu Glu Arg Leu Gln Glu Leu Gln Glu Ala Thr Asp Glu Leu Asp
705                 710                 715                 720

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

Gly Asp Leu Leu Ile Asp Ser Leu Gln Asp His Leu Glu Lys Val Lys
            740                 745                 750

Ala Leu Arg Gly Glu Ile Ala Pro Leu Lys Glu Asn Val Ser His Val
        755                 760                 765

Asn Asp Leu Ala Arg Gln Leu Thr Thr Leu Gly Ile Gln Leu Ser Pro
    770                 775                 780

Tyr Asn Leu Ser Thr Leu Glu Asp Leu Asn Thr Arg Trp Lys Leu Leu
785                 790                 795                 800

Gln Val Ala Val Glu Asp Arg Val Arg Gln Leu His Glu Ala His Arg
                805                 810                 815

Asp Phe Gly Pro Ala Ser Gln His Phe Leu Ser Thr Ser Val Gln Gly
            820                 825                 830

Pro Trp Glu Arg Ala Ile Ser Pro Asn Lys Val Pro Tyr Tyr Ile Asn
        835                 840                 845

His Glu Thr Gln Thr Thr Cys Trp Asp His Pro Lys Met Thr Glu Leu
    850                 855                 860

Tyr Gln Ser Leu Ala Asp Leu Asn Asn Val Arg Phe Ser Ala Tyr Arg
865                 870                 875                 880

Thr Ala Met Lys Leu Arg Arg Leu Gln Lys Ala Leu Cys Leu Asp Leu
                885                 890                 895

Leu Ser Leu Ser Ala Ala Cys Asp Ala Leu Asp Gln His Asn Leu Lys
            900                 905                 910

Gln Asn Asp Gln Pro Met Asp Ile Leu Gln Ile Ile Asn Cys Leu Thr
        915                 920                 925

Thr Ile Tyr Asp Arg Leu Glu Gln Glu His Asn Asn Leu Val Asn Val
    930                 935                 940
```

```
Pro Leu Cys Val Asp Met Cys Leu Asn Trp Leu Leu Asn Val Tyr Asp
945                 950                 955                 960

Thr Gly Arg Thr Gly Arg Ile Arg Val Leu Ser Phe Lys Thr Gly Ile
                965                 970                 975

Ile Ser Leu Cys Lys Ala His Leu Glu Asp Lys Tyr Arg Tyr Leu Phe
            980                 985                 990

Lys Gln Val Ala Ser Ser Thr Gly  Phe Cys Asp Gln Arg  Arg Leu Gly
        995                 1000                1005

Leu Leu  Leu His Asp Ser Ile  Gln Ile Pro Arg Gln  Leu Gly Glu
    1010                1015                1020

Val Ala  Ser Phe Gly Gly Ser  Asn Ile Glu Pro Ser  Val Arg Ser
    1025                1030                1035

Cys Phe  Gln Phe Ala Asn Asn  Lys Pro Glu Ile Glu  Ala Ala Leu
    1040                1045                1050

Phe Leu  Asp Trp Met Arg Leu  Glu Pro Gln Ser Met  Val Trp Leu
    1055                1060                1065

Pro Val  Leu His Arg Val Ala  Ala Ala Glu Thr Ala  Lys His Gln
    1070                1075                1080

Ala Lys  Cys Asn Ile Cys Lys  Glu Cys Pro Ile Ile  Gly Phe Arg
    1085                1090                1095

Tyr Arg  Ser Leu Lys His Phe  Asn Tyr Asp Ile Cys  Gln Ser Cys
    1100                1105                1110

Phe Phe  Ser Gly Arg Val Ala  Lys Gly His Lys Met  His Tyr Pro
    1115                1120                1125

Met Val  Glu Tyr Cys Thr Pro  Thr Thr Ser Gly Glu  Asp Val Arg
    1130                1135                1140

Asp Phe  Ala Lys Val Leu Lys  Asn Lys Phe Arg Thr  Lys Arg Tyr
    1145                1150                1155

Phe Ala  Lys His Pro Arg Met  Gly Tyr Leu Pro Val  Gln Thr Val
    1160                1165                1170

Leu Glu  Gly Asp Asn Met Glu  Thr Asp Thr Met
    1175                1180
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<210> 8
<211> 1188
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<213> Artificial Sequence

<220>
<223> µDys3

<400> 8

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Met Leu Trp Trp Glu Glu Val Glu Asp Cys Tyr Glu Arg Glu Asp Val
1               5                  10                  15

Gln Lys Lys Thr Phe Thr Lys Trp Val Asn Ala Gln Phe Ser Lys Phe
            20                  25                  30

Gly Lys Gln His Ile Glu Asn Leu Phe Ser Asp Leu Gln Asp Gly Arg
        35                  40                  45

Arg Leu Leu Asp Leu Leu Glu Gly Leu Thr Gly Gln Lys Leu Pro Lys
    50                  55                  60

Glu Lys Gly Ser Thr Arg Val His Ala Leu Asn Asn Val Asn Lys Ala
65                  70                  75                  80

Leu Arg Val Leu Gln Asn Asn Asn Val Asp Leu Val Asn Ile Gly Ser
                85                  90                  95

Thr Asp Ile Val Asp Gly Asn His Lys Leu Thr Leu Gly Leu Ile Trp
            100                 105                 110

Asn Ile Ile Leu His Trp Gln Val Lys Asn Val Met Lys Asn Ile Met
        115                 120                 125

Ala Gly Leu Gln Gln Thr Asn Ser Glu Lys Ile Leu Leu Ser Trp Val
    130                 135                 140

Arg Gln Ser Thr Arg Asn Tyr Pro Gln Val Asn Val Ile Asn Phe Thr
145                 150                 155                 160

Thr Ser Trp Ser Asp Gly Leu Ala Leu Asn Ala Leu Ile His Ser His
                165                 170                 175

Arg Pro Asp Leu Phe Asp Trp Asn Ser Val Val Cys Gln Gln Ser Ala
            180                 185                 190

Thr Gln Arg Leu Glu His Ala Phe Asn Ile Ala Arg Tyr Gln Leu Gly
        195                 200                 205
```

```
Ile Glu Lys Leu Leu Asp Pro Glu Asp Val Asp Thr Thr Tyr Pro Asp
    210                 215                 220

Lys Lys Ser Ile Leu Met Tyr Ile Thr Ser Leu Phe Gln Val Leu Pro
225                 230                 235                 240

Gln Gln Val Ser Ile Glu Ala Ile Gln Glu Val Glu Met Leu Pro Arg
                245                 250                 255

Pro Pro Lys Val Thr Lys Glu Glu His Phe Gln Leu His His Gln Met
            260                 265                 270

His Tyr Ser Gln Gln Ile Thr Val Ser Leu Ala Gln Gly Tyr Glu Arg
        275                 280                 285

Thr Ser Ser Pro Lys Pro Arg Phe Lys Ser Tyr Ala Tyr Thr Gln Ala
    290                 295                 300

Ala Tyr Val Thr Thr Ser Asp Pro Thr Arg Ser Pro Phe Pro Ser Gln
305                 310                 315                 320

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

Ser Glu Val Asn Leu Asp Arg Tyr Gln Thr Ala Leu Glu Glu Val Leu
            340                 345                 350

Ser Trp Leu Leu Ser Ala Glu Asp Thr Leu Gln Ala Gln Gly Glu Ile
        355                 360                 365

Ser Asn Asp Val Glu Val Val Lys Asp Gln Phe His Thr His Glu Gly
    370                 375                 380

Tyr Met Met Asp Leu Thr Ala His Gln Gly Arg Val Gly Asn Ile Leu
385                 390                 395                 400

Gln Leu Gly Ser Lys Leu Ile Gly Thr Gly Lys Leu Ser Glu Asp Glu
                405                 410                 415

Glu Thr Glu Val Gln Glu Gln Met Asn Leu Leu Asn Ser Arg Trp Glu
            420                 425                 430

Cys Leu Arg Val Ala Ser Met Glu Lys Gln Ser Asn Leu His Arg Val
        435                 440                 445

Leu Met Asp Leu Gln Asn Gln Lys Leu Lys Glu Leu Asn Asp Trp Leu
    450                 455                 460
```

```
Thr Lys Thr Glu Glu Arg Thr Arg Lys Met Glu Glu Glu Pro Leu Gly
465                 470                 475                 480

Pro Asp Leu Glu Asp Leu Lys Arg Gln Val Gln Gln His Lys Val Leu
                485                 490                 495

Gln Glu Asp Leu Glu Gln Glu Gln Val Arg Val Asn Ser Leu Thr His
            500                 505                 510

Met Val Val Val Val Asp Glu Ser Ser Gly Asp His Ala Thr Ala Ala
        515                 520                 525

Leu Glu Glu Gln Leu Lys Val Leu Gly Asp Arg Trp Ala Asn Ile Cys
    530                 535                 540

Arg Trp Thr Glu Asp Arg Trp Val Leu Leu Gln Asp Ile Leu Leu Lys
545                 550                 555                 560

Trp Gln Arg Leu Thr Glu Glu Gln Cys Leu Phe Ser Ala Trp Leu Ser
                565                 570                 575

Glu Lys Glu Asp Ala Val Asn Lys Ile His Thr Thr Gly Phe Lys Asp
            580                 585                 590

Gln Asn Glu Met Leu Ser Ser Leu Gln Lys Leu Ala Val Leu Lys Ala
        595                 600                 605

Asp Leu Glu Lys Lys Lys Gln Ser Met Gly Lys Leu Tyr Ser Leu Lys
    610                 615                 620

Gln Asp Leu Leu Ser Thr Leu Lys Asn Lys Ser Val Thr Gln Lys Thr
625                 630                 635                 640

Glu Ala Trp Leu Asp Asn Phe Ala Arg Cys Trp Asp Asn Leu Val Gln
                645                 650                 655

Lys Leu Glu Lys Ser Thr Ala Gln Ile Ser Gln Ala Ala Pro Gly Leu
            660                 665                 670

Thr Thr Ile Gly Ala Ser Pro Thr Gln Thr Val Thr Leu Val Thr Gln
        675                 680                 685

Pro Val Val Thr Lys Glu Thr Ala Ile Ser Lys Leu Glu Met Pro Ser
    690                 695                 700

Ser Leu Met Leu Glu Val Pro Ala Leu Ala Asp Phe Asn Arg Ala Trp
```

705 710 715 720

Thr Glu Leu Thr Asp Trp Leu Ser Leu Leu Asp Gln Val Ile Lys Ser
725 730 735

Trp Gln Pro Val Gly Asp Leu Leu Ile Asp Ser Leu Gln Asp His Leu
740 745 750

Glu Lys Val Lys Ala Leu Arg Gly Glu Ile Ala Pro Leu Lys Glu Asn
755 760 765

Val Ser His Val Asn Asp Leu Ala Arg Gln Leu Thr Thr Leu Gly Ile
770 775 780

Gln Leu Ser Pro Tyr Asn Leu Ser Thr Leu Glu Asp Leu Asn Thr Arg
785 790 795 800

Trp Lys Leu Leu Gln Val Ala Val Glu Asp Arg Val Arg Gln Leu His
805 810 815

Glu Ala His Arg Asp Phe Gly Pro Ala Ser Gln His Phe Leu Ser Thr
820 825 830

Ser Val Gln Gly Pro Trp Glu Arg Ala Ile Ser Pro Asn Lys Val Pro
835 840 845

Tyr Tyr Ile Asn His Glu Thr Gln Thr Thr Cys Trp Asp His Pro Lys
850 855 860

Met Thr Glu Leu Tyr Gln Ser Leu Ala Asp Leu Asn Asn Val Arg Phe
865 870 875 880

Ser Ala Tyr Arg Thr Ala Met Lys Leu Arg Arg Leu Gln Lys Ala Leu
885 890 895

Cys Leu Asp Leu Leu Ser Leu Ser Ala Ala Cys Asp Ala Leu Asp Gln
900 905 910

His Asn Leu Lys Gln Asn Asp Gln Pro Met Asp Ile Leu Gln Ile Ile
915 920 925

Asn Cys Leu Thr Thr Ile Tyr Asp Arg Leu Glu Gln Glu His Asn Asn
930 935 940

Leu Val Asn Val Pro Leu Cys Val Asp Met Cys Leu Asn Trp Leu Leu
945 950 955 960

```
Asn Val Tyr Asp Thr Gly Arg Thr Gly Arg Ile Arg Val Leu Ser Phe
                965                 970                 975

Lys Thr Gly Ile Ile Ser Leu Cys Lys Ala His Leu Glu Asp Lys Tyr
            980                 985                 990

Arg Tyr Leu Phe Lys Gln Val Ala  Ser Ser Thr Gly Phe  Cys Asp Gln
        995                 1000                1005

Arg Arg  Leu Gly Leu Leu Leu  His Asp Ser Ile Gln  Ile Pro Arg
    1010                1015                1020

Gln Leu  Gly Glu Val Ala Ser  Phe Gly Gly Ser Asn  Ile Glu Pro
    1025                1030                1035

Ser Val  Arg Ser Cys Phe Gln  Phe Ala Asn Asn Lys  Pro Glu Ile
    1040                1045                1050

Glu Ala  Ala Leu Phe Leu Asp  Trp Met Arg Leu Glu  Pro Gln Ser
    1055                1060                1065

Met Val  Trp Leu Pro Val Leu  His Arg Val Ala Ala  Ala Glu Thr
    1070                1075                1080

Ala Lys  His Gln Ala Lys Cys  Asn Ile Cys Lys Glu  Cys Pro Ile
    1085                1090                1095

Ile Gly  Phe Arg Tyr Arg Ser  Leu Lys His Phe Asn  Tyr Asp Ile
    1100                1105                1110

Cys Gln  Ser Cys Phe Phe Ser  Gly Arg Val Ala Lys  Gly His Lys
    1115                1120                1125

Met His  Tyr Pro Met Val Glu  Tyr Cys Thr Pro Thr  Thr Ser Gly
    1130                1135                1140

Glu Asp  Val Arg Asp Phe Ala  Lys Val Leu Lys Asn  Lys Phe Arg
    1145                1150                1155

Thr Lys  Arg Tyr Phe Ala Lys  His Pro Arg Met Gly  Tyr Leu Pro
    1160                1165                1170

Val Gln  Thr Val Leu Glu Gly  Asp Asn Met Glu Thr  Asp Thr Met
    1175                1180                1185


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Gln Lys Lys Thr Phe Thr Lys Trp Val Asn Ala Gln Phe Ser Lys Phe
            20                  25                  30

Gly Lys Gln His Ile Glu Asn Leu Phe Ser Asp Leu Gln Asp Gly Arg
        35                  40                  45

Arg Leu Leu Asp Leu Leu Glu Gly Leu Thr Gly Gln Lys Leu Pro Lys
    50                  55                  60

Glu Lys Gly Ser Thr Arg Val His Ala Leu Asn Asn Val Asn Lys Ala
65                  70                  75                  80

Leu Arg Val Leu Gln Asn Asn Asn Val Asp Leu Val Asn Ile Gly Ser
                85                  90                  95

Thr Asp Ile Val Asp Gly Asn His Lys Leu Thr Leu Gly Leu Ile Trp
            100                 105                 110

Asn Ile Ile Leu His Trp Gln Val Lys Asn Val Met Lys Asn Ile Met
        115                 120                 125

Ala Gly Leu Gln Gln Thr Asn Ser Glu Lys Ile Leu Leu Ser Trp Val
    130                 135                 140

Arg Gln Ser Thr Arg Asn Tyr Pro Gln Val Asn Val Ile Asn Phe Thr
145                 150                 155                 160

Thr Ser Trp Ser Asp Gly Leu Ala Leu Asn Ala Leu Ile His Ser His
                165                 170                 175

Arg Pro Asp Leu Phe Asp Trp Asn Ser Val Val Cys Gln Gln Ser Ala
            180                 185                 190

Thr Gln Arg Leu Glu His Ala Phe Asn Ile Ala Arg Tyr Gln Leu Gly
        195                 200                 205

Ile Glu Lys Leu Leu Asp Pro Glu Asp Val Asp Thr Thr Tyr Pro Asp
    210                 215                 220
```

```
Lys Lys Ser Ile Leu Met Tyr Ile Thr Ser Leu Phe Gln Val Leu Pro
225                 230                 235                 240

Gln Gln Val Ser Ile Glu Ala Ile Gln Glu Val Glu Met Leu Pro Arg
                245                 250                 255

Pro Pro Lys Val Thr Lys Glu Glu His Phe Gln Leu His His Gln Met
            260                 265                 270

His Tyr Ser Gln Gln Ile Thr Val Ser Leu Ala Gln Gly Tyr Glu Arg
        275                 280                 285

Thr Ser Ser Pro Lys Pro Arg Phe Lys Ser Tyr Ala Tyr Thr Gln Ala
    290                 295                 300

Ala Tyr Val Thr Thr Ser Asp Pro Thr Arg Ser Pro Phe Pro Ser Gln
305                 310                 315                 320

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

Ser Glu Val Asn Leu Asp Arg Tyr Gln Thr Ala Leu Glu Glu Val Leu
            340                 345                 350

Ser Trp Leu Leu Ser Ala Glu Asp Thr Leu Gln Ala Gln Gly Glu Ile
        355                 360                 365

Ser Asn Asp Val Glu Val Val Lys Asp Gln Phe His Thr His Glu Gly
    370                 375                 380

Tyr Met Met Asp Leu Thr Ala His Gln Gly Arg Val Gly Asn Ile Leu
385                 390                 395                 400

Gln Leu Gly Ser Lys Leu Ile Gly Thr Gly Lys Leu Ser Glu Asp Glu
                405                 410                 415

Glu Thr Glu Val Gln Glu Gln Met Asn Leu Leu Asn Ser Arg Trp Glu
            420                 425                 430

Cys Leu Arg Val Ala Ser Met Glu Lys Gln Ser Asn Leu His Arg Val
        435                 440                 445

Leu Met Asp Leu Gln Asn Gln Lys Leu Lys Glu Leu Asn Asp Trp Leu
    450                 455                 460

Thr Lys Thr Glu Glu Arg Thr Arg Lys Met Glu Glu Glu Pro Leu Gly
465                 470                 475                 480
```

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Pro Asp Leu Glu Asp Leu Lys Arg Gln Val Gln Gln His Lys Val Leu
                485                 490                 495

Gln Glu Asp Leu Glu Gln Glu Gln Val Arg Val Asn Ser Leu Thr His
            500                 505                 510

Met Val Val Val Val Asp Glu Ser Ser Gly Asp His Ala Thr Ala Ala
        515                 520                 525

Leu Glu Glu Gln Leu Lys Val Leu Gly Asp Arg Trp Ala Asn Ile Cys
    530                 535                 540

Arg Trp Thr Glu Asp Arg Trp Val Leu Leu Gln Asp Ile Leu Leu Lys
545                 550                 555                 560

Trp Gln Arg Leu Thr Glu Glu Gln Cys Leu Phe Ser Ala Trp Leu Ser
                565                 570                 575

Glu Lys Glu Asp Ala Val Asn Lys Ile His Thr Thr Gly Phe Lys Asp
            580                 585                 590

Gln Asn Glu Met Leu Ser Ser Leu Gln Lys Leu Ala Val Leu Lys Ala
        595                 600                 605

Asp Leu Glu Lys Lys Lys Gln Ser Met Gly Lys Leu Tyr Ser Leu Lys
    610                 615                 620

Gln Asp Leu Leu Ser Thr Leu Lys Asn Lys Ser Val Thr Gln Lys Thr
625                 630                 635                 640

Glu Ala Trp Leu Asp Asn Phe Ala Arg Cys Trp Asp Asn Leu Val Gln
                645                 650                 655

Lys Leu Glu Lys Ser Thr Ala Gln Ile Ser Gln Ala Ala Pro Gly Leu
            660                 665                 670

Thr Thr Ile Gly Ala Ser Pro Thr Gln Thr Val Thr Leu Val Thr Gln
        675                 680                 685

Pro Val Val Thr Lys Glu Thr Ala Ile Ser Lys Leu Glu Met Pro Ser
    690                 695                 700

Ser Leu Met Leu Glu Glu Leu Pro Pro Glu Glu Arg Ala Gln Asn Val
705                 710                 715                 720

Thr Arg Leu Leu Arg Lys Gln Ala Glu Glu Val Asn Thr Glu Trp Glu
                725                 730                 735
```

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Lys Leu Asn Leu His Ser Ala Asp Trp Gln Arg Lys Ile Asp Glu Thr
            740                 745                 750

Leu Glu Arg Leu Gln Glu Leu Gln Glu Ala Thr Asp Glu Leu Asp Leu
        755                 760                 765

Lys Leu Arg Gln Ala Glu Val Ile Lys Gly Ser Trp Gln Pro Val Gly
    770                 775                 780

Asp Leu Leu Ile Asp Ser Leu Gln Asp His Leu Glu Lys Val Lys Ala
785                 790                 795                 800

Leu Arg Gly Glu Ile Ala Pro Leu Lys Glu Asn Val Ser His Val Asn
                805                 810                 815

Asp Leu Ala Arg Gln Leu Thr Thr Leu Gly Ile Gln Leu Ser Pro Tyr
            820                 825                 830

Asn Leu Ser Thr Leu Glu Asp Leu Asn Thr Arg Trp Lys Leu Leu Gln
        835                 840                 845

Val Ala Val Glu Asp Arg Val Arg Gln Leu His Glu Ala His Arg Asp
    850                 855                 860

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

Trp Glu Arg Ala Ile Ser Pro Asn Lys Val Pro Tyr Tyr Ile Asn His
                885                 890                 895

Glu Thr Gln Thr Thr Cys Trp Asp His Pro Lys Met Thr Glu Leu Tyr
            900                 905                 910

Gln Ser Leu Ala Asp Leu Asn Asn Val Arg Phe Ser Ala Tyr Arg Thr
        915                 920                 925

Ala Met Lys Leu Arg Arg Leu Gln Lys Ala Leu Cys Leu Asp Leu Leu
    930                 935                 940

Ser Leu Ser Ala Ala Cys Asp Ala Leu Asp Gln His Asn Leu Lys Gln
945                 950                 955                 960

Asn Asp Gln Pro Met Asp Ile Leu Gln Ile Ile Asn Cys Leu Thr Thr
                965                 970                 975

Ile Tyr Asp Arg Leu Glu Gln Glu His Asn Asn Leu Val Asn Val Pro
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            980                 985                 990

Leu Cys Val Asp Met Cys Leu Asn  Trp Leu Leu Asn Val  Tyr Asp Thr
        995                 1000                1005

Gly Arg  Thr Gly Arg Ile Arg  Val Leu Ser Phe Lys  Thr Gly Ile
    1010                1015                1020

Ile Ser  Leu Cys Lys Ala His  Leu Glu Asp Lys Tyr  Arg Tyr Leu
    1025                1030                1035

Phe Lys  Gln Val Ala Ser Ser  Thr Gly Phe Cys Asp  Gln Arg Arg
    1040                1045                1050

Leu Gly  Leu Leu Leu His Asp  Ser Ile Gln Ile Pro  Arg Gln Leu
    1055                1060                1065

Gly Glu  Val Ala Ser Phe Gly  Gly Ser Asn Ile Glu  Pro Ser Val
    1070                1075                1080

Arg Ser  Cys Phe Gln Phe Ala  Asn Asn Lys Pro Glu  Ile Glu Ala
    1085                1090                1095

Ala Leu  Phe Leu Asp Trp Met  Arg Leu Glu Pro Gln  Ser Met Val
    1100                1105                1110

Trp Leu  Pro Val Leu His Arg  Val Ala Ala Ala Glu  Thr Ala Lys
    1115                1120                1125

His Gln  Ala Lys Cys Asn Ile  Cys Lys Glu Cys Pro  Ile Ile Gly
    1130                1135                1140

Phe Arg  Tyr Arg Ser Leu Lys  His Phe Asn Tyr Asp  Ile Cys Gln
    1145                1150                1155

Ser Cys  Phe Phe Ser Gly Arg  Val Ala Lys Gly His  Lys Met His
    1160                1165                1170

Tyr Pro  Met Val Glu Tyr Cys  Thr Pro Thr Thr Ser  Gly Glu Asp
    1175                1180                1185

Val Arg  Asp Phe Ala Lys Val  Leu Lys Asn Lys Phe  Arg Thr Lys
    1190                1195                1200

Arg Tyr  Phe Ala Lys His Pro  Arg Met Gly Tyr Leu  Pro Val Gln
    1205                1210                1215
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Thr Val Leu Glu Gly Asp Asn Met Glu Thr Asp Thr Met
1220 1225 1230

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Gln Lys Lys Thr Phe Thr Lys Trp Val Asn Ala Gln Phe Ser Lys Phe
20 25 30

Gly Lys Gln His Ile Glu Asn Leu Phe Ser Asp Leu Gln Asp Gly Arg
35 40 45

Arg Leu Leu Asp Leu Leu Glu Gly Leu Thr Gly Gln Lys Leu Pro Lys
50 55 60

Glu Lys Gly Ser Thr Arg Val His Ala Leu Asn Asn Val Asn Lys Ala
65 70 75 80

Leu Arg Val Leu Gln Asn Asn Asn Val Asp Leu Val Asn Ile Gly Ser
85 90 95

Thr Asp Ile Val Asp Gly Asn His Lys Leu Thr Leu Gly Leu Ile Trp
100 105 110

Asn Ile Ile Leu His Trp Gln Val Lys Asn Val Met Lys Asn Ile Met
115 120 125

Ala Gly Leu Gln Gln Thr Asn Ser Glu Lys Ile Leu Leu Ser Trp Val
130 135 140

Arg Gln Ser Thr Arg Asn Tyr Pro Gln Val Asn Val Ile Asn Phe Thr
145 150 155 160

Thr Ser Trp Ser Asp Gly Leu Ala Leu Asn Ala Leu Ile His Ser His
165 170 175

Arg Pro Asp Leu Phe Asp Trp Asn Ser Val Val Cys Gln Gln Ser Ala
180 185 190

Thr Gln Arg Leu Glu His Ala Phe Asn Ile Ala Arg Tyr Gln Leu Gly

```
        195                 200                 205

Ile Glu Lys Leu Leu Asp Pro Glu Asp Val Asp Thr Thr Tyr Pro Asp
    210                 215                 220

Lys Lys Ser Ile Leu Met Tyr Ile Thr Ser Leu Phe Gln Val Leu Pro
225                 230                 235                 240

Gln Gln Val Ser Ile Glu Ala Ile Gln Glu Val Glu Met Leu Pro Arg
                245                 250                 255

Pro Pro Lys Val Thr Lys Glu Glu His Phe Gln Leu His His Gln Met
            260                 265                 270

His Tyr Ser Gln Gln Ile Thr Val Ser Leu Ala Gln Gly Tyr Glu Arg
        275                 280                 285

Thr Ser Ser Pro Lys Pro Arg Phe Lys Ser Tyr Ala Tyr Thr Gln Ala
    290                 295                 300

Ala Tyr Val Thr Thr Ser Asp Pro Thr Arg Ser Pro Phe Pro Ser Gln
305                 310                 315                 320

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

Ser Glu Val Asn Leu Asp Arg Tyr Gln Thr Ala Leu Glu Glu Val Leu
            340                 345                 350

Ser Trp Leu Leu Ser Ala Glu Asp Thr Leu Gln Ala Gln Gly Glu Ile
        355                 360                 365

Ser Asn Asp Val Glu Val Val Lys Asp Gln Phe His Thr His Glu Gly
    370                 375                 380

Tyr Met Met Asp Leu Thr Ala His Gln Gly Arg Val Gly Asn Ile Leu
385                 390                 395                 400

Gln Leu Gly Ser Lys Leu Ile Gly Thr Gly Lys Leu Ser Glu Asp Glu
                405                 410                 415

Glu Thr Glu Val Gln Glu Gln Met Asn Leu Leu Asn Ser Arg Trp Glu
            420                 425                 430

Cys Leu Arg Val Ala Ser Met Glu Lys Gln Ser Asn Leu His Arg Val
        435                 440                 445
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Leu Met Asp Leu Gln Asn Gln Lys Leu Lys Glu Leu Asn Asp Trp Leu
    450                 455                 460

Thr Lys Thr Glu Glu Arg Thr Arg Lys Met Glu Glu Glu Pro Leu Gly
465                 470                 475                 480

Pro Asp Leu Glu Asp Leu Lys Arg Gln Val Gln Gln His Lys Val Leu
                485                 490                 495

Gln Glu Asp Leu Glu Gln Glu Gln Val Arg Val Asn Ser Leu Thr His
            500                 505                 510

Met Val Val Val Val Asp Glu Ser Ser Gly Asp His Ala Thr Ala Ala
        515                 520                 525

Leu Glu Glu Gln Leu Lys Val Leu Gly Asp Arg Trp Ala Asn Ile Cys
    530                 535                 540

Arg Trp Thr Glu Asp Arg Trp Val Leu Leu Gln Asp Ile Leu Leu Lys
545                 550                 555                 560

Trp Gln Arg Leu Thr Glu Glu Gln Cys Leu Phe Ser Ala Trp Leu Ser
                565                 570                 575

Glu Lys Glu Asp Ala Val Asn Lys Ile His Thr Thr Gly Phe Lys Asp
            580                 585                 590

Gln Asn Glu Met Leu Ser Ser Leu Gln Lys Leu Ala Val Leu Lys Ala
        595                 600                 605

Asp Leu Glu Lys Lys Lys Gln Ser Met Gly Lys Leu Tyr Ser Leu Lys
    610                 615                 620

Gln Asp Leu Leu Ser Thr Leu Lys Asn Lys Ser Val Thr Gln Lys Thr
625                 630                 635                 640

Glu Ala Trp Leu Asp Asn Phe Ala Arg Cys Trp Asp Asn Leu Val Gln
                645                 650                 655

Lys Leu Glu Lys Ser Thr Ala Gln Ile Ser Gln Ala Ile His Thr Val
            660                 665                 670

Arg Glu Glu Thr Met Met Val Met Thr Glu Asp Met Pro Leu Glu Ile
        675                 680                 685

Ser Tyr Val Pro Ser Thr Tyr Leu Thr Glu Ile Thr His Val Ser Gln
    690                 695                 700
```

```
Ala Leu Leu Glu Val Glu Gln Leu Leu Asn Ala Pro Asp Leu Cys Ala
705                 710                 715                 720

Lys Asp Phe Glu Asp Leu Phe Lys Gln Glu Glu Ser Leu Lys Asn Ile
                725                 730                 735

Lys Asp Ser Leu Gln Gln Ser Ser Gly Arg Ile Asp Ile Ile His Ser
            740                 745                 750

Lys Lys Thr Ala Ala Leu Gln Ser Ala Thr Pro Val Glu Arg Val Lys
        755                 760                 765

Leu Gln Glu Ala Leu Ser Gln Leu Asp Phe Gln Trp Glu Lys Val Asn
    770                 775                 780

Lys Met Tyr Lys Asp Arg Gln Gly Arg Phe Asp Arg Ser Val Glu Lys
785                 790                 795                 800

Trp Arg Arg Phe His Tyr Asp Ile Lys Ile Phe Asn Gln Trp Leu Thr
                805                 810                 815

Glu Ala Glu Gln Phe Leu Arg Lys Thr Gln Ile Pro Glu Asn Trp Glu
            820                 825                 830

His Ala Lys Tyr Lys Trp Tyr Leu Lys Glu Leu Gln Asp Gly Ile Gly
        835                 840                 845

Gln Arg Gln Thr Val Val Arg Thr Leu Asn Ala Thr Gly Glu Glu Ile
    850                 855                 860

Ile Gln Gln Ser Ser Lys Thr Asp Ala Ser Ile Leu Gln Glu Lys Leu
865                 870                 875                 880

Gly Ser Leu Asn Leu Arg Trp Gln Glu Val Cys Lys Gln Leu Ser Asp
                885                 890                 895

Arg Lys Lys Arg Leu Glu Glu Gln Leu Glu Arg Leu Gln Glu Leu Gln
            900                 905                 910

Glu Ala Thr Asp Glu Leu Asp Leu Lys Leu Arg Gln Ala Glu Val Ile
        915                 920                 925

Lys Gly Ser Trp Gln Pro Val Gly Asp Leu Leu Ile Asp Ser Leu Gln
    930                 935                 940

Asp His Leu Glu Lys Val Lys Ala Leu Arg Gly Glu Ile Ala Pro Leu
945                 950                 955                 960
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Lys Glu Asn Val Ser His Val Asn Asp Leu Ala Arg Gln Leu Thr Thr
                965                 970                 975

Leu Gly Ile Gln Leu Ser Pro Tyr Asn Leu Ser Thr Leu Glu Asp Leu
            980                 985                 990

Asn Thr Arg Trp Lys Leu Leu Gln  Val Ala Val Glu Asp  Arg Val Arg
        995                 1000                1005

Gln Leu  His Glu Ala His Arg  Asp Phe Gly Pro Ala  Ser Gln His
    1010                1015                1020

Phe Leu  Ser Thr Ser Val Gln  Gly Pro Trp Glu Arg  Ala Ile Ser
    1025                1030                1035

Pro Asn  Lys Val Pro Tyr Tyr  Ile Asn His Glu Thr  Gln Thr Thr
    1040                1045                1050

Cys Trp  Asp His Pro Lys Met  Thr Glu Leu Tyr Gln  Ser Leu Ala
    1055                1060                1065

Asp Leu  Asn Asn Val Arg Phe  Ser Ala Tyr Arg Thr  Ala Met Lys
    1070                1075                1080

Leu Arg  Arg Leu Gln Lys Ala  Leu Cys Leu Asp Leu  Leu Ser Leu
    1085                1090                1095

Ser Ala  Ala Cys Asp Ala Leu  Asp Gln His Asn Leu  Lys Gln Asn
    1100                1105                1110

Asp Gln  Pro Met Asp Ile Leu  Gln Ile Ile Asn Cys  Leu Thr Thr
    1115                1120                1125

Ile Tyr  Asp Arg Leu Glu Gln  Glu His Asn Asn Leu  Val Asn Val
    1130                1135                1140

Pro Leu  Cys Val Asp Met Cys  Leu Asn Trp Leu Leu  Asn Val Tyr
    1145                1150                1155

Asp Thr  Gly Arg Thr Gly Arg  Ile Arg Val Leu Ser  Phe Lys Thr
    1160                1165                1170

Gly Ile  Ile Ser Leu Cys Lys  Ala His Leu Glu Asp  Lys Tyr Arg
    1175                1180                1185

Tyr Leu  Phe Lys Gln Val Ala  Ser Ser Thr Gly Phe  Cys Asp Gln
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1190 1195 1200

Arg Arg Leu Gly Leu Leu Leu His Asp Ser Ile Gln Ile Pro Arg
1205 1210 1215

Gln Leu Gly Glu Val Ala Ser Phe Gly Gly Ser Asn Ile Glu Pro
1220 1225 1230

Ser Val Arg Ser Cys Phe Gln Phe Ala Asn Asn Lys Pro Glu Ile
1235 1240 1245

Glu Ala Ala Leu Phe Leu Asp Trp Met Arg Leu Glu Pro Gln Ser
1250 1255 1260

Met Val Trp Leu Pro Val Leu His Arg Val Ala Ala Ala Glu Thr
1265 1270 1275

Ala Lys His Gln Ala Lys Cys Asn Ile Cys Lys Glu Cys Pro Ile
1280 1285 1290

Ile Gly Phe Arg Tyr Arg Ser Leu Lys His Phe Asn Tyr Asp Ile
1295 1300 1305

Cys Gln Ser Cys Phe Phe Ser Gly Arg Val Ala Lys Gly His Lys
1310 1315 1320

Met His Tyr Pro Met Val Glu Tyr Cys Thr Pro Thr Thr Ser Gly
1325 1330 1335

Glu Asp Val Arg Asp Phe Ala Lys Val Leu Lys Asn Lys Phe Arg
1340 1345 1350

Thr Lys Arg Tyr Phe Ala Lys His Pro Arg Met Gly Tyr Leu Pro
1355 1360 1365

Val Gln Thr Val Leu Glu Gly Asp Asn Met Glu Thr Asp Thr Met
1370 1375 1380

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ggtcgagttg caaaaggcca taaaatgcac tatcccatgg tggaatattg cactccgact 3420

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gacaacatgg aaactgacac aatg 3564

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ctgcgggttt tgcagaacaa taatgttgat ttagtgaata ttggaagtac tgacatcgta 300

gatggaaatc ataaactgac tcttggtttg atttggaata taatcctcca ctggcaggtc 360

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ctgagctggg tccgacaatc aactcgtaat tatccacagg ttaatgtaat caacttcacc 480

accagctggt ctgatggcct ggctttgaat gctctcatcc atagtcatag gccagaccta 540

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