SEQUENCE LISTING

<110> Novartis AG

<120> Organic Compounds

<130> PAT052777A

<160> 26

<170> PatentIn version 3.3

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<213> Artificial

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<213> Artificial

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<400> 4

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Glu Ile Gln Met Lys Arg Thr Ala Ile Glu Ala Phe Asn Glu Thr Ile
20 25 30

Lys Ile Phe Glu Glu Gln Cys Gln Thr Gln Glu Arg Tyr Ser Lys Glu
35 40 45

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Tyr Ile Glu Lys Phe Lys Arg Glu Gly Asn Glu Lys Glu Ile Gln Arg
    50                  55                  60

Ile Met His Asn Tyr Asp Lys Leu Lys Ser Arg Ile Ser Glu Ile Ile
65                  70                  75                  80

Asp Ser Arg Arg Arg Leu Glu Glu Asp Leu Lys Lys Gln Ala Ala Glu
                85                  90                  95

Tyr Arg Glu Ile Asp Lys Arg Met Asn Ser Ile Lys Pro Gly Gly Gly
            100                 105                 110

Gly Gly Gly Gly Gly Gly Gly Gly Gly Leu Val Glu Cys Leu Leu Pro
        115                 120                 125

Asn Gly Met Ile Val Thr Leu Glu Cys Leu Arg Glu Ala Thr Leu Ile
    130                 135                 140

Thr Ile Lys His Glu Leu Phe Lys Glu Ala Arg Lys Tyr Pro Leu His
145                 150                 155                 160

Gln Leu Leu Gln Asp Glu Ser Ser Tyr Ile Phe Val Ser Val Thr Gln
                165                 170                 175

Glu Ala Glu Arg Glu Glu Phe Phe Asp Glu Thr Arg Arg Leu Cys Asp
            180                 185                 190

Leu Arg Leu Phe Gln Pro Phe Leu Lys Val Ile Glu Pro Val Gly Asn
        195                 200                 205

Arg Glu Glu Lys Ile Leu Asn Arg Glu Ile Gly Phe Ala Ile Gly Met
    210                 215                 220

Pro Val Cys Glu Phe Asp Met Val Lys Asp Pro Glu Val Gln Asp Phe
225                 230                 235                 240

Arg Arg Asn Ile Leu Asn Val Cys Lys Glu Ala Val Asp Leu Arg Asp
                245                 250                 255

Leu Asn Ser Pro His Ser Arg Ala Met Tyr Val Tyr Pro Pro Asn Val
            260                 265                 270

Glu Ser Ser Pro Glu Leu Pro Lys His Ile Tyr Asn Lys Leu Asp Lys
        275                 280                 285

Gly Gln Ile Ile Val Val Ile Trp Val Ile Val Ser Pro Asn Asn Asp
    290                 295                 300

Lys Gln Lys Tyr Thr Leu Lys Ile Asn His Asp Cys Val Pro Glu Gln
305                 310                 315                 320
```

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Val Ile Ala Glu Ala Ile Arg Lys Lys Thr Arg Ser Met Leu Leu Ser
                325                 330                 335

Ser Glu Gln Leu Lys Leu Cys Val Leu Glu Tyr Gln Gly Lys Tyr Ile
            340                 345                 350

Leu Lys Val Cys Gly Cys Asp Glu Tyr Phe Leu Glu Lys Tyr Pro Leu
        355                 360                 365

Ser Gln Tyr Lys Tyr Ile Arg Ser Cys Ile Met Leu Gly Arg Met Pro
    370                 375                 380

Asn Leu Met Leu Met Ala Lys Glu Ser Leu Tyr Ser Gln Leu Pro Met
385                 390                 395                 400

Asp Cys Phe Thr Met Pro Ser Tyr Ser Arg Arg Ile Ser Thr Ala Thr
                405                 410                 415

Pro Tyr Met Asn Gly Glu Thr Ser Thr Lys Ser Leu Trp Val Ile Asn
            420                 425                 430

Ser Ala Leu Arg Ile Lys Ile Leu Cys Ala Thr Tyr Val Asn Val Asn
        435                 440                 445

Ile Arg Asp Ile Asp Lys Ile Tyr Val Arg Thr Gly Ile Tyr His Gly
    450                 455                 460

Gly Glu Pro Leu Cys Asp Asn Val Asn Thr Gln Arg Val Pro Cys Ser
465                 470                 475                 480

Asn Pro Arg Trp Asn Glu Trp Leu Asn Tyr Asp Ile Tyr Ile Pro Asp
                485                 490                 495

Leu Pro Arg Ala Ala Arg Leu Cys Leu Ser Ile Cys Ser Val Lys Gly
            500                 505                 510

Arg Lys Gly Ala Lys Glu Glu His Cys Pro Leu Ala Trp Gly Asn Ile
        515                 520                 525

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

Asn Leu Trp Pro Val Pro His Gly Leu Glu Asp Leu Leu Asn Pro Ile
545                 550                 555                 560

Gly Val Thr Gly Ser Asn Pro Asn Lys Glu Thr Pro Cys Leu Glu Leu
                565                 570                 575

Glu Phe Asp Trp Phe Ser Ser Val Val Lys Phe Pro Asp Met Ser Val
            580                 585                 590
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Ile Glu Glu His Ala Asn Trp Ser Val Ser Arg Glu Ala Gly Phe Ser
595 600 605

Tyr Ser His Ala Gly Leu Ser Asn Arg Leu Ala Arg Asp Asn Glu Leu
610 615 620

Arg Glu Asn Asp Lys Glu Gln Leu Lys Ala Ile Ser Thr Arg Asp Pro
625 630 635 640

Leu Ser Glu Ile Thr Glu Gln Glu Lys Asp Phe Leu Trp Ser His Arg
645 650 655

His Tyr Cys Val Thr Ile Pro Glu Ile Leu Pro Lys Leu Leu Leu Ser
660 665 670

Val Lys Trp Asn Ser Arg Asp Glu Val Ala Gln Met Tyr Cys Leu Val
675 680 685

Lys Asp Trp Pro Pro Ile Lys Pro Glu Gln Ala Met Glu Leu Leu Asp
690 695 700

Cys Asn Tyr Pro Asp Pro Met Val Arg Gly Phe Ala Val Arg Cys Leu
705 710 715 720

Glu Lys Tyr Leu Thr Asp Asp Lys Leu Ser Gln Tyr Leu Ile Gln Leu
725 730 735

Val Gln Val Leu Lys Tyr Glu Gln Tyr Leu Asp Asn Leu Leu Val Arg
740 745 750

Phe Leu Leu Lys Lys Ala Leu Thr Asn Gln Arg Ile Gly His Phe Phe
755 760 765

Phe Trp His Leu Lys Ser Glu Met His Asn Lys Thr Val Ser Gln Arg
770 775 780

Phe Gly Leu Leu Leu Glu Ser Tyr Cys Arg Ala Cys Gly Met Tyr Leu
785 790 795 800

Lys His Leu Asn Arg Gln Val Glu Ala Met Glu Lys Leu Ile Asn Leu
805 810 815

Thr Asp Ile Leu Lys Gln Glu Lys Lys Asp Glu Thr Gln Lys Val Gln
820 825 830

Met Lys Phe Leu Val Glu Gln Met Arg Arg Pro Asp Phe Met Asp Ala
835 840 845

Leu Gln Gly Phe Leu Ser Pro Leu Asn Pro Ala His Gln Leu Gly Asn
850 855 860

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Leu Arg Leu Glu Glu Cys Arg Ile Met Ser Ser Ala Lys Arg Pro Leu
865                 870                 875                 880

Trp Leu Asn Trp Glu Asn Pro Asp Ile Met Ser Glu Leu Leu Phe Gln
                885                 890                 895

Asn Asn Glu Ile Ile Phe Lys Asn Gly Asp Asp Leu Arg Gln Asp Met
            900                 905                 910

Leu Thr Leu Gln Ile Ile Arg Ile Met Glu Asn Ile Trp Gln Asn Gln
        915                 920                 925

Gly Leu Asp Leu Arg Met Leu Pro Tyr Gly Cys Leu Ser Ile Gly Asp
    930                 935                 940

Cys Val Gly Leu Ile Glu Val Val Arg Asn Ser His Thr Ile Met Gln
945                 950                 955                 960

Ile Gln Cys Lys Gly Gly Leu Lys Gly Ala Leu Gln Phe Asn Ser His
                965                 970                 975

Thr Leu His Gln Trp Leu Lys Asp Lys Asn Lys Gly Glu Ile Tyr Asp
            980                 985                 990

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

Thr Phe  Ile Leu Gly Ile Gly  Asp Arg His Asn Ser  Asn Ile Met
    1010                1015                1020

Val Lys  Asp Asp Gly Gln Leu  Phe His Ile Asp Phe  Gly His Phe
    1025                1030                1035

Leu Asp  His Lys Lys Lys Lys  Phe Gly Tyr Lys Arg  Glu Arg Val
    1040                1045                1050

Pro Phe  Val Leu Thr Gln Asp  Phe Leu Ile Val Ile  Ser Lys Gly
    1055                1060                1065

Ala Gln  Glu Cys Thr Lys Thr  Arg Glu Phe Glu Arg  Phe Gln Glu
    1070                1075                1080

Met Cys  Tyr Lys Ala Tyr Leu  Ala Ile Arg Gln His  Ala Asn Leu
    1085                1090                1095

Phe Ile  Asn Leu Phe Ser Met  Met Leu Gly Ser Gly  Met Pro Glu
    1100                1105                1110

Leu Gln  Ser Phe Asp Asp Ile  Ala Tyr Ile Arg Lys  Thr Leu Ala
    1115                1120                1125
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Leu Asp Lys Thr Glu Gln Glu Ala Leu Glu Tyr Phe Met Lys Gln
1130 1135 1140

Met Asn Asp Ala His His Gly Gly Trp Thr Thr Lys Met Asp Trp
1145 1150 1155

Ile Phe His Thr Ile Lys Gln His Ala Leu Asn Glu Leu Gly Gly
1160 1165 1170

Ala His His His His His His
1175 1180

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<213> Artificial

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<223> PCR primer

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cgagaatatg atagattata tgaagaat 28

<210> 6
<211> 30
<212> DNA
<213> Artificial

<220>
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<400> 6
tggtttaatg ctgttcatac gtttgtcaat 30

<210> 7
<211> 76
<212> DNA
<213> Artificial

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<223> PCR primer

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agattatatg aagaat 76

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<211> 54
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<220>
<223> PCR primer

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<210> 9
<211> 54
<212> DNA
<213> Artificial

<220>
<223> PCR primer

<400> 9
attaaaccag gaggaggagg aggaggatgc ttcagtttca taatgcctcc tgct 54

<210> 10
<211> 57
<212> DNA
<213> Artificial

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<223> PCR primer

<400> 10
agctccgtga tggtgatggt gatgtgctcc agatctgtag tctttccgaa ctgtgtg 57

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<211> 61
<212> DNA
<213> Artificial

<220>
<223> PCR primer

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<212> PRT
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<223> PI3K kinase construct

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Glu Ile Gln Met Lys Arg Thr Ala Ile Glu Ala Phe Asn Glu Thr Ile
20 25 30

Lys Ile Phe Glu Glu Gln Cys Gln Thr Gln Glu Arg Tyr Ser Lys Glu
35 40 45

Tyr Ile Glu Lys Phe Lys Arg Glu Gly Lys Glu Lys Glu Ile Gln Arg
50 55 60

Ile Met His Asn Tyr Asp Lys Leu Lys Ser Arg Ile Ser Glu Ile Ile
65 70 75 80

```
Asp Ser Arg Arg Arg Leu Glu Glu Asp Leu Lys Lys Gln Ala Ala Glu
                85                  90                  95

Tyr Arg Glu Ile Asp Lys Arg Met Asn Ser Ile Lys Pro Gly Gly Gly
            100                 105                 110

Gly Gly Gly Cys Phe Ser Phe Ile Met Pro Pro Ala Met Ala Asp Ile
        115                 120                 125

Leu Asp Ile Trp Ala Val Asp Ser Gln Ile Ala Ser Asp Gly Ser Ile
    130                 135                 140

Pro Val Asp Phe Leu Leu Pro Thr Gly Ile Tyr Ile Gln Leu Glu Val
145                 150                 155                 160

Pro Arg Glu Ala Thr Ile Ser Tyr Ile Lys Gln Met Leu Trp Lys Gln
                165                 170                 175

Val His Asn Tyr Pro Met Phe Asn Leu Leu Met Asp Ile Asp Ser Tyr
            180                 185                 190

Met Phe Ala Cys Val Asn Gln Thr Ala Val Tyr Glu Glu Leu Glu Asp
        195                 200                 205

Glu Thr Arg Arg Leu Cys Asp Val Arg Pro Phe Leu Pro Val Leu Lys
    210                 215                 220

Leu Val Thr Arg Ser Cys Asp Pro Gly Glu Lys Leu Asp Ser Lys Ile
225                 230                 235                 240

Gly Val Leu Ile Gly Lys Gly Leu His Glu Phe Asp Ser Leu Lys Asp
                245                 250                 255

Pro Glu Val Asn Glu Phe Arg Arg Lys Met Arg Lys Phe Ser Glu Glu
            260                 265                 270

Lys Ile Leu Ser Leu Val Gly Leu Ser Trp Met Asp Trp Leu Lys Gln
        275                 280                 285

Thr Tyr Pro Pro Glu His Glu Pro Ser Ile Pro Glu Asn Leu Glu Asp
    290                 295                 300

Lys Leu Tyr Gly Gly Lys Leu Ile Val Ala Val His Phe Glu Asn Cys
305                 310                 315                 320

Gln Asp Val Phe Ser Phe Gln Val Ser Pro Asn Met Asn Pro Ile Lys
                325                 330                 335

Val Asn Glu Leu Ala Ile Gln Lys Arg Leu Thr Ile His Gly Lys Glu
            340                 345                 350
```

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Asp Glu Val Ser Pro Tyr Asp Tyr Val Leu Gln Val Ser Gly Arg Val
        355                 360                 365

Glu Tyr Val Phe Gly Asp His Pro Leu Ile Gln Phe Gln Tyr Ile Arg
    370                 375                 380

Asn Cys Val Met Asn Arg Ala Leu Pro His Phe Ile Leu Val Glu Cys
385                 390                 395                 400

Cys Lys Ile Lys Lys Met Tyr Glu Gln Glu Met Ile Ala Ile Glu Ala
                405                 410                 415

Ala Ile Asn Arg Asn Ser Ser Asn Leu Pro Leu Pro Leu Pro Pro Lys
            420                 425                 430

Lys Thr Arg Ile Ile Ser His Val Trp Glu Asn Asn Asn Pro Phe Gln
        435                 440                 445

Ile Val Leu Val Lys Gly Asn Lys Leu Asn Thr Glu Glu Thr Val Lys
    450                 455                 460

Val His Val Arg Ala Gly Leu Phe His Gly Thr Glu Leu Leu Cys Lys
465                 470                 475                 480

Thr Ile Val Ser Ser Glu Val Ser Gly Lys Asn Asp His Ile Trp Asn
                485                 490                 495

Glu Pro Leu Glu Phe Asp Ile Asn Ile Cys Asp Leu Pro Arg Met Ala
            500                 505                 510

Arg Leu Cys Phe Ala Val Tyr Ala Val Leu Asp Lys Val Lys Thr Lys
        515                 520                 525

Lys Ser Thr Lys Thr Ile Asn Pro Ser Lys Tyr Gln Thr Ile Arg Lys
    530                 535                 540

Ala Gly Lys Val His Tyr Pro Val Ala Trp Val Asn Thr Met Val Phe
545                 550                 555                 560

Asp Phe Lys Gly Gln Leu Arg Thr Gly Asp Ile Ile Leu His Ser Trp
                565                 570                 575

Ser Ser Phe Pro Asp Glu Leu Glu Glu Met Leu Asn Pro Met Gly Thr
            580                 585                 590

Val Gln Thr Asn Pro Tyr Thr Glu Asn Ala Thr Ala Leu His Val Lys
        595                 600                 605

Phe Pro Glu Asn Lys Lys Gln Pro Tyr Tyr Tyr Pro Pro Phe Asp Lys
    610                 615                 620
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Ile Ile Glu Lys Ala Ala Glu Ile Ala Ser Ser Asp Ser Ala Asn Val
625                 630                 635                 640

Ser Ser Arg Gly Gly Lys Lys Phe Leu Pro Val Leu Lys Glu Ile Leu
                645                 650                 655

Asp Arg Asp Pro Leu Ser Gln Leu Cys Glu Asn Glu Met Asp Leu Ile
            660                 665                 670

Trp Thr Leu Arg Gln Asp Cys Arg Glu Ile Phe Pro Gln Ser Leu Pro
        675                 680                 685

Lys Leu Leu Leu Ser Ile Lys Trp Asn Lys Leu Glu Asp Val Ala Gln
    690                 695                 700

Leu Gln Ala Leu Leu Gln Ile Trp Pro Lys Leu Pro Pro Arg Glu Ala
705                 710                 715                 720

Leu Glu Leu Leu Asp Phe Asn Tyr Pro Asp Gln Tyr Val Arg Glu Tyr
                725                 730                 735

Ala Val Gly Cys Leu Arg Gln Met Ser Asp Glu Glu Leu Ser Gln Tyr
            740                 745                 750

Leu Leu Gln Leu Val Gln Val Leu Lys Tyr Glu Pro Phe Leu Asp Cys
        755                 760                 765

Ala Leu Ser Arg Phe Leu Leu Glu Arg Ala Leu Gly Asn Arg Arg Ile
    770                 775                 780

Gly Gln Phe Leu Phe Trp His Leu Arg Ser Glu Val His Ile Pro Ala
785                 790                 795                 800

Val Ser Val Gln Phe Gly Val Ile Leu Glu Ala Tyr Cys Arg Gly Ser
                805                 810                 815

Val Gly His Met Lys Val Leu Ser Lys Gln Val Glu Ala Leu Asn Lys
            820                 825                 830

Leu Lys Thr Leu Asn Ser Leu Ile Lys Leu Asn Ala Val Lys Leu Asn
        835                 840                 845

Arg Ala Lys Gly Lys Glu Ala Met His Thr Cys Leu Lys Gln Ser Ala
    850                 855                 860

Tyr Arg Glu Ala Leu Ser Asp Leu Gln Ser Pro Leu Asn Pro Cys Val
865                 870                 875                 880

Ile Leu Ser Glu Leu Tyr Val Glu Lys Cys Lys Tyr Met Asp Ser Lys
                885                 890                 895
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Met Lys Pro Leu Trp Leu Val Tyr Asn Asn Lys Val Phe Gly Glu Asp
            900                 905                 910

Ser Val Gly Val Ile Phe Lys Asn Gly Asp Asp Leu Arg Gln Asp Met
        915                 920                 925

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

Gly Leu Asp Leu Arg Met Leu Pro Tyr Gly Cys Leu Ala Thr Gly Asp
945                 950                 955                 960

Arg Ser Gly Leu Ile Glu Val Val Ser Thr Ser Glu Thr Ile Ala Asp
                965                 970                 975

Ile Gln Leu Asn Ser Ser Asn Val Ala Ala Ala Ala Ala Phe Asn Lys
            980                 985                 990

Asp Ala Leu Leu Asn Trp Leu Lys  Glu Tyr Asn Ser Gly  Asp Asp Leu
        995                 1000                1005

Asp Arg  Ala Ile Glu Glu Phe  Thr Leu Ser Cys Ala  Gly Tyr Cys
    1010                1015                1020

Val Ala  Ser Tyr Val Leu Gly  Ile Gly Asp Arg His  Ser Asp Asn
    1025                1030                1035

Ile Met  Val Lys Lys Thr Gly  Gln Leu Phe His Ile  Asp Phe Gly
    1040                1045                1050

His Ile  Leu Gly Asn Phe Lys  Ser Lys Phe Gly Ile  Lys Arg Glu
    1055                1060                1065

Arg Val  Pro Phe Ile Leu Thr  Tyr Asp Phe Ile His  Val Ile Gln
    1070                1075                1080

Gln Gly  Lys Thr Gly Asn Thr  Glu Lys Phe Gly Arg  Phe Arg Gln
    1085                1090                1095

Cys Cys  Glu Asp Ala Tyr Leu  Ile Leu Arg Arg His  Gly Asn Leu
    1100                1105                1110

Phe Ile  Thr Leu Phe Ala Leu  Met Leu Thr Ala Gly  Leu Pro Glu
    1115                1120                1125

Leu Thr  Ser Val Lys Asp Ile  Gln Tyr Leu Lys Asp  Ser Leu Ala
    1130                1135                1140

Leu Gly  Lys Ser Glu Glu Glu  Ala Leu Lys Gln Phe  Lys Gln Lys
    1145                1150                1155
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Phe Asp Glu Ala Leu Arg Glu Ser Trp Thr Thr Lys Val Asn Trp
1160 1165 1170

Met Ala His Thr Val Arg Lys Asp Tyr Arg Ser Gly Ala His His
1175 1180 1185

His His His His Gly Ala
1190

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<212> PRT
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<223> PI3K kinase construct

<400> 13

Met Ser Glu Glu Ser Gln Ala Phe Gln Arg Gln Leu Thr Ala Leu Ile
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Gly Tyr Asp Val Thr Asp Val Ser Asn Val His Asp Asp Glu Leu Glu
20 25 30

Phe Thr Arg Arg Gly Leu Val Thr Pro Arg Met Ala Glu Val Ala Ser
35 40 45

Arg Asp Pro Lys Leu Tyr Ala Met His Pro Trp Val Thr Ser Lys Pro
50 55 60

Leu Pro Glu Tyr Leu Trp Lys Lys Ile Ala Asn Asn Cys Ile Phe Ile
65 70 75 80

Val Ile His Arg Ser Thr Thr Ser Gln Thr Ile Lys Val Ser Pro Asp
85 90 95

Asp Thr Pro Gly Ala Ile Leu Gln Ser Phe Phe Thr Lys Met Ala Lys
100 105 110

Lys Lys Ser Leu Met Asp Ile Pro Glu Ser Gln Ser Glu Gln Asp Phe
115 120 125

Val Leu Arg Val Cys Gly Arg Asp Glu Tyr Leu Val Gly Glu Thr Pro
130 135 140

Ile Lys Asn Phe Gln Trp Val Arg His Cys Leu Lys Asn Gly Glu Glu
145 150 155 160

Ile His Val Val Leu Asp Thr Pro Pro Asp Pro Ala Leu Asp Glu Val
165 170 175

Arg Lys Glu Glu Trp Pro Leu Val Asp Asp Cys Thr Gly Val Thr Gly
180 185 190

```
Tyr His Glu Gln Leu Thr Ile His Gly Lys Asp His Glu Ser Val Phe
        195                 200                 205

Thr Val Ser Leu Trp Asp Cys Asp Arg Lys Phe Arg Val Lys Ile Arg
    210                 215                 220

Gly Ile Asp Ile Pro Val Leu Pro Arg Asn Thr Asp Leu Thr Val Phe
225                 230                 235                 240

Val Glu Ala Asn Ile Gln His Gly Gln Gln Val Leu Cys Gln Arg Arg
                245                 250                 255

Thr Ser Pro Lys Pro Phe Thr Glu Glu Val Leu Trp Asn Val Trp Leu
            260                 265                 270

Glu Phe Ser Ile Lys Ile Lys Asp Leu Pro Lys Gly Ala Leu Leu Asn
        275                 280                 285

Leu Gln Ile Tyr Cys Gly Lys Ala Pro Ala Leu Ser Ser Lys Ala Ser
    290                 295                 300

Ala Glu Ser Pro Ser Ser Glu Ser Lys Gly Lys Val Arg Leu Leu Tyr
305                 310                 315                 320

Tyr Val Asn Leu Leu Leu Ile Asp His Arg Phe Leu Leu Arg Arg Gly
                325                 330                 335

Glu Tyr Val Leu His Met Trp Gln Ile Ser Gly Lys Gly Glu Asp Gln
            340                 345                 350

Gly Ser Phe Asn Ala Asp Lys Leu Thr Ser Ala Thr Asn Pro Asp Lys
        355                 360                 365

Glu Asn Ser Met Ser Ile Ser Ile Leu Leu Asp Asn Tyr Cys His Pro
    370                 375                 380

Ile Ala Leu Pro Lys His Gln Pro Thr Pro Asp Pro Glu Gly Asp Arg
385                 390                 395                 400

Val Arg Ala Glu Met Pro Asn Gln Leu Arg Lys Gln Leu Glu Ala Ile
                405                 410                 415

Ile Ala Thr Asp Pro Leu Asn Pro Leu Thr Ala Glu Asp Lys Glu Leu
            420                 425                 430

Leu Trp His Phe Arg Tyr Glu Ser Leu Lys His Pro Lys Ala Tyr Pro
        435                 440                 445

Lys Leu Phe Ser Ser Val Lys Trp Gly Gln Gln Glu Ile Val Ala Lys
    450                 455                 460
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Thr Tyr Gln Leu Leu Ala Arg Arg Glu Val Trp Asp Gln Ser Ala Leu
465                 470                 475                 480

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

Asn Val Arg Ala Ile Ala Val Gln Lys Leu Glu Ser Leu Glu Asp Asp
            500                 505                 510

Asp Val Leu His Tyr Leu Leu Gln Leu Val Gln Ala Val Lys Phe Glu
        515                 520                 525

Pro Tyr His Asp Ser Ala Leu Ala Arg Phe Leu Leu Lys Arg Gly Leu
    530                 535                 540

Arg Asn Lys Arg Ile Gly His Phe Leu Phe Trp Phe Leu Arg Ser Glu
545                 550                 555                 560

Ile Ala Gln Ser Arg His Tyr Gln Gln Arg Phe Ala Val Ile Leu Glu
                565                 570                 575

Ala Tyr Leu Arg Gly Cys Gly Thr Ala Met Leu His Asp Phe Thr Gln
            580                 585                 590

Gln Val Gln Val Ile Glu Met Leu Gln Lys Val Thr Leu Asp Ile Lys
        595                 600                 605

Ser Leu Ser Ala Glu Lys Tyr Asp Val Ser Ser Gln Val Ile Ser Gln
    610                 615                 620

Leu Lys Gln Lys Leu Glu Asn Leu Gln Asn Ser Gln Leu Pro Glu Ser
625                 630                 635                 640

Phe Arg Val Pro Tyr Asp Pro Gly Leu Lys Ala Gly Ala Leu Ala Ile
                645                 650                 655

Glu Lys Cys Lys Val Met Ala Ser Lys Lys Lys Pro Leu Trp Leu Glu
            660                 665                 670

Phe Lys Cys Ala Asp Pro Thr Ala Leu Ser Asn Glu Thr Ile Gly Ile
        675                 680                 685

Ile Phe Lys His Gly Asp Asp Leu Arg Gln Asp Met Leu Ile Leu Gln
    690                 695                 700

Ile Leu Arg Ile Met Glu Ser Ile Trp Glu Thr Glu Ser Leu Asp Leu
705                 710                 715                 720

Cys Leu Leu Pro Tyr Gly Cys Ile Ser Thr Gly Asp Lys Ile Gly Met
                725                 730                 735
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Ile Glu Ile Val Lys Asp Ala Thr Thr Ile Ala Lys Ile Gln Gln Ser
740 745 750

Thr Val Gly Asn Thr Gly Ala Phe Lys Asp Glu Val Leu Asn His Trp
755 760 765

Leu Lys Glu Lys Ser Pro Thr Glu Glu Lys Phe Gln Ala Ala Val Glu
770 775 780

Arg Phe Val Tyr Ser Cys Ala Gly Tyr Cys Val Ala Thr Phe Val Leu
785 790 795 800

Gly Ile Gly Asp Arg His Asn Asp Asn Ile Met Ile Thr Glu Thr Gly
805 810 815

Asn Leu Phe His Ile Asp Phe Gly His Ile Leu Gly Asn Tyr Lys Ser
820 825 830

Phe Leu Gly Ile Asn Lys Glu Arg Val Pro Phe Val Leu Thr Pro Asp
835 840 845

Phe Leu Phe Val Met Gly Thr Ser Gly Lys Lys Thr Ser Pro His Phe
850 855 860

Gln Lys Phe Gln Asp Ile Cys Val Lys Ala Tyr Leu Ala Leu Arg His
865 870 875 880

His Thr Asn Leu Leu Ile Ile Leu Phe Ser Met Met Leu Met Thr Gly
885 890 895

Met Pro Gln Leu Thr Ser Lys Glu Asp Ile Glu Tyr Ile Arg Asp Ala
900 905 910

Leu Thr Val Gly Lys Asn Glu Glu Asp Ala Lys Lys Tyr Phe Leu Asp
915 920 925

Gln Ile Glu Val Cys Arg Asp Lys Gly Trp Thr Val Gln Phe Asn Trp
930 935 940

Phe Leu His Leu Val Leu Gly Ile Lys Gln Gly Glu Lys His Ser Ala
945 950 955 960

His His His His His His
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<211> 45
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<223> PCR primer

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<212> DNA
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<210> 16
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<212> DNA
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<223> PCR primer

<400> 16
ctactgcctg ttgtctttgg acacgt 26

<210> 17
<211> 53
<212> DNA
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<220>
<223> PCR primer

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attaaaccag gaggaggagg aggaggaccc cctggggtgg actgccccat gga 53

<210> 18
<211> 56
<212> DNA
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<400> 18
agctccgtga tggtgatggt gatgtgctcc ctgcctgttg tctttggaca cgttgt 56

<210> 19
<211> 60
<212> DNA
<213> Artificial

<220>
<223> PCR primer

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<210> 20
<211> 1169

<212> PRT
<213> Artificial

<220>
<223> PI3K kinase construct

<400> 20

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Glu Ile Gln Met Lys Arg Thr Ala Ile Glu Ala Phe Asn Glu Thr Ile
            20                  25                  30

Lys Ile Phe Glu Glu Gln Cys Gln Thr Gln Glu Arg Tyr Ser Lys Glu
        35                  40                  45

Tyr Ile Glu Lys Phe Lys Arg Glu Gly Asn Glu Lys Glu Ile Gln Arg
    50                  55                  60

Ile Met His Asn Tyr Asp Lys Leu Lys Ser Arg Ile Ser Glu Ile Ile
65                  70                  75                  80

Asp Ser Arg Arg Arg Leu Glu Glu Asp Leu Lys Lys Gln Ala Ala Glu
                85                  90                  95

Tyr Arg Glu Ile Asp Lys Arg Met Asn Ser Ile Lys Pro Gly Gly Gly
            100                 105                 110

Gly Gly Gly Pro Pro Gly Val Asp Cys Pro Met Glu Phe Trp Thr Lys
        115                 120                 125

Glu Glu Asn Gln Ser Val Val Val Asp Phe Leu Leu Pro Thr Gly Val
    130                 135                 140

Tyr Leu Asn Phe Pro Val Ser Arg Asn Ala Asn Leu Ser Thr Ile Lys
145                 150                 155                 160

Gln Leu Leu Trp His Arg Ala Gln Tyr Glu Pro Leu Phe His Met Leu
                165                 170                 175

Ser Gly Pro Glu Ala Tyr Val Phe Thr Cys Ile Asn Gln Thr Ala Glu
            180                 185                 190

Gln Gln Glu Leu Glu Asp Glu Gln Arg Arg Leu Cys Asp Val Gln Pro
        195                 200                 205

Phe Leu Pro Val Leu Arg Leu Val Ala Arg Glu Gly Asp Arg Val Lys
    210                 215                 220

Lys Leu Ile Asn Ser Gln Ile Ser Leu Leu Ile Gly Lys Gly Leu His
225                 230                 235                 240
```

```
Glu Phe Asp Ser Leu Cys Asp Pro Glu Val Asn Asp Phe Arg Ala Lys
                245                 250                 255

Met Cys Gln Phe Cys Glu Glu Ala Ala Ala Arg Arg Gln Gln Leu Gly
            260                 265                 270

Trp Glu Ala Trp Leu Gln Tyr Ser Phe Pro Leu Gln Leu Glu Pro Ser
        275                 280                 285

Ala Gln Thr Trp Gly Pro Gly Thr Leu Arg Leu Pro Asn Arg Ala Leu
    290                 295                 300

Leu Val Asn Val Lys Phe Glu Gly Ser Glu Glu Ser Phe Thr Phe Gln
305                 310                 315                 320

Val Ser Thr Lys Asp Val Pro Leu Ala Leu Met Ala Cys Ala Leu Arg
                325                 330                 335

Lys Lys Ala Thr Val Phe Arg Gln Pro Leu Val Glu Gln Pro Glu Asp
            340                 345                 350

Tyr Thr Leu Gln Val Asn Gly Arg His Glu Tyr Leu Tyr Gly Ser Tyr
        355                 360                 365

Pro Leu Cys Gln Phe Gln Tyr Ile Cys Ser Cys Leu His Ser Gly Leu
    370                 375                 380

Thr Pro His Leu Thr Met Val His Ser Ser Ser Ile Leu Ala Met Arg
385                 390                 395                 400

Asp Glu Gln Ser Asn Pro Ala Pro Gln Val Gln Lys Pro Arg Ala Lys
                405                 410                 415

Pro Pro Pro Ile Pro Ala Lys Lys Pro Ser Ser Val Ser Leu Trp Ser
            420                 425                 430

Leu Glu Gln Pro Phe Arg Ile Glu Leu Ile Gln Gly Ser Lys Val Asn
        435                 440                 445

Ala Asp Glu Arg Met Lys Leu Val Val Gln Ala Gly Leu Phe His Gly
    450                 455                 460

Asn Glu Met Leu Cys Lys Thr Val Ser Ser Ser Glu Val Ser Val Cys
465                 470                 475                 480

Ser Glu Pro Val Trp Lys Gln Arg Leu Glu Phe Asp Ile Asn Ile Cys
                485                 490                 495

Asp Leu Pro Arg Met Ala Arg Leu Cys Phe Ala Leu Tyr Ala Val Ile
            500                 505                 510
```

```
Glu Lys Ala Lys Lys Ala Arg Ser Thr Lys Lys Lys Ser Lys Lys Ala
        515                 520                 525

Asp Cys Pro Ile Ala Trp Ala Asn Leu Met Leu Phe Asp Tyr Lys Asp
    530                 535                 540

Gln Leu Lys Thr Gly Glu Arg Cys Leu Tyr Met Trp Pro Ser Val Pro
545                 550                 555                 560

Asp Glu Lys Gly Glu Leu Leu Asn Pro Thr Gly Thr Val Arg Ser Asn
                565                 570                 575

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

Ala Pro His Pro Val Tyr Tyr Pro Ala Leu Glu Lys Ile Leu Glu Leu
        595                 600                 605

Gly Arg His Ser Glu Cys Val His Val Thr Glu Glu Glu Gln Leu Gln
    610                 615                 620

Leu Arg Glu Ile Leu Glu Arg Arg Gly Ser Gly Glu Leu Tyr Glu His
625                 630                 635                 640

Glu Lys Asp Leu Val Trp Lys Leu Arg His Glu Val Gln Glu His Phe
                645                 650                 655

Pro Glu Ala Leu Ala Arg Leu Leu Leu Val Thr Lys Trp Asn Lys His
            660                 665                 670

Glu Asp Val Ala Gln Met Leu Tyr Leu Leu Cys Ser Trp Pro Glu Leu
        675                 680                 685

Pro Val Leu Ser Ala Leu Glu Leu Leu Asp Phe Ser Phe Pro Asp Cys
    690                 695                 700

His Val Gly Ser Phe Ala Ile Lys Ser Leu Arg Lys Leu Thr Asp Asp
705                 710                 715                 720

Glu Leu Phe Gln Tyr Leu Leu Gln Leu Val Gln Val Leu Lys Tyr Glu
                725                 730                 735

Ser Tyr Leu Asp Cys Glu Leu Thr Lys Phe Leu Leu Asp Arg Ala Leu
            740                 745                 750

Ala Asn Arg Lys Ile Gly His Phe Leu Phe Trp His Leu Arg Ser Glu
        755                 760                 765

Met His Val Pro Ser Val Ala Leu Arg Phe Gly Leu Ile Leu Glu Ala
    770                 775                 780
```

```
Tyr Cys Arg Gly Ser Thr His His Met Lys Val Leu Met Lys Gln Gly
785                 790                 795                 800

Glu Ala Leu Ser Lys Leu Lys Ala Leu Asn Asp Phe Val Lys Leu Ser
                805                 810                 815

Ser Gln Lys Thr Pro Lys Pro Gln Thr Lys Glu Leu Met His Leu Cys
            820                 825                 830

Met Arg Gln Glu Ala Tyr Leu Glu Ala Leu Ser His Leu Gln Ser Pro
        835                 840                 845

Leu Asp Pro Ser Thr Leu Leu Ala Glu Val Cys Val Glu Gln Cys Thr
    850                 855                 860

Phe Met Asp Ser Lys Met Lys Pro Leu Trp Ile Met Tyr Ser Asn Glu
865                 870                 875                 880

Glu Ala Gly Ser Gly Gly Ser Val Gly Ile Ile Phe Lys Asn Gly Asp
                885                 890                 895

Asp Leu Arg Gln Asp Met Leu Thr Leu Gln Met Ile Gln Leu Met Asp
            900                 905                 910

Val Leu Trp Lys Gln Glu Gly Leu Asp Leu Arg Met Thr Pro Tyr Gly
        915                 920                 925

Cys Leu Pro Thr Gly Asp Arg Thr Gly Leu Ile Glu Val Val Leu Arg
    930                 935                 940

Ser Asp Thr Ile Ala Asn Ile Gln Leu Asn Lys Ser Asn Met Ala Ala
945                 950                 955                 960

Thr Ala Ala Phe Asn Lys Asp Ala Leu Leu Asn Trp Leu Lys Ser Lys
                965                 970                 975

Asn Pro Gly Glu Ala Leu Asp Arg Ala Ile Glu Glu Phe Thr Leu Ser
            980                 985                 990

Cys Ala Gly Tyr Cys Val Ala Thr  Tyr Val Leu Gly Ile  Gly Asp Arg
        995                 1000                1005

His Ser  Asp Asn Ile Met Ile  Arg Glu Ser Gly Gln  Leu Phe His
    1010                1015                1020

Ile Asp  Phe Gly His Phe Leu  Gly Asn Phe Lys Thr  Lys Phe Gly
    1025                1030                1035

Ile Asn  Arg Glu Arg Val Pro  Phe Ile Leu Thr Tyr  Asp Phe Val
    1040                1045                1050
```

His Val Ile Gln Gln Gly Lys Thr Asn Asn Ser Glu Lys Phe Glu
1055 1060 1065

Arg Phe Arg Gly Tyr Cys Glu Arg Ala Tyr Thr Ile Leu Arg Arg
1070 1075 1080

His Gly Leu Leu Phe Leu His Leu Phe Ala Leu Met Arg Ala Ala
1085 1090 1095

Gly Leu Pro Glu Leu Ser Cys Ser Lys Asp Ile Gln Tyr Leu Lys
1100 1105 1110

Asp Ser Leu Ala Leu Gly Lys Thr Glu Glu Glu Ala Leu Lys His
1115 1120 1125

Phe Arg Val Lys Phe Asn Glu Ala Leu Arg Glu Ser Trp Lys Thr
1130 1135 1140

Lys Val Asn Trp Leu Ala His Asn Val Ser Lys Asp Asn Arg Gln
1145 1150 1155

Glu Leu Gly Gly Ala His His His His His His
1160 1165

<210> 21
<211> 33
<212> DNA
<213> Artificial

<220>
<223> PCR primer

<400> 21
ctctctgaaa tcactaagca ggagaaagat ttt 33

<210> 22
<211> 33
<212> DNA
<213> Artificial

<220>
<223> PCR primer

<400> 22
aaaatctttc tcctgcttag tgatttcaga gag 33

<210> 23
<211> 1180
<212> PRT
<213> Artificial

<220>
<223> PI3K kinase construct

<400> 23

Met Arg Glu Tyr Asp Arg Leu Tyr Glu Glu Tyr Thr Arg Thr Ser Gln
1 5 10 15

```
Glu Ile Gln Met Lys Arg Thr Ala Ile Glu Ala Phe Asn Glu Thr Ile
            20                  25                  30

Lys Ile Phe Glu Glu Gln Cys Gln Thr Gln Glu Arg Tyr Ser Lys Glu
        35                  40                  45

Tyr Ile Glu Lys Phe Lys Arg Glu Gly Asn Glu Lys Glu Ile Gln Arg
    50                  55                  60

Ile Met His Asn Tyr Asp Lys Leu Lys Ser Arg Ile Ser Glu Ile Ile
65                  70                  75                  80

Asp Ser Arg Arg Arg Leu Glu Glu Asp Leu Lys Lys Gln Ala Ala Glu
                85                  90                  95

Tyr Arg Glu Ile Asp Lys Arg Met Asn Ser Ile Lys Pro Gly Gly Ile
            100                 105                 110

Ser Gly Gly Gly Gly Gly Ile Met Val Leu Val Glu Cys Leu Leu Pro
        115                 120                 125

Asn Gly Met Ile Val Thr Leu Glu Cys Leu Arg Glu Ala Thr Leu Ile
    130                 135                 140

Thr Ile Lys His Glu Leu Phe Lys Glu Ala Arg Lys Tyr Pro Leu His
145                 150                 155                 160

Gln Leu Leu Gln Asp Glu Ser Ser Tyr Ile Phe Val Ser Val Thr Gln
                165                 170                 175

Glu Ala Glu Arg Glu Glu Phe Phe Asp Glu Thr Arg Arg Leu Cys Asp
            180                 185                 190

Leu Arg Leu Phe Gln Pro Phe Leu Lys Val Ile Glu Pro Val Gly Asn
        195                 200                 205

Arg Glu Glu Lys Ile Leu Asn Arg Glu Ile Gly Phe Ala Ile Gly Met
    210                 215                 220

Pro Val Cys Glu Phe Asp Met Val Lys Asp Pro Glu Val Gln Asp Phe
225                 230                 235                 240

Arg Arg Asn Ile Leu Asn Val Cys Lys Glu Ala Val Asp Leu Arg Asp
                245                 250                 255

Leu Asn Ser Pro His Ser Arg Ala Met Tyr Val Tyr Pro Pro Asn Val
            260                 265                 270

Glu Ser Ser Pro Glu Leu Pro Lys His Ile Tyr Asn Lys Leu Asp Lys
        275                 280                 285
```

```
Gly Gln Ile Ile Val Val Ile Trp Val Ile Val Ser Pro Asn Asn Asp
    290                 295                 300

Lys Gln Lys Tyr Thr Leu Lys Ile Asn His Asp Cys Val Pro Glu Gln
305                 310                 315                 320

Val Ile Ala Glu Ala Ile Arg Lys Lys Thr Arg Ser Met Leu Leu Ser
                325                 330                 335

Ser Glu Gln Leu Lys Leu Cys Val Leu Glu Tyr Gln Gly Lys Tyr Ile
            340                 345                 350

Leu Lys Val Cys Gly Cys Asp Glu Tyr Phe Leu Glu Lys Tyr Pro Leu
        355                 360                 365

Ser Gln Tyr Lys Tyr Ile Arg Ser Cys Ile Met Leu Gly Arg Met Pro
    370                 375                 380

Asn Leu Met Leu Met Ala Lys Glu Ser Leu Tyr Ser Gln Leu Pro Met
385                 390                 395                 400

Asp Cys Phe Thr Met Pro Ser Tyr Ser Arg Arg Ile Ser Thr Ala Thr
                405                 410                 415

Pro Tyr Met Asn Gly Glu Thr Ser Thr Lys Ser Leu Trp Val Ile Asn
            420                 425                 430

Ser Ala Leu Arg Ile Lys Ile Leu Cys Ala Thr Tyr Val Asn Val Asn
        435                 440                 445

Ile Arg Asp Ile Asp Lys Ile Tyr Val Arg Thr Gly Ile Tyr His Gly
    450                 455                 460

Gly Glu Pro Leu Cys Asp Asn Val Asn Thr Gln Arg Val Pro Cys Ser
465                 470                 475                 480

Asn Pro Arg Trp Asn Glu Trp Leu Asn Tyr Asp Ile Tyr Ile Pro Asp
                485                 490                 495

Leu Pro Arg Ala Ala Arg Leu Cys Leu Ser Ile Cys Ser Val Lys Gly
            500                 505                 510

Arg Lys Gly Ala Lys Glu Glu His Cys Pro Leu Ala Trp Gly Asn Ile
        515                 520                 525

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

Asn Leu Trp Pro Val Pro His Gly Leu Glu Asp Leu Leu Asn Pro Ile
545                 550                 555                 560
```

```
Gly Val Thr Gly Ser Asn Pro Asn Lys Glu Thr Pro Cys Leu Glu Leu
                565                 570                 575

Glu Phe Asp Trp Phe Ser Ser Val Val Lys Phe Pro Asp Met Ser Val
            580                 585                 590

Ile Glu Glu His Ala Asn Trp Ser Val Ser Arg Glu Ala Gly Phe Ser
        595                 600                 605

Tyr Ser His Ala Gly Leu Ser Asn Arg Leu Ala Arg Asp Asn Glu Leu
    610                 615                 620

Arg Glu Asn Asp Lys Glu Gln Leu Lys Ala Ile Ser Thr Arg Asp Pro
625                 630                 635                 640

Leu Ser Glu Ile Thr Lys Gln Glu Lys Asp Phe Leu Trp Ser His Arg
                645                 650                 655

His Tyr Cys Val Thr Ile Pro Glu Ile Leu Pro Lys Leu Leu Leu Ser
            660                 665                 670

Val Lys Trp Asn Ser Arg Asp Glu Val Ala Gln Met Tyr Cys Leu Val
        675                 680                 685

Lys Asp Trp Pro Pro Ile Lys Pro Glu Gln Ala Met Glu Leu Leu Asp
    690                 695                 700

Cys Asn Tyr Pro Asp Pro Met Val Arg Gly Phe Ala Val Arg Cys Leu
705                 710                 715                 720

Glu Lys Tyr Leu Thr Asp Asp Lys Leu Ser Gln Tyr Leu Ile Gln Leu
                725                 730                 735

Val Gln Val Leu Lys Tyr Glu Gln Tyr Leu Asp Asn Leu Leu Val Arg
            740                 745                 750

Phe Leu Leu Lys Lys Ala Leu Thr Asn Gln Arg Ile Gly His Phe Phe
        755                 760                 765

Phe Trp His Leu Lys Ser Glu Met His Asn Lys Thr Val Ser Gln Arg
    770                 775                 780

Phe Gly Leu Leu Leu Glu Ser Tyr Cys Arg Ala Cys Gly Met Tyr Leu
785                 790                 795                 800

Lys His Leu Asn Arg Gln Val Glu Ala Met Glu Lys Leu Ile Asn Leu
                805                 810                 815

Thr Asp Ile Leu Lys Gln Glu Lys Lys Asp Glu Thr Gln Lys Val Gln
            820                 825                 830
```

```
Met Lys Phe Leu Val Glu Gln Met Arg Arg Pro Asp Phe Met Asp Ala
        835                 840                 845

Leu Gln Gly Phe Leu Ser Pro Leu Asn Pro Ala His Gln Leu Gly Asn
    850                 855                 860

Leu Arg Leu Glu Glu Cys Arg Ile Met Ser Ser Ala Lys Arg Pro Leu
865                 870                 875                 880

Trp Leu Asn Trp Glu Asn Pro Asp Ile Met Ser Glu Leu Leu Phe Gln
                885                 890                 895

Asn Asn Glu Ile Ile Phe Lys Asn Gly Asp Asp Leu Arg Gln Asp Met
            900                 905                 910

Leu Thr Leu Gln Ile Ile Arg Ile Met Glu Asn Ile Trp Gln Asn Gln
        915                 920                 925

Gly Leu Asp Leu Arg Met Leu Pro Tyr Gly Cys Leu Ser Ile Gly Asp
    930                 935                 940

Cys Val Gly Leu Ile Glu Val Val Arg Asn Ser His Thr Ile Met Gln
945                 950                 955                 960

Ile Gln Cys Lys Gly Gly Leu Lys Gly Ala Leu Gln Phe Asn Ser His
                965                 970                 975

Thr Leu His Gln Trp Leu Lys Asp Lys Asn Lys Gly Glu Ile Tyr Asp
            980                 985                 990

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

Thr Phe  Ile Leu Gly Ile Gly  Asp Arg His Asn Ser  Asn Ile Met
    1010                1015                1020

Val Lys  Asp Asp Gly Gln Leu  Phe His Ile Asp Phe  Gly His Phe
    1025                1030                1035

Leu Asp  His Lys Lys Lys Lys  Phe Gly Tyr Lys Arg  Glu Arg Val
    1040                1045                1050

Pro Phe  Val Leu Thr Gln Asp  Phe Leu Ile Val Ile  Ser Lys Gly
    1055                1060                1065

Ala Gln  Glu Cys Thr Lys Thr  Arg Glu Phe Glu Arg  Phe Gln Glu
    1070                1075                1080

Met Cys  Tyr Lys Ala Tyr Leu  Ala Ile Arg Gln His  Ala Asn Leu
    1085                1090                1095
```

Phe Ile Asn Leu Phe Ser Met Met Leu Gly Ser Gly Met Pro Glu
1100 1105 1110

Leu Gln Ser Phe Asp Asp Ile Ala Tyr Ile Arg Lys Thr Leu Ala
1115 1120 1125

Leu Asp Lys Thr Glu Gln Glu Ala Leu Glu Tyr Phe Met Lys Gln
1130 1135 1140

Met Asn Asp Ala His His Gly Gly Trp Thr Thr Lys Met Asp Trp
1145 1150 1155

Ile Phe His Thr Ile Lys Gln His Ala Leu Asn Glu Leu Gly Gly
1160 1165 1170

Ala His His His His His His
1175 1180

<210> 24
<211> 33
<212> DNA
<213> Artificial

<220>
<223> PCR primer

<400> 24
caaatgaatg atgcacgtca tggtggctgg aca 33

<210> 25
<211> 33
<212> DNA
<213> Artificial

<220>
<223> PCR primer

<400> 25
tgtccagcca ccatgacgtg catcattcat ttg 33

<210> 26
<211> 1180
<212> PRT
<213> Artificial

<220>
<223> PI3K kinase construct

<400> 26

Met Arg Glu Tyr Asp Arg Leu Tyr Glu Glu Tyr Thr Arg Thr Ser Gln
1 5 10 15

Glu Ile Gln Met Lys Arg Thr Ala Ile Glu Ala Phe Asn Glu Thr Ile
20 25 30

```
Lys Ile Phe Glu Glu Gln Cys Gln Thr Gln Glu Arg Tyr Ser Lys Glu
        35                  40                  45

Tyr Ile Glu Lys Phe Lys Arg Glu Gly Asn Glu Lys Glu Ile Gln Arg
    50                  55                  60

Ile Met His Asn Tyr Asp Lys Leu Lys Ser Arg Ile Ser Glu Ile Ile
65                  70                  75                  80

Asp Ser Arg Arg Arg Leu Glu Glu Asp Leu Lys Lys Gln Ala Ala Glu
                85                  90                  95

Tyr Arg Glu Ile Asp Lys Arg Met Asn Ser Ile Lys Pro Gly Gly Ile
            100                 105                 110

Ser Gly Gly Gly Gly Gly Ile Met Val Leu Val Glu Cys Leu Leu Pro
        115                 120                 125

Asn Gly Met Ile Val Thr Leu Glu Cys Leu Arg Glu Ala Thr Leu Ile
    130                 135                 140

Thr Ile Lys His Glu Leu Phe Lys Glu Ala Arg Lys Tyr Pro Leu His
145                 150                 155                 160

Gln Leu Leu Gln Asp Glu Ser Ser Tyr Ile Phe Val Ser Val Thr Gln
                165                 170                 175

Glu Ala Glu Arg Glu Glu Phe Phe Asp Glu Thr Arg Arg Leu Cys Asp
            180                 185                 190

Leu Arg Leu Phe Gln Pro Phe Leu Lys Val Ile Glu Pro Val Gly Asn
        195                 200                 205

Arg Glu Glu Lys Ile Leu Asn Arg Glu Ile Gly Phe Ala Ile Gly Met
    210                 215                 220

Pro Val Cys Glu Phe Asp Met Val Lys Asp Pro Glu Val Gln Asp Phe
225                 230                 235                 240

Arg Arg Asn Ile Leu Asn Val Cys Lys Glu Ala Val Asp Leu Arg Asp
                245                 250                 255

Leu Asn Ser Pro His Ser Arg Ala Met Tyr Val Tyr Pro Pro Asn Val
            260                 265                 270

Glu Ser Ser Pro Glu Leu Pro Lys His Ile Tyr Asn Lys Leu Asp Lys
        275                 280                 285

Gly Gln Ile Ile Val Val Ile Trp Val Ile Val Ser Pro Asn Asn Asp
    290                 295                 300
```

```
Lys Gln Lys Tyr Thr Leu Lys Ile Asn His Asp Cys Val Pro Glu Gln
305                 310                 315                 320

Val Ile Ala Glu Ala Ile Arg Lys Lys Thr Arg Ser Met Leu Leu Ser
                325                 330                 335

Ser Glu Gln Leu Lys Leu Cys Val Leu Glu Tyr Gln Gly Lys Tyr Ile
            340                 345                 350

Leu Lys Val Cys Gly Cys Asp Glu Tyr Phe Leu Glu Lys Tyr Pro Leu
        355                 360                 365

Ser Gln Tyr Lys Tyr Ile Arg Ser Cys Ile Met Leu Gly Arg Met Pro
    370                 375                 380

Asn Leu Met Leu Met Ala Lys Glu Ser Leu Tyr Ser Gln Leu Pro Met
385                 390                 395                 400

Asp Cys Phe Thr Met Pro Ser Tyr Ser Arg Arg Ile Ser Thr Ala Thr
                405                 410                 415

Pro Tyr Met Asn Gly Glu Thr Ser Thr Lys Ser Leu Trp Val Ile Asn
            420                 425                 430

Ser Ala Leu Arg Ile Lys Ile Leu Cys Ala Thr Tyr Val Asn Val Asn
        435                 440                 445

Ile Arg Asp Ile Asp Lys Ile Tyr Val Arg Thr Gly Ile Tyr His Gly
    450                 455                 460

Gly Glu Pro Leu Cys Asp Asn Val Asn Thr Gln Arg Val Pro Cys Ser
465                 470                 475                 480

Asn Pro Arg Trp Asn Glu Trp Leu Asn Tyr Asp Ile Tyr Ile Pro Asp
                485                 490                 495

Leu Pro Arg Ala Ala Arg Leu Cys Leu Ser Ile Cys Ser Val Lys Gly
            500                 505                 510

Arg Lys Gly Ala Lys Glu Glu His Cys Pro Leu Ala Trp Gly Asn Ile
        515                 520                 525

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

Asn Leu Trp Pro Val Pro His Gly Leu Glu Asp Leu Leu Asn Pro Ile
545                 550                 555                 560

Gly Val Thr Gly Ser Asn Pro Asn Lys Glu Thr Pro Cys Leu Glu Leu
                565                 570                 575
```

```
Glu Phe Asp Trp Phe Ser Ser Val Val Lys Phe Pro Asp Met Ser Val
            580                 585                 590

Ile Glu Glu His Ala Asn Trp Ser Val Ser Arg Glu Ala Gly Phe Ser
        595                 600                 605

Tyr Ser His Ala Gly Leu Ser Asn Arg Leu Ala Arg Asp Asn Glu Leu
    610                 615                 620

Arg Glu Asn Asp Lys Glu Gln Leu Lys Ala Ile Ser Thr Arg Asp Pro
625                 630                 635                 640

Leu Ser Glu Ile Thr Glu Gln Glu Lys Asp Phe Leu Trp Ser His Arg
                645                 650                 655

His Tyr Cys Val Thr Ile Pro Glu Ile Leu Pro Lys Leu Leu Leu Ser
            660                 665                 670

Val Lys Trp Asn Ser Arg Asp Glu Val Ala Gln Met Tyr Cys Leu Val
        675                 680                 685

Lys Asp Trp Pro Pro Ile Lys Pro Glu Gln Ala Met Glu Leu Leu Asp
    690                 695                 700

Cys Asn Tyr Pro Asp Pro Met Val Arg Gly Phe Ala Val Arg Cys Leu
705                 710                 715                 720

Glu Lys Tyr Leu Thr Asp Asp Lys Leu Ser Gln Tyr Leu Ile Gln Leu
                725                 730                 735

Val Gln Val Leu Lys Tyr Glu Gln Tyr Leu Asp Asn Leu Leu Val Arg
            740                 745                 750

Phe Leu Leu Lys Lys Ala Leu Thr Asn Gln Arg Ile Gly His Phe Phe
        755                 760                 765

Phe Trp His Leu Lys Ser Glu Met His Asn Lys Thr Val Ser Gln Arg
    770                 775                 780

Phe Gly Leu Leu Leu Glu Ser Tyr Cys Arg Ala Cys Gly Met Tyr Leu
785                 790                 795                 800

Lys His Leu Asn Arg Gln Val Glu Ala Met Glu Lys Leu Ile Asn Leu
                805                 810                 815

Thr Asp Ile Leu Lys Gln Glu Lys Lys Asp Glu Thr Gln Lys Val Gln
            820                 825                 830

Met Lys Phe Leu Val Glu Gln Met Arg Arg Pro Asp Phe Met Asp Ala
        835                 840                 845
```

```
Leu Gln Gly Phe Leu Ser Pro Leu Asn Pro Ala His Gln Leu Gly Asn
    850                 855                 860

Leu Arg Leu Glu Glu Cys Arg Ile Met Ser Ser Ala Lys Arg Pro Leu
865                 870                 875                 880

Trp Leu Asn Trp Glu Asn Pro Asp Ile Met Ser Glu Leu Leu Phe Gln
                885                 890                 895

Asn Asn Glu Ile Ile Phe Lys Asn Gly Asp Asp Leu Arg Gln Asp Met
            900                 905                 910

Leu Thr Leu Gln Ile Ile Arg Ile Met Glu Asn Ile Trp Gln Asn Gln
        915                 920                 925

Gly Leu Asp Leu Arg Met Leu Pro Tyr Gly Cys Leu Ser Ile Gly Asp
    930                 935                 940

Cys Val Gly Leu Ile Glu Val Val Arg Asn Ser His Thr Ile Met Gln
945                 950                 955                 960

Ile Gln Cys Lys Gly Gly Leu Lys Gly Ala Leu Gln Phe Asn Ser His
                965                 970                 975

Thr Leu His Gln Trp Leu Lys Asp Lys Asn Lys Gly Glu Ile Tyr Asp
            980                 985                 990

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

Thr Phe  Ile Leu Gly Ile Gly  Asp Arg His Asn Ser  Asn Ile Met
    1010                1015                1020

Val Lys  Asp Asp Gly Gln Leu  Phe His Ile Asp Phe  Gly His Phe
    1025                1030                1035

Leu Asp  His Lys Lys Lys Lys  Phe Gly Tyr Lys Arg  Glu Arg Val
    1040                1045                1050

Pro Phe  Val Leu Thr Gln Asp  Phe Leu Ile Val Ile  Ser Lys Gly
    1055                1060                1065

Ala Gln  Glu Cys Thr Lys Thr  Arg Glu Phe Glu Arg  Phe Gln Glu
    1070                1075                1080

Met Cys  Tyr Lys Ala Tyr Leu  Ala Ile Arg Gln His  Ala Asn Leu
    1085                1090                1095

Phe Ile  Asn Leu Phe Ser Met  Met Leu Gly Ser Gly  Met Pro Glu
    1100                1105                1110
```

```
Leu Gln  Ser Phe Asp Asp Ile  Ala Tyr Ile Arg Lys  Thr Leu Ala
    1115                 1120                 1125

Leu Asp  Lys Thr Glu Gln Glu  Ala Leu Glu Tyr Phe  Met Lys Gln
    1130                 1135                 1140

Met Asn  Asp Ala Arg His Gly  Gly Trp Thr Thr Lys  Met Asp Trp
    1145                 1150                 1155

Ile Phe  His Thr Ile Lys Gln  His Ala Leu Asn Glu  Leu Gly Gly
    1160                 1165                 1170

Ala His  His His His His His
    1175                 1180
```