

SEQUENCE LISTING

<110> DAIICHI SANKYO COMPANY, LIMITED

<120> A novel endo-beta-N-acetylglucosaminidase

<130> PH-9000-PCT

<150> JP 2020-147745

<151> 2020-09-02

<160> 46

<170> PatentIn version 3.5

<210> 1

<211> 2787

<212> DNA

<213> Streptococcus iniae

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 <212> PRT
 <213> Streptococcus iniae

<400> 2

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

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

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

His Lys Pro Val Ser Pro Lys Gln Ala Leu Gln Asn Ala Lys Lys Ala
 85 90 95

Asp Ala Gln Ala Glu Arg Leu Ala Lys Met Thr Ile Pro Lys Lys Glu
 100 105 110

Glu Leu Lys Ala Leu Glu Gly Pro Leu Tyr Gly Gly Tyr Phe Arg Thr
 115 120 125

Trp Gln Asp Lys Thr Ser Asp Pro Thr Glu Thr Asn Lys Val Asn Ser
 130 135 140

Phe Gly Glu Leu Pro Lys Glu Val Asp Leu Ala Phe Val Phe His Asp
 145 150 155 160

Tyr Thr Lys Asp Tyr Ser Leu Phe Trp Glu Glu Leu Ala Thr Lys Gln
 165 170 175

Val Pro Lys Leu Asn Lys Gln Gly Thr Arg Val Ile Arg Thr Ile Pro
 180 185 190

Trp Arg Phe Leu Ser Gly Ala Asp His Ser Asp Ile Ser Ala Asp Lys
 195 200 205

Glu Lys Phe Pro Asn Thr Glu Ala Gly Asn Lys Ala Leu Ala Lys Ala
 210 215 220

Ile Val Asp Glu Tyr Val Tyr Lys Tyr Asn Leu Asp Gly Leu Asp Ile
 225 230 235 240

Asp Ile Glu Arg Asp Ser Val Pro Lys Val Asn Asp Lys Glu Asp Pro
 245 250 255

Glu Ala Leu Ala Arg Thr Val Glu Val Phe Lys Glu Ile Gly Lys Leu
 260 265 270

Ile Gly Ala Asn Gly Ala Asp Lys Ser Arg Leu Leu Ile Met Asp Thr
 275 280 285

Thr Tyr Thr Ala Glu Glu Asn Pro Leu Ile Lys Glu Thr Ala Gln Tyr
 290 295 300

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

Asn Tyr Leu His His Lys Asn Ile Leu Asp Glu Thr Ser Ser Met Glu
 325 330 335

Gly Arg Trp Gln Gly Tyr Ser Lys Tyr Ile Arg Pro Glu Gln Tyr Met
 340 345 350

Val Gly Phe Ser Phe Tyr Glu Glu Lys Asp Phe Asn Asn Arg Trp Lys
 355 360 365

Asp Ile Asn Glu Glu Asp Pro Ser Asp Pro His Ile Gly Glu Lys Ile
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Gln Gly Thr Arg Ala Glu Arg Tyr Ala Lys Trp Gln Pro Lys Thr Gly
 385 390 395 400

Gly Leu Lys Gly Gly Leu Phe Ser Tyr Ala Ile Asp Arg Asp Gly Val
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Ala Gln Pro Lys Gln Lys Thr Glu His Pro Glu Leu Asp Lys Ile Val
 420 425 430

Lys Ser Glu Tyr Lys Val Ser Lys Ala Leu Lys Lys Leu Met Met Thr

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Glu	Arg	Phe	Lys	Gly	Thr	Leu	Arg	Leu	Asp	Asn	Pro	Glu	Ile	Lys	Asp
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Leu	Thr	Gly	Leu	Asn	Lys	Leu	Lys	Arg	Val	Ala	Lys	Leu	Glu	Leu	Ile
			500					505					510		
Asn	Leu	Pro	Lys	Ile	Thr	Lys	Ile	Asp	Lys	Asp	Asp	Leu	Pro	Gln	Asn
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Leu	Lys	Pro	Leu	Thr	Asp	Asn	Gln	Lys	Ser	Asn	Leu	Glu	Ile	Lys	Gly
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Thr	Tyr	Asp	Asp	Ser	Lys	Leu	Tyr	Lys	Asp	Ile	Pro	Ala	Phe	Asp	Leu
545					550					555					560
Val	Ile	Ser	Gly	Leu	Ser	Gly	Leu	Glu	Ser	Leu	Asp	Ile	Ser	Gly	His
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Gln	Arg	Asp	Thr	Leu	Ser	Gly	Ile	Asp	Ala	Ser	Thr	Leu	Pro	Ser	Leu
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Lys	Ala	Ile	Asn	Ile	Ser	Asp	Asn	His	Phe	Asp	Leu	Ala	Gln	Gly	Thr
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Gly	Ala	Ser	Thr	Ala	Ser	Phe	Asp	Lys	Gln	Lys	Pro	Lys	Gly	Leu	Tyr
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Pro	Glu	Ser	Tyr	Ser	Thr	Ala	Pro	Leu	His	Leu	Gln	Val	Gly	Gln	Gly
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Lys	Ile	Asn	Val	Ile	Asp	Asp	Leu	Ile	Phe	Gly	Thr	Arg	Thr	Asn	Gln
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Asn Thr Leu Ile Asn Thr Glu Asn Asp Phe Glu Ala Tyr Lys Glu Gln
 675 680 685

Thr Ile Gln Gly Lys Pro Phe Ile Ala Pro Asp Tyr Leu Tyr Asp Asn
 690 695 700

Phe Lys Val Ser Tyr Lys Glu Tyr Ser Ala Ser Ile Val Asp Ser Thr
 705 710 715 720

Leu Ala Glu Thr Thr Asp Lys Thr Ile Asp Thr Ala Lys Ala Glu Thr
 725 730 735

Tyr Gln Val Thr Val Ser Asn Lys Asp Gly Lys Thr Val His Ser Val
 740 745 750

Lys Val Ile Val Gly Asp Glu Lys Pro Met Met Val Asn Leu Ala Gln
 755 760 765

Asp Ala Lys Ile Ile Gly Thr Asp Asn Met Thr Gln Ser Ala Lys Val
 770 775 780

Phe Asp Gly Gln Lys Asp Gln Phe Leu Leu Ser Trp Asn Lys Asp Ser
 785 790 795 800

Ser Val Ile Phe Glu Leu Lys Thr Pro Gly Thr Ala Lys His Trp Arg
 805 810 815

Phe Phe Asp Asp Gly Lys Asn Asp Ser Val Thr Leu Ser Val Phe Lys
 820 825 830

Gly Asp Ala Ser Asn Phe Glu Thr Glu Lys Asp Lys Ala Glu Asn Trp
 835 840 845

Val Glu Ile Thr Lys Asp Ser Arg Lys Asn Asp Asp Lys Val Phe Ser
 850 855 860

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

Lys Glu Ala Lys Tyr Ile Tyr Phe Asn Glu Leu Gln Ile Leu Gly Tyr
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Pro Gly Val Val Ala Lys Lys Thr Ala Asp Asp Leu Arg Pro Thr Glu

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905

910

Ala Asp Lys Ser Asp Asp Lys Ser Asp Lys Asn Asp Thr Glu Ala Lys
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<212> PRT

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<223> Amino acid sequence of Endo-Si D241Q

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

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

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

His Lys Pro Val Ser Pro Lys Gln Ala Leu Gln Asn Ala Lys Lys Ala
 85 90 95

Asp Ala Gln Ala Glu Arg Leu Ala Lys Met Thr Ile Pro Lys Lys Glu
 100 105 110

Glu Leu Lys Ala Leu Glu Gly Pro Leu Tyr Gly Gly Tyr Phe Arg Thr
 115 120 125

Trp Gln Asp Lys Thr Ser Asp Pro Thr Glu Thr Asn Lys Val Asn Ser
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Phe Gly Glu Leu Pro Lys Glu Val Asp Leu Ala Phe Val Phe His Asp
 145 150 155 160

Tyr Thr Lys Asp Tyr Ser Leu Phe Trp Glu Glu Leu Ala Thr Lys Gln

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Trp	Arg	Phe	Leu	Ser	Gly	Ala	Asp	His	Ser	Asp	Ile	Ser	Ala	Asp	Lys				
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Glu	Lys	Phe	Pro	Asn	Thr	Glu	Ala	Gly	Asn	Lys	Ala	Leu	Ala	Lys	Ala				
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Ile	Val	Asp	Glu	Tyr	Val	Tyr	Lys	Tyr	Asn	Leu	Asp	Gly	Leu	Asp	Ile				
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Glu	Ala	Leu	Ala	Arg	Thr	Val	Glu	Val	Phe	Lys	Glu	Ile	Gly	Lys	Leu				
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Ile	Gly	Ala	Asn	Gly	Ala	Asp	Lys	Ser	Arg	Leu	Leu	Ile	Met	Asp	Thr				
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Asn	Tyr	Leu	His	His	Lys	Asn	Ile	Leu	Asp	Glu	Thr	Ser	Ser	Met	Glu				
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Gly	Arg	Trp	Gln	Gly	Tyr	Ser	Lys	Tyr	Ile	Arg	Pro	Glu	Gln	Tyr	Met				
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Val	Gly	Phe	Ser	Phe	Tyr	Glu	Glu	Lys	Asp	Phe	Asn	Asn	Arg	Trp	Lys				
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Gly Leu Lys Gly Gly Leu Phe Ser Tyr Ala Ile Asp Arg Asp Gly Val
405 410 415

Ala Gln Pro Lys Gln Lys Thr Glu His Pro Glu Leu Asp Lys Ile Val
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Lys Ser Glu Tyr Lys Val Ser Lys Ala Leu Lys Lys Leu Met Met Thr
435 440 445

Asp Asp Gln Tyr Gln Pro Ile Asp Gln Ser Asp Phe Pro Asp Lys Ala
450 455 460

Leu Arg Glu Ser Ile Ile Lys Gln Val Gly Thr Arg Arg Gly Asp Leu
465 470 475 480

Glu Arg Phe Lys Gly Thr Leu Arg Leu Asp Asn Pro Glu Ile Lys Asp
485 490 495

Leu Thr Gly Leu Asn Lys Leu Lys Arg Val Ala Lys Leu Glu Leu Ile
500 505 510

Asn Leu Pro Lys Ile Thr Lys Ile Asp Lys Asp Asp Leu Pro Gln Asn
515 520 525

Leu Lys Pro Leu Thr Asp Asn Gln Lys Ser Asn Leu Glu Ile Lys Gly
530 535 540

Thr Tyr Asp Asp Ser Lys Leu Tyr Lys Asp Ile Pro Ala Phe Asp Leu
545 550 555 560

Val Ile Ser Gly Leu Ser Gly Leu Glu Ser Leu Asp Ile Ser Gly His
565 570 575

Gln Arg Asp Thr Leu Ser Gly Ile Asp Ala Ser Thr Leu Pro Ser Leu
580 585 590

Lys Ala Ile Asn Ile Ser Asp Asn His Phe Asp Leu Ala Gln Gly Thr
595 600 605

Glu Asn Arg His Ile Leu Asp Thr Ile Leu Ala Thr Leu Ala Lys Asn
610 615 620

Gly Ala Ser Thr Ala Ser Phe Asp Lys Gln Lys Pro Lys Gly Leu Tyr

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Thr	Ile	Gln	Gly	Lys	Pro	Phe	Ile	Ala	Pro	Asp	Tyr	Leu	Tyr	Asp	Asn
	690					695					700				
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Tyr	Gln	Val	Thr	Val	Ser	Asn	Lys	Asp	Gly	Lys	Thr	Val	His	Ser	Val
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Lys	Val	Ile	Val	Gly	Asp	Glu	Lys	Pro	Met	Met	Val	Asn	Leu	Ala	Gln
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Phe	Asp	Gly	Gln	Lys	Asp	Gln	Phe	Leu	Leu	Ser	Trp	Asn	Lys	Asp	Ser
785					790					795					800
Ser	Val	Ile	Phe	Glu	Leu	Lys	Thr	Pro	Gly	Thr	Ala	Lys	His	Trp	Arg
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Phe	Phe	Asp	Asp	Gly	Lys	Asn	Asp	Ser	Val	Thr	Leu	Ser	Val	Phe	Lys
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Gly	Asp	Ala	Ser	Asn	Phe	Glu	Thr	Glu	Lys	Asp	Lys	Ala	Glu	Asn	Trp
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Val	Glu	Ile	Thr	Lys	Asp	Ser	Arg	Lys	Asn	Asp	Asp	Lys	Val	Phe	Ser
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Ser Pro Leu Glu Val Asp Asn Ala Lys Tyr Leu Lys Val Thr Ile Lys
865 870 875 880

Lys Glu Ala Lys Tyr Ile Tyr Phe Asn Glu Leu Gln Ile Leu Gly Tyr
885 890 895

Pro Gly Val Val Ala Lys Lys Thr Ala Asp Asp Leu Arg Pro Thr Glu
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Ala Asp Lys Ser Asp Asp Lys Ser Asp Lys Asn Asp Thr Glu Ala Lys
915 920 925

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<223> Amino acid sequence of Endo-Si D241Q/Q311L

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

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

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

His Lys Pro Val Ser Pro Lys Gln Ala Leu Gln Asn Ala Lys Lys Ala
85 90 95

Asp Ala Gln Ala Glu Arg Leu Ala Lys Met Thr Ile Pro Lys Lys Glu
100 105 110

Glu Leu Lys Ala Leu Glu Gly Pro Leu Tyr Gly Gly Tyr Phe Arg Thr
115 120 125

Trp Gln Asp Lys Thr Ser Asp Pro Thr Glu Thr Asn Lys Val Asn Ser
 130 135 140

Phe Gly Glu Leu Pro Lys Glu Val Asp Leu Ala Phe Val Phe His Asp
 145 150 155 160

Tyr Thr Lys Asp Tyr Ser Leu Phe Trp Glu Glu Leu Ala Thr Lys Gln
 165 170 175

Val Pro Lys Leu Asn Lys Gln Gly Thr Arg Val Ile Arg Thr Ile Pro
 180 185 190

Trp Arg Phe Leu Ser Gly Ala Asp His Ser Asp Ile Ser Ala Asp Lys
 195 200 205

Glu Lys Phe Pro Asn Thr Glu Ala Gly Asn Lys Ala Leu Ala Lys Ala
 210 215 220

Ile Val Asp Glu Tyr Val Tyr Lys Tyr Asn Leu Asp Gly Leu Asp Ile
 225 230 235 240

Gln Ile Glu Arg Asp Ser Val Pro Lys Val Asn Asp Lys Glu Asp Pro
 245 250 255

Glu Ala Leu Ala Arg Thr Val Glu Val Phe Lys Glu Ile Gly Lys Leu
 260 265 270

Ile Gly Ala Asn Gly Ala Asp Lys Ser Arg Leu Leu Ile Met Asp Thr
 275 280 285

Thr Tyr Thr Ala Glu Glu Asn Pro Leu Ile Lys Glu Thr Ala Gln Tyr
 290 295 300

Leu Asn Leu Leu Leu Val Leu Val Tyr Gly Phe Ser Gly Glu Asn Gly
 305 310 315 320

Asn Tyr Leu His His Lys Asn Ile Leu Asp Glu Thr Ser Ser Met Glu
 325 330 335

Gly Arg Trp Gln Gly Tyr Ser Lys Tyr Ile Arg Pro Glu Gln Tyr Met
 340 345 350

Val Gly Phe Ser Phe Tyr Glu Glu Lys Asp Phe Asn Asn Arg Trp Lys

355					360					365					
Asp	Ile	Asn	Glu	Glu	Asp	Pro	Ser	Asp	Pro	His	Ile	Gly	Glu	Lys	Ile
370					375					380					
Gln	Gly	Thr	Arg	Ala	Glu	Arg	Tyr	Ala	Lys	Trp	Gln	Pro	Lys	Thr	Gly
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Gly	Leu	Lys	Gly	Gly	Leu	Phe	Ser	Tyr	Ala	Ile	Asp	Arg	Asp	Gly	Val
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Ala	Gln	Pro	Lys	Gln	Lys	Thr	Glu	His	Pro	Glu	Leu	Asp	Lys	Ile	Val
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Lys	Ser	Glu	Tyr	Lys	Val	Ser	Lys	Ala	Leu	Lys	Lys	Leu	Met	Met	Thr
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Asp	Asp	Gln	Tyr	Gln	Pro	Ile	Asp	Gln	Ser	Asp	Phe	Pro	Asp	Lys	Ala
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Leu	Arg	Glu	Ser	Ile	Ile	Lys	Gln	Val	Gly	Thr	Arg	Arg	Gly	Asp	Leu
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Glu	Arg	Phe	Lys	Gly	Thr	Leu	Arg	Leu	Asp	Asn	Pro	Glu	Ile	Lys	Asp
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Leu	Thr	Gly	Leu	Asn	Lys	Leu	Lys	Arg	Val	Ala	Lys	Leu	Glu	Leu	Ile
			500					505					510		
Asn	Leu	Pro	Lys	Ile	Thr	Lys	Ile	Asp	Lys	Asp	Asp	Leu	Pro	Gln	Asn
		515					520					525			
Leu	Lys	Pro	Leu	Thr	Asp	Asn	Gln	Lys	Ser	Asn	Leu	Glu	Ile	Lys	Gly
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Thr	Tyr	Asp	Asp	Ser	Lys	Leu	Tyr	Lys	Asp	Ile	Pro	Ala	Phe	Asp	Leu
545					550					555					560
Val	Ile	Ser	Gly	Leu	Ser	Gly	Leu	Glu	Ser	Leu	Asp	Ile	Ser	Gly	His
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Gln	Arg	Asp	Thr	Leu	Ser	Gly	Ile	Asp	Ala	Ser	Thr	Leu	Pro	Ser	Leu
			580					585					590		

Lys Ala Ile Asn Ile Ser Asp Asn His Phe Asp Leu Ala Gln Gly Thr
 595 600 605

Glu Asn Arg His Ile Leu Asp Thr Ile Leu Ala Thr Leu Ala Lys Asn
 610 615 620

Gly Ala Ser Thr Ala Ser Phe Asp Lys Gln Lys Pro Lys Gly Leu Tyr
 625 630 635 640

Pro Glu Ser Tyr Ser Thr Ala Pro Leu His Leu Gln Val Gly Gln Gly
 645 650 655

Lys Ile Asn Val Ile Asp Asp Leu Ile Phe Gly Thr Arg Thr Asn Gln
 660 665 670

Asn Thr Leu Ile Asn Thr Glu Asn Asp Phe Glu Ala Tyr Lys Glu Gln
 675 680 685

Thr Ile Gln Gly Lys Pro Phe Ile Ala Pro Asp Tyr Leu Tyr Asp Asn
 690 695 700

Phe Lys Val Ser Tyr Lys Glu Tyr Ser Ala Ser Ile Val Asp Ser Thr
 705 710 715 720

Leu Ala Glu Thr Thr Asp Lys Thr Ile Asp Thr Ala Lys Ala Glu Thr
 725 730 735

Tyr Gln Val Thr Val Ser Asn Lys Asp Gly Lys Thr Val His Ser Val
 740 745 750

Lys Val Ile Val Gly Asp Glu Lys Pro Met Met Val Asn Leu Ala Gln
 755 760 765

Asp Ala Lys Ile Ile Gly Thr Asp Asn Met Thr Gln Ser Ala Lys Val
 770 775 780

Phe Asp Gly Gln Lys Asp Gln Phe Leu Leu Ser Trp Asn Lys Asp Ser
 785 790 795 800

Ser Val Ile Phe Glu Leu Lys Thr Pro Gly Thr Ala Lys His Trp Arg
 805 810 815

Phe Phe Asp Asp Gly Lys Asn Asp Ser Val Thr Leu Ser Val Phe Lys

820

825

830

Gly Asp Ala Ser Asn Phe Glu Thr Glu Lys Asp Lys Ala Glu Asn Trp
 835 840 845

Val Glu Ile Thr Lys Asp Ser Arg Lys Asn Asp Asp Lys Val Phe Ser
 850 855 860

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

Lys Glu Ala Lys Tyr Ile Tyr Phe Asn Glu Leu Gln Ile Leu Gly Tyr
 885 890 895

Pro Gly Val Val Ala Lys Lys Thr Ala Asp Asp Leu Arg Pro Thr Glu
 900 905 910

Ala Asp Lys Ser Asp Asp Lys Ser Asp Lys Asn Asp Thr Glu Ala Lys
 915 920 925

<210> 5

<211> 928

<212> PRT

<213> Artificial

<220>

<223> Amino acid sequence of Endo-Si D241Q/E360Q

<400> 5

Met Asn Lys Arg Leu Leu Val Lys Arg Thr Phe Gly Cys Val Cys Ala
 1 5 10 15

Ala Ala Ile Leu Gly Val Ala Pro Leu Ser His Pro Thr Ile Val Glu
 20 25 30

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

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

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

His Lys Pro Val Ser Pro Lys Gln Ala Leu Gln Asn Ala Lys Lys Ala

85

90

95

Asp Ala Gln Ala Glu Arg Leu Ala Lys Met Thr Ile Pro Lys Lys Glu
 100 105 110

Glu Leu Lys Ala Leu Glu Gly Pro Leu Tyr Gly Gly Tyr Phe Arg Thr
 115 120 125

Trp Gln Asp Lys Thr Ser Asp Pro Thr Glu Thr Asn Lys Val Asn Ser
 130 135 140

Phe Gly Glu Leu Pro Lys Glu Val Asp Leu Ala Phe Val Phe His Asp
 145 150 155 160

Tyr Thr Lys Asp Tyr Ser Leu Phe Trp Glu Glu Leu Ala Thr Lys Gln
 165 170 175

Val Pro Lys Leu Asn Lys Gln Gly Thr Arg Val Ile Arg Thr Ile Pro
 180 185 190

Trp Arg Phe Leu Ser Gly Ala Asp His Ser Asp Ile Ser Ala Asp Lys
 195 200 205

Glu Lys Phe Pro Asn Thr Glu Ala Gly Asn Lys Ala Leu Ala Lys Ala
 210 215 220

Ile Val Asp Glu Tyr Val Tyr Lys Tyr Asn Leu Asp Gly Leu Asp Ile
 225 230 235 240

Gln Ile Glu Arg Asp Ser Val Pro Lys Val Asn Asp Lys Glu Asp Pro
 245 250 255

Glu Ala Leu Ala Arg Thr Val Glu Val Phe Lys Glu Ile Gly Lys Leu
 260 265 270

Ile Gly Ala Asn Gly Ala Asp Lys Ser Arg Leu Leu Ile Met Asp Thr
 275 280 285

Thr Tyr Thr Ala Glu Glu Asn Pro Leu Ile Lys Glu Thr Ala Gln Tyr
 290 295 300

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

Asn Tyr Leu His His Lys Asn Ile Leu Asp Glu Thr Ser Ser Met Glu
325 330 335

Gly Arg Trp Gln Gly Tyr Ser Lys Tyr Ile Arg Pro Glu Gln Tyr Met
340 345 350

Val Gly Phe Ser Phe Tyr Glu Gln Lys Asp Phe Asn Asn Arg Trp Lys
355 360 365

Asp Ile Asn Glu Glu Asp Pro Ser Asp Pro His Ile Gly Glu Lys Ile
370 375 380

Gln Gly Thr Arg Ala Glu Arg Tyr Ala Lys Trp Gln Pro Lys Thr Gly
385 390 395 400

Gly Leu Lys Gly Gly Leu Phe Ser Tyr Ala Ile Asp Arg Asp Gly Val
405 410 415

Ala Gln Pro Lys Gln Lys Thr Glu His Pro Glu Leu Asp Lys Ile Val
420 425 430

Lys Ser Glu Tyr Lys Val Ser Lys Ala Leu Lys Lys Leu Met Met Thr
435 440 445

Asp Asp Gln Tyr Gln Pro Ile Asp Gln Ser Asp Phe Pro Asp Lys Ala
450 455 460

Leu Arg Glu Ser Ile Ile Lys Gln Val Gly Thr Arg Arg Gly Asp Leu
465 470 475 480

Glu Arg Phe Lys Gly Thr Leu Arg Leu Asp Asn Pro Glu Ile Lys Asp
485 490 495

Leu Thr Gly Leu Asn Lys Leu Lys Arg Val Ala Lys Leu Glu Leu Ile
500 505 510

Asn Leu Pro Lys Ile Thr Lys Ile Asp Lys Asp Asp Leu Pro Gln Asn
515 520 525

Leu Lys Pro Leu Thr Asp Asn Gln Lys Ser Asn Leu Glu Ile Lys Gly
530 535 540

Thr Tyr Asp Asp Ser Lys Leu Tyr Lys Asp Ile Pro Ala Phe Asp Leu

545		550		555		560									
Val	Ile	Ser	Gly	Leu	Ser	Gly	Leu	Glu	Ser	Leu	Asp	Ile	Ser	Gly	His
				565					570					575	
Gln	Arg	Asp	Thr	Leu	Ser	Gly	Ile	Asp	Ala	Ser	Thr	Leu	Pro	Ser	Leu
			580					585					590		
Lys	Ala	Ile	Asn	Ile	Ser	Asp	Asn	His	Phe	Asp	Leu	Ala	Gln	Gly	Thr
		595					600					605			
Glu	Asn	Arg	His	Ile	Leu	Asp	Thr	Ile	Leu	Ala	Thr	Leu	Ala	Lys	Asn
	610					615					620				
Gly	Ala	Ser	Thr	Ala	Ser	Phe	Asp	Lys	Gln	Lys	Pro	Lys	Gly	Leu	Tyr
625					630					635					640
Pro	Glu	Ser	Tyr	Ser	Thr	Ala	Pro	Leu	His	Leu	Gln	Val	Gly	Gln	Gly
				645					650					655	
Lys	Ile	Asn	Val	Ile	Asp	Asp	Leu	Ile	Phe	Gly	Thr	Arg	Thr	Asn	Gln
			660					665					670		
Asn	Thr	Leu	Ile	Asn	Thr	Glu	Asn	Asp	Phe	Glu	Ala	Tyr	Lys	Glu	Gln
		675					680					685			
Thr	Ile	Gln	Gly	Lys	Pro	Phe	Ile	Ala	Pro	Asp	Tyr	Leu	Tyr	Asp	Asn
	690					695					700				
Phe	Lys	Val	Ser	Tyr	Lys	Glu	Tyr	Ser	Ala	Ser	Ile	Val	Asp	Ser	Thr
705					710					715					720
Leu	Ala	Glu	Thr	Thr	Asp	Lys	Thr	Ile	Asp	Thr	Ala	Lys	Ala	Glu	Thr
				725					730					735	
Tyr	Gln	Val	Thr	Val	Ser	Asn	Lys	Asp	Gly	Lys	Thr	Val	His	Ser	Val
			740					745					750		
Lys	Val	Ile	Val	Gly	Asp	Glu	Lys	Pro	Met	Met	Val	Asn	Leu	Ala	Gln
		755					760					765			
Asp	Ala	Lys	Ile	Ile	Gly	Thr	Asp	Asn	Met	Thr	Gln	Ser	Ala	Lys	Val
	770					775					780				

Phe Asp Gly Gln Lys Asp Gln Phe Leu Leu Ser Trp Asn Lys Asp Ser
785 790 795 800

Ser Val Ile Phe Glu Leu Lys Thr Pro Gly Thr Ala Lys His Trp Arg
805 810 815

Phe Phe Asp Asp Gly Lys Asn Asp Ser Val Thr Leu Ser Val Phe Lys
820 825 830

Gly Asp Ala Ser Asn Phe Glu Thr Glu Lys Asp Lys Ala Glu Asn Trp
835 840 845

Val Glu Ile Thr Lys Asp Ser Arg Lys Asn Asp Asp Lys Val Phe Ser
850 855 860

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

Lys Glu Ala Lys Tyr Ile Tyr Phe Asn Glu Leu Gln Ile Leu Gly Tyr
885 890 895

Pro Gly Val Val Ala Lys Lys Thr Ala Asp Asp Leu Arg Pro Thr Glu
900 905 910

Ala Asp Lys Ser Asp Asp Lys Ser Asp Lys Asn Asp Thr Glu Ala Lys
915 920 925

<210> 6

<211> 928

<212> PRT

<213> Artificial

<220>

<223> Amino acid sequence of Endo-Si D241M

<400> 6

Met Asn Lys Arg Leu Leu Val Lys Arg Thr Phe Gly Cys Val Cys Ala
1 5 10 15

Ala Ala Ile Leu Gly Val Ala Pro Leu Ser His Pro Thr Ile Val Glu
20 25 30

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

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

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

His Lys Pro Val Ser Pro Lys Gln Ala Leu Gln Asn Ala Lys Lys Ala
 85 90 95

Asp Ala Gln Ala Glu Arg Leu Ala Lys Met Thr Ile Pro Lys Lys Glu
 100 105 110

Glu Leu Lys Ala Leu Glu Gly Pro Leu Tyr Gly Gly Tyr Phe Arg Thr
 115 120 125

Trp Gln Asp Lys Thr Ser Asp Pro Thr Glu Thr Asn Lys Val Asn Ser
 130 135 140

Phe Gly Glu Leu Pro Lys Glu Val Asp Leu Ala Phe Val Phe His Asp
 145 150 155 160

Tyr Thr Lys Asp Tyr Ser Leu Phe Trp Glu Glu Leu Ala Thr Lys Gln
 165 170 175

Val Pro Lys Leu Asn Lys Gln Gly Thr Arg Val Ile Arg Thr Ile Pro
 180 185 190

Trp Arg Phe Leu Ser Gly Ala Asp His Ser Asp Ile Ser Ala Asp Lys
 195 200 205

Glu Lys Phe Pro Asn Thr Glu Ala Gly Asn Lys Ala Leu Ala Lys Ala
 210 215 220

Ile Val Asp Glu Tyr Val Tyr Lys Tyr Asn Leu Asp Gly Leu Asp Ile
 225 230 235 240

Met Ile Glu Arg Asp Ser Val Pro Lys Val Asn Asp Lys Glu Asp Pro
 245 250 255

Glu Ala Leu Ala Arg Thr Val Glu Val Phe Lys Glu Ile Gly Lys Leu
 260 265 270

Ile Gly Ala Asn Gly Ala Asp Lys Ser Arg Leu Leu Ile Met Asp Thr

275					280					285					
Thr	Tyr	Thr	Ala	Glu	Glu	Asn	Pro	Leu	Ile	Lys	Glu	Thr	Ala	Gln	Tyr
	290					295					300				
Leu	Asn	Leu	Leu	Leu	Val	Gln	Val	Tyr	Gly	Phe	Ser	Gly	Glu	Asn	Gly
305					310					315					320
Asn	Tyr	Leu	His	His	Lys	Asn	Ile	Leu	Asp	Glu	Thr	Ser	Ser	Met	Glu
				325					330					335	
Gly	Arg	Trp	Gln	Gly	Tyr	Ser	Lys	Tyr	Ile	Arg	Pro	Glu	Gln	Tyr	Met
			340					345					350		
Val	Gly	Phe	Ser	Phe	Tyr	Glu	Glu	Lys	Asp	Phe	Asn	Asn	Arg	Trp	Lys
		355					360					365			
Asp	Ile	Asn	Glu	Glu	Asp	Pro	Ser	Asp	Pro	His	Ile	Gly	Glu	Lys	Ile
	370					375					380				
Gln	Gly	Thr	Arg	Ala	Glu	Arg	Tyr	Ala	Lys	Trp	Gln	Pro	Lys	Thr	Gly
385					390					395					400
Gly	Leu	Lys	Gly	Gly	Leu	Phe	Ser	Tyr	Ala	Ile	Asp	Arg	Asp	Gly	Val
				405					410					415	
Ala	Gln	Pro	Lys	Gln	Lys	Thr	Glu	His	Pro	Glu	Leu	Asp	Lys	Ile	Val
			420					425					430		
Lys	Ser	Glu	Tyr	Lys	Val	Ser	Lys	Ala	Leu	Lys	Lys	Leu	Met	Met	Thr
		435					440					445			
Asp	Asp	Gln	Tyr	Gln	Pro	Ile	Asp	Gln	Ser	Asp	Phe	Pro	Asp	Lys	Ala
	450					455					460				
Leu	Arg	Glu	Ser	Ile	Ile	Lys	Gln	Val	Gly	Thr	Arg	Arg	Gly	Asp	Leu
465					470					475					480
Glu	Arg	Phe	Lys	Gly	Thr	Leu	Arg	Leu	Asp	Asn	Pro	Glu	Ile	Lys	Asp
				485					490					495	
Leu	Thr	Gly	Leu	Asn	Lys	Leu	Lys	Arg	Val	Ala	Lys	Leu	Glu	Leu	Ile
			500					505					510		

Asn Leu Pro Lys Ile Thr Lys Ile Asp Lys Asp Asp Leu Pro Gln Asn
515 520 525

Leu Lys Pro Leu Thr Asp Asn Gln Lys Ser Asn Leu Glu Ile Lys Gly
530 535 540

Thr Tyr Asp Asp Ser Lys Leu Tyr Lys Asp Ile Pro Ala Phe Asp Leu
545 550 555 560

Val Ile Ser Gly Leu Ser Gly Leu Glu Ser Leu Asp Ile Ser Gly His
565 570 575

Gln Arg Asp Thr Leu Ser Gly Ile Asp Ala Ser Thr Leu Pro Ser Leu
580 585 590

Lys Ala Ile Asn Ile Ser Asp Asn His Phe Asp Leu Ala Gln Gly Thr
595 600 605

Glu Asn Arg His Ile Leu Asp Thr Ile Leu Ala Thr Leu Ala Lys Asn
610 615 620

Gly Ala Ser Thr Ala Ser Phe Asp Lys Gln Lys Pro Lys Gly Leu Tyr
625 630 635 640

Pro Glu Ser Tyr Ser Thr Ala Pro Leu His Leu Gln Val Gly Gln Gly
645 650 655

Lys Ile Asn Val Ile Asp Asp Leu Ile Phe Gly Thr Arg Thr Asn Gln
660 665 670

Asn Thr Leu Ile Asn Thr Glu Asn Asp Phe Glu Ala Tyr Lys Glu Gln
675 680 685

Thr Ile Gln Gly Lys Pro Phe Ile Ala Pro Asp Tyr Leu Tyr Asp Asn
690 695 700

Phe Lys Val Ser Tyr Lys Glu Tyr Ser Ala Ser Ile Val Asp Ser Thr
705 710 715 720

Leu Ala Glu Thr Thr Asp Lys Thr Ile Asp Thr Ala Lys Ala Glu Thr
725 730 735

Tyr Gln Val Thr Val Ser Asn Lys Asp Gly Lys Thr Val His Ser Val

740

745

750

Lys Val Ile Val Gly Asp Glu Lys Pro Met Met Val Asn Leu Ala Gln
 755 760 765

Asp Ala Lys Ile Ile Gly Thr Asp Asn Met Thr Gln Ser Ala Lys Val
 770 775 780

Phe Asp Gly Gln Lys Asp Gln Phe Leu Leu Ser Trp Asn Lys Asp Ser
 785 790 795 800

Ser Val Ile Phe Glu Leu Lys Thr Pro Gly Thr Ala Lys His Trp Arg
 805 810 815

Phe Phe Asp Asp Gly Lys Asn Asp Ser Val Thr Leu Ser Val Phe Lys
 820 825 830

Gly Asp Ala Ser Asn Phe Glu Thr Glu Lys Asp Lys Ala Glu Asn Trp
 835 840 845

Val Glu Ile Thr Lys Asp Ser Arg Lys Asn Asp Asp Lys Val Phe Ser
 850 855 860

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

Lys Glu Ala Lys Tyr Ile Tyr Phe Asn Glu Leu Gln Ile Leu Gly Tyr
 885 890 895

Pro Gly Val Val Ala Lys Lys Thr Ala Asp Asp Leu Arg Pro Thr Glu
 900 905 910

Ala Asp Lys Ser Asp Asp Lys Ser Asp Lys Asn Asp Thr Glu Ala Lys
 915 920 925

<210> 7
 <211> 928
 <212> PRT
 <213> Artificial

<220>
 <223> Amino acid sequence of Endo-Si D241M/Q311L

<400> 7

Met Asn Lys Arg Leu Leu Val Lys Arg Thr Phe Gly Cys Val Cys Ala

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

Met Ile Glu Arg Asp₂₄₅ Ser Val Pro Lys Val₂₅₀ Asn Asp Lys Glu Asp₂₅₅ Pro

Glu Ala Leu Ala Arg Thr Val Glu Val Phe Lys Glu Ile Gly Lys Leu
260 265 270

Ile Gly Ala Asn Gly Ala Asp Lys Ser Arg Leu Leu Ile Met Asp Thr
275 280 285

Thr Tyr Thr Ala Glu Glu Asn Pro Leu Ile Lys Glu Thr Ala Gln Tyr
290 295 300

Leu Asn Leu Leu Leu Val Leu Val Tyr Gly Phe Ser Gly Glu Asn Gly
305 310 315 320

Asn Tyr Leu His His Lys Asn Ile Leu Asp Glu Thr Ser Ser Met Glu
325 330 335

Gly Arg Trp Gln Gly Tyr Ser Lys Tyr Ile Arg Pro Glu Gln Tyr Met
340 345 350

Val Gly Phe Ser Phe Tyr Glu Glu Lys Asp Phe Asn Asn Arg Trp Lys
355 360 365

Asp Ile Asn Glu Glu Asp Pro Ser Asp Pro His Ile Gly Glu Lys Ile
370 375 380

Gln Gly Thr Arg Ala Glu Arg Tyr Ala Lys Trp Gln Pro Lys Thr Gly
385 390 395 400

Gly Leu Lys Gly Gly Leu Phe Ser Tyr Ala Ile Asp Arg Asp Gly Val
405 410 415

Ala Gln Pro Lys Gln Lys Thr Glu His Pro Glu Leu Asp Lys Ile Val
420 425 430

Lys Ser Glu Tyr Lys Val Ser Lys Ala Leu Lys Lys Leu Met Met Thr
435 440 445

Asp Asp Gln Tyr Gln Pro Ile Asp Gln Ser Asp Phe Pro Asp Lys Ala
450 455 460

Leu Arg Glu Ser Ile Ile Lys Gln Val Gly Thr Arg Arg Gly Asp Leu

465		470		475		480
Glu Arg Phe Lys	Gly 485	Thr Leu Arg Leu	Asp 490	Asn Pro Glu Ile	Lys 495	Asp
Leu Thr Gly Leu	Asn 500	Lys Leu Lys Arg	Val 505	Ala Lys Leu Glu	Leu 510	Ile
Asn Leu Pro Lys	Ile 515	Thr Lys Ile Asp	Lys 520	Asp Asp Leu Pro	Gln 525	Asn
Leu Lys Pro Leu	Thr 530	Asp Asn Gln Lys	Ser 535	Asn Leu Glu Ile	Lys 540	Gly
Thr Tyr Asp Asp	Ser 545	Lys Leu Tyr Lys	Asp 550	Ile Pro Ala Phe	Asp 555	Leu 560
Val Ile Ser Gly	Leu 565	Ser Gly Leu Glu	Ser 570	Leu Asp Ile Ser	Gly 575	His
Gln Arg Asp Thr	Leu 580	Ser Gly Ile Asp	Ala 585	Ser Thr Leu Pro	Ser 590	Leu
Lys Ala Ile Asn	Ile 595	Ser Asp Asn His	Phe 600	Asp Leu Ala Gln	Gly 605	Thr
Glu Asn Arg His	Ile 610	Leu Asp Thr Ile	Leu 615	Ala Thr Leu Ala	Lys 620	Asn
Gly Ala Ser Thr	Ala 625	Ser Phe Asp Lys	Gln 630	Lys Pro Lys Gly	Leu 635	Tyr 640
Pro Glu Ser Tyr	Ser 645	Thr Ala Pro Leu	His 650	Leu Gln Val Gly	Gln 655	Gly
Lys Ile Asn Val	Ile 660	Asp Asp Leu Ile	Phe 665	Gly Thr Arg Thr	Asn 670	Gln
Asn Thr Leu Ile	Asn 675	Thr Glu Asn Asp	Phe 680	Glu Ala Tyr Lys	Glu 685	Gln
Thr Ile Gln Gly	Lys 690	Pro Phe Ile Ala	Pro 695	Asp Tyr Leu Tyr	Asp 700	Asn

Phe Lys Val Ser Tyr Lys Glu Tyr Ser Ala Ser Ile Val Asp Ser Thr
705 710 715 720

Leu Ala Glu Thr Thr Asp Lys Thr Ile Asp Thr Ala Lys Ala Glu Thr
725 730 735

Tyr Gln Val Thr Val Ser Asn Lys Asp Gly Lys Thr Val His Ser Val
740 745 750

Lys Val Ile Val Gly Asp Glu Lys Pro Met Met Val Asn Leu Ala Gln
755 760 765

Asp Ala Lys Ile Ile Gly Thr Asp Asn Met Thr Gln Ser Ala Lys Val
770 775 780

Phe Asp Gly Gln Lys Asp Gln Phe Leu Leu Ser Trp Asn Lys Asp Ser
785 790 795 800

Ser Val Ile Phe Glu Leu Lys Thr Pro Gly Thr Ala Lys His Trp Arg
805 810 815

Phe Phe Asp Asp Gly Lys Asn Asp Ser Val Thr Leu Ser Val Phe Lys
820 825 830

Gly Asp Ala Ser Asn Phe Glu Thr Glu Lys Asp Lys Ala Glu Asn Trp
835 840 845

Val Glu Ile Thr Lys Asp Ser Arg Lys Asn Asp Asp Lys Val Phe Ser
850 855 860

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

Lys Glu Ala Lys Tyr Ile Tyr Phe Asn Glu Leu Gln Ile Leu Gly Tyr
885 890 895

Pro Gly Val Val Ala Lys Lys Thr Ala Asp Asp Leu Arg Pro Thr Glu
900 905 910

Ala Asp Lys Ser Asp Asp Lys Ser Asp Lys Asn Asp Thr Glu Ala Lys
915 920 925

<211> 928
 <212> PRT
 <213> Artificial

<220>

<223> Amino acid sequence of Endo-Si D241M/E360Q

<400> 8

Met Asn Lys Arg Leu Leu Val Lys Arg Thr Phe Gly Cys Val Cys Ala
 1 5 10 15

Ala Ala Ile Leu Gly Val Ala Pro Leu Ser His Pro Thr Ile Val Glu
 20 25 30

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

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

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

His Lys Pro Val Ser Pro Lys Gln Ala Leu Gln Asn Ala Lys Lys Ala
 85 90 95

Asp Ala Gln Ala Glu Arg Leu Ala Lys Met Thr Ile Pro Lys Lys Glu
 100 105 110

Glu Leu Lys Ala Leu Glu Gly Pro Leu Tyr Gly Gly Tyr Phe Arg Thr
 115 120 125

Trp Gln Asp Lys Thr Ser Asp Pro Thr Glu Thr Asn Lys Val Asn Ser
 130 135 140

Phe Gly Glu Leu Pro Lys Glu Val Asp Leu Ala Phe Val Phe His Asp
 145 150 155 160

Tyr Thr Lys Asp Tyr Ser Leu Phe Trp Glu Glu Leu Ala Thr Lys Gln
 165 170 175

Val Pro Lys Leu Asn Lys Gln Gly Thr Arg Val Ile Arg Thr Ile Pro
 180 185 190

Trp Arg Phe Leu Ser Gly Ala Asp His Ser Asp Ile Ser Ala Asp Lys

195						200						205					
Glu	Lys	Phe	Pro	Asn	Thr	Glu	Ala	Gly	Asn	Lys	Ala	Leu	Ala	Lys	Ala		
	210						215					220					
Ile	Val	Asp	Glu	Tyr	Val	Tyr	Lys	Tyr	Asn	Leu	Asp	Gly	Leu	Asp	Ile		
	225						230					235			240		
Met	Ile	Glu	Arg	Asp	Ser	Val	Pro	Lys	Val	Asn	Asp	Lys	Glu	Asp	Pro		
				245						250				255			
Glu	Ala	Leu	Ala	Arg	Thr	Val	Glu	Val	Phe	Lys	Glu	Ile	Gly	Lys	Leu		
			260						265					270			
Ile	Gly	Ala	Asn	Gly	Ala	Asp	Lys	Ser	Arg	Leu	Leu	Ile	Met	Asp	Thr		
		275					280						285				
Thr	Tyr	Thr	Ala	Glu	Glu	Asn	Pro	Leu	Ile	Lys	Glu	Thr	Ala	Gln	Tyr		
	290						295					300					
Leu	Asn	Leu	Leu	Leu	Val	Gln	Val	Tyr	Gly	Phe	Ser	Gly	Glu	Asn	Gly		
	305						310			315					320		
Asn	Tyr	Leu	His	His	Lys	Asn	Ile	Leu	Asp	Glu	Thr	Ser	Ser	Met	Glu		
				325						330				335			
Gly	Arg	Trp	Gln	Gly	Tyr	Ser	Lys	Tyr	Ile	Arg	Pro	Glu	Gln	Tyr	Met		
			340						345					350			
Val	Gly	Phe	Ser	Phe	Tyr	Glu	Gln	Lys	Asp	Phe	Asn	Asn	Arg	Trp	Lys		
		355						360					365				
Asp	Ile	Asn	Glu	Glu	Asp	Pro	Ser	Asp	Pro	His	Ile	Gly	Glu	Lys	Ile		
	370						375						380				
Gln	Gly	Thr	Arg	Ala	Glu	Arg	Tyr	Ala	Lys	Trp	Gln	Pro	Lys	Thr	Gly		
	385						390			395					400		
Gly	Leu	Lys	Gly	Gly	Leu	Phe	Ser	Tyr	Ala	Ile	Asp	Arg	Asp	Gly	Val		
				405					410					415			
Ala	Gln	Pro	Lys	Gln	Lys	Thr	Glu	His	Pro	Glu	Leu	Asp	Lys	Ile	Val		
			420					425					430				

Lys Ser Glu Tyr Lys Val Ser Lys Ala Leu Lys Lys Leu Met Met Thr
 435 440 445

Asp Asp Gln Tyr Gln Pro Ile Asp Gln Ser Asp Phe Pro Asp Lys Ala
 450 455 460

Leu Arg Glu Ser Ile Ile Lys Gln Val Gly Thr Arg Arg Gly Asp Leu
 465 470 475 480

Glu Arg Phe Lys Gly Thr Leu Arg Leu Asp Asn Pro Glu Ile Lys Asp
 485 490 495

Leu Thr Gly Leu Asn Lys Leu Lys Arg Val Ala Lys Leu Glu Leu Ile
 500 505 510

Asn Leu Pro Lys Ile Thr Lys Ile Asp Lys Asp Asp Leu Pro Gln Asn
 515 520 525

Leu Lys Pro Leu Thr Asp Asn Gln Lys Ser Asn Leu Glu Ile Lys Gly
 530 535 540

Thr Tyr Asp Asp Ser Lys Leu Tyr Lys Asp Ile Pro Ala Phe Asp Leu
 545 550 555 560

Val Ile Ser Gly Leu Ser Gly Leu Glu Ser Leu Asp Ile Ser Gly His
 565 570 575

Gln Arg Asp Thr Leu Ser Gly Ile Asp Ala Ser Thr Leu Pro Ser Leu
 580 585 590

Lys Ala Ile Asn Ile Ser Asp Asn His Phe Asp Leu Ala Gln Gly Thr
 595 600 605

Glu Asn Arg His Ile Leu Asp Thr Ile Leu Ala Thr Leu Ala Lys Asn
 610 615 620

Gly Ala Ser Thr Ala Ser Phe Asp Lys Gln Lys Pro Lys Gly Leu Tyr
 625 630 635 640

Pro Glu Ser Tyr Ser Thr Ala Pro Leu His Leu Gln Val Gly Gln Gly
 645 650 655

Lys Ile Asn Val Ile Asp Asp Leu Ile Phe Gly Thr Arg Thr Asn Gln

660

665

670

Asn Thr Leu Ile Asn Thr Glu Asn Asp Phe Glu Ala Tyr Lys Glu Gln
 675 680 685

Thr Ile Gln Gly Lys Pro Phe Ile Ala Pro Asp Tyr Leu Tyr Asp Asn
 690 695 700

Phe Lys Val Ser Tyr Lys Glu Tyr Ser Ala Ser Ile Val Asp Ser Thr
 705 710 715 720

Leu Ala Glu Thr Thr Asp Lys Thr Ile Asp Thr Ala Lys Ala Glu Thr
 725 730 735

Tyr Gln Val Thr Val Ser Asn Lys Asp Gly Lys Thr Val His Ser Val
 740 745 750

Lys Val Ile Val Gly Asp Glu Lys Pro Met Met Val Asn Leu Ala Gln
 755 760 765

Asp Ala Lys Ile Ile Gly Thr Asp Asn Met Thr Gln Ser Ala Lys Val
 770 775 780

Phe Asp Gly Gln Lys Asp Gln Phe Leu Leu Ser Trp Asn Lys Asp Ser
 785 790 795 800

Ser Val Ile Phe Glu Leu Lys Thr Pro Gly Thr Ala Lys His Trp Arg
 805 810 815

Phe Phe Asp Asp Gly Lys Asn Asp Ser Val Thr Leu Ser Val Phe Lys
 820 825 830

Gly Asp Ala Ser Asn Phe Glu Thr Glu Lys Asp Lys Ala Glu Asn Trp
 835 840 845

Val Glu Ile Thr Lys Asp Ser Arg Lys Asn Asp Asp Lys Val Phe Ser
 850 855 860

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

Lys Glu Ala Lys Tyr Ile Tyr Phe Asn Glu Leu Gln Ile Leu Gly Tyr
 885 890 895

Pro Gly Val Val Ala Lys Lys Thr Ala Asp Asp Leu Arg Pro Thr Glu
 900 905 910

Ala Asp Lys Ser Asp Asp Lys Ser Asp Lys Asn Asp Thr Glu Ala Lys
 915 920 925

<210> 9

<211> 928

<212> PRT

<213> Artificial

<220>

<223> Amino acid sequence of Endo-Si T190Q/D241Q

<400> 9

Met Asn Lys Arg Leu Leu Val Lys Arg Thr Phe Gly Cys Val Cys Ala
 1 5 10 15

Ala Ala Ile Leu Gly Val Ala Pro Leu Ser His Pro Thr Ile Val Glu
 20 25 30

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

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

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

His Lys Pro Val Ser Pro Lys Gln Ala Leu Gln Asn Ala Lys Lys Ala
 85 90 95

Asp Ala Gln Ala Glu Arg Leu Ala Lys Met Thr Ile Pro Lys Lys Glu
 100 105 110

Glu Leu Lys Ala Leu Glu Gly Pro Leu Tyr Gly Gly Tyr Phe Arg Thr
 115 120 125

Trp Gln Asp Lys Thr Ser Asp Pro Thr Glu Thr Asn Lys Val Asn Ser
 130 135 140

Phe Gly Glu Leu Pro Lys Glu Val Asp Leu Ala Phe Val Phe His Asp
 145 150 155 160

Tyr Thr Lys Asp Tyr Ser Leu Phe Trp Glu Glu Leu Ala Thr Lys Gln
165 170 175

Val Pro Lys Leu Asn Lys Gln Gly Thr Arg Val Ile Arg Gln Ile Pro
180 185 190

Trp Arg Phe Leu Ser Gly Ala Asp His Ser Asp Ile Ser Ala Asp Lys
195 200 205

Glu Lys Phe Pro Asn Thr Glu Ala Gly Asn Lys Ala Leu Ala Lys Ala
210 215 220

Ile Val Asp Glu Tyr Val Tyr Lys Tyr Asn Leu Asp Gly Leu Asp Ile
225 230 235 240

Gln Ile Glu Arg Asp Ser Val Pro Lys Val Asn Asp Lys Glu Asp Pro
245 250 255

Glu Ala Leu Ala Arg Thr Val Glu Val Phe Lys Glu Ile Gly Lys Leu
260 265 270

Ile Gly Ala Asn Gly Ala Asp Lys Ser Arg Leu Leu Ile Met Asp Thr
275 280 285

Thr Tyr Thr Ala Glu Glu Asn Pro Leu Ile Lys Glu Thr Ala Gln Tyr
290 295 300

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

Asn Tyr Leu His His Lys Asn Ile Leu Asp Glu Thr Ser Ser Met Glu
325 330 335

Gly Arg Trp Gln Gly Tyr Ser Lys Tyr Ile Arg Pro Glu Gln Tyr Met
340 345 350

Val Gly Phe Ser Phe Tyr Glu Glu Lys Asp Phe Asn Asn Arg Trp Lys
355 360 365

Asp Ile Asn Glu Glu Asp Pro Ser Asp Pro His Ile Gly Glu Lys Ile
370 375 380

Gln Gly Thr Arg Ala Glu Arg Tyr Ala Lys Trp Gln Pro Lys Thr Gly

385		390		395		400
Gly Leu Lys Gly	Gly Leu Phe Ser Tyr	Ala Ile Asp Arg Asp	Gly Val			
	405	410	415			
Ala Gln Pro Lys	Gln Lys Thr Glu His Pro Glu Leu Asp	Lys Ile Val				
	420	425	430			
Lys Ser Glu Tyr	Lys Val Ser Lys Ala Leu Lys Lys	Leu Met Met Thr				
	435	440	445			
Asp Asp Gln Tyr	Gln Pro Ile Asp Gln Ser Asp Phe Pro Asp	Lys Ala				
	450	455	460			
Leu Arg Glu Ser	Ile Ile Lys Gln Val Gly Thr Arg Arg Gly Asp	Leu				
	465	470	475			480
Glu Arg Phe Lys	Gly Thr Leu Arg Leu Asp Asn Pro Glu Ile Lys Asp					
	485	490	495			
Leu Thr Gly Leu	Asn Lys Leu Lys Arg Val Ala Lys Leu Glu Leu Ile					
	500	505	510			
Asn Leu Pro Lys	Ile Thr Lys Ile Asp Lys Asp Asp Leu Pro Gln Asn					
	515	520	525			
Leu Lys Pro Leu	Thr Asp Asn Gln Lys Ser Asn Leu Glu Ile Lys Gly					
	530	535	540			
Thr Tyr Asp Asp	Ser Lys Leu Tyr Lys Asp Ile Pro Ala Phe Asp	Leu				
	545	550	555			560
Val Ile Ser Gly	Leu Ser Gly Leu Glu Ser Leu Asp Ile Ser Gly His					
	565	570	575			
Gln Arg Asp Thr	Leu Ser Gly Ile Asp Ala Ser Thr Leu Pro Ser Leu					
	580	585	590			
Lys Ala Ile Asn	Ile Ser Asp Asn His Phe Asp Leu Ala Gln Gly Thr					
	595	600	605			
Glu Asn Arg His	Ile Leu Asp Thr Ile Leu Ala Thr Leu Ala Lys Asn					
	610	615	620			

Gly Ala Ser Thr Ala Ser Phe Asp Lys Gln Lys Pro Lys Gly Leu Tyr
625 630 635 640

Pro Glu Ser Tyr Ser Thr Ala Pro Leu His Leu Gln Val Gly Gln Gly
645 650 655

Lys Ile Asn Val Ile Asp Asp Leu Ile Phe Gly Thr Arg Thr Asn Gln
660 665 670

Asn Thr Leu Ile Asn Thr Glu Asn Asp Phe Glu Ala Tyr Lys Glu Gln
675 680 685

Thr Ile Gln Gly Lys Pro Phe Ile Ala Pro Asp Tyr Leu Tyr Asp Asn
690 695 700

Phe Lys Val Ser Tyr Lys Glu Tyr Ser Ala Ser Ile Val Asp Ser Thr
705 710 715 720

Leu Ala Glu Thr Thr Asp Lys Thr Ile Asp Thr Ala Lys Ala Glu Thr
725 730 735

Tyr Gln Val Thr Val Ser Asn Lys Asp Gly Lys Thr Val His Ser Val
740 745 750

Lys Val Ile Val Gly Asp Glu Lys Pro Met Met Val Asn Leu Ala Gln
755 760 765

Asp Ala Lys Ile Ile Gly Thr Asp Asn Met Thr Gln Ser Ala Lys Val
770 775 780

Phe Asp Gly Gln Lys Asp Gln Phe Leu Leu Ser Trp Asn Lys Asp Ser
785 790 795 800

Ser Val Ile Phe Glu Leu Lys Thr Pro Gly Thr Ala Lys His Trp Arg
805 810 815

Phe Phe Asp Asp Gly Lys Asn Asp Ser Val Thr Leu Ser Val Phe Lys
820 825 830

Gly Asp Ala Ser Asn Phe Glu Thr Glu Lys Asp Lys Ala Glu Asn Trp
835 840 845

Val Glu Ile Thr Lys Asp Ser Arg Lys Asn Asp Asp Lys Val Phe Ser

850

855

860

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

Lys Glu Ala Lys Tyr Ile Tyr Phe Asn Glu Leu Gln Ile Leu Gly Tyr
 885 890 895

Pro Gly Val Val Ala Lys Lys Thr Ala Asp Asp Leu Arg Pro Thr Glu
 900 905 910

Ala Asp Lys Ser Asp Asp Lys Ser Asp Lys Asn Asp Thr Glu Ala Lys
 915 920 925

<210> 10

<211> 928

<212> PRT

<213> Artificial

<220>

<223> Amino acid sequence of Endo-Si T190Q

<400> 10

Met Asn Lys Arg Leu Leu Val Lys Arg Thr Phe Gly Cys Val Cys Ala
 1 5 10 15

Ala Ala Ile Leu Gly Val Ala Pro Leu Ser His Pro Thr Ile Val Glu
 20 25 30

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

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

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

His Lys Pro Val Ser Pro Lys Gln Ala Leu Gln Asn Ala Lys Lys Ala
 85 90 95

Asp Ala Gln Ala Glu Arg Leu Ala Lys Met Thr Ile Pro Lys Lys Glu
 100 105 110

Glu Leu Lys Ala Leu Glu Gly Pro Leu Tyr Gly Gly Tyr Phe Arg Thr

115					120					125					
Trp	Gln	Asp	Lys	Thr	Ser	Asp	Pro	Thr	Glu	Thr	Asn	Lys	Val	Asn	Ser
	130					135					140				
Phe	Gly	Glu	Leu	Pro	Lys	Glu	Val	Asp	Leu	Ala	Phe	Val	Phe	His	Asp
145					150					155					160
Tyr	Thr	Lys	Asp	Tyr	Ser	Leu	Phe	Trp	Glu	Glu	Leu	Ala	Thr	Lys	Gln
				165					170					175	
Val	Pro	Lys	Leu	Asn	Lys	Gln	Gly	Thr	Arg	Val	Ile	Arg	Gln	Ile	Pro
			180					185					190		
Trp	Arg	Phe	Leu	Ser	Gly	Ala	Asp	His	Ser	Asp	Ile	Ser	Ala	Asp	Lys
		195					200					205			
Glu	Lys	Phe	Pro	Asn	Thr	Glu	Ala	Gly	Asn	Lys	Ala	Leu	Ala	Lys	Ala
	210					215					220				
Ile	Val	Asp	Glu	Tyr	Val	Tyr	Lys	Tyr	Asn	Leu	Asp	Gly	Leu	Asp	Ile
225					230					235					240
Asp	Ile	Glu	Arg	Asp	Ser	Val	Pro	Lys	Val	Asn	Asp	Lys	Glu	Asp	Pro
				245					250					255	
Glu	Ala	Leu	Ala	Arg	Thr	Val	Glu	Val	Phe	Lys	Glu	Ile	Gly	Lys	Leu
			260					265					270		
Ile	Gly	Ala	Asn	Gly	Ala	Asp	Lys	Ser	Arg	Leu	Leu	Ile	Met	Asp	Thr
		275					280					285			
Thr	Tyr	Thr	Ala	Glu	Glu	Asn	Pro	Leu	Ile	Lys	Glu	Thr	Ala	Gln	Tyr
	290					295					300				
Leu	Asn	Leu	Leu	Leu	Val	Gln	Val	Tyr	Gly	Phe	Ser	Gly	Glu	Asn	Gly
305					310					315					320
Asn	Tyr	Leu	His	His	Lys	Asn	Ile	Leu	Asp	Glu	Thr	Ser	Ser	Met	Glu
				325					330					335	
Gly	Arg	Trp	Gln	Gly	Tyr	Ser	Lys	Tyr	Ile	Arg	Pro	Glu	Gln	Tyr	Met
			340					345					350		

Val Gly Phe Ser Phe Tyr Glu Glu Lys Asp Phe Asn Asn Arg Trp Lys
 355 360 365

Asp Ile Asn Glu Glu Asp Pro Ser Asp Pro His Ile Gly Glu Lys Ile
 370 375 380

Gln Gly Thr Arg Ala Glu Arg Tyr Ala Lys Trp Gln Pro Lys Thr Gly
 385 390 395 400

Gly Leu Lys Gly Gly Leu Phe Ser Tyr Ala Ile Asp Arg Asp Gly Val
 405 410 415

Ala Gln Pro Lys Gln Lys Thr Glu His Pro Glu Leu Asp Lys Ile Val
 420 425 430

Lys Ser Glu Tyr Lys Val Ser Lys Ala Leu Lys Lys Leu Met Met Thr
 435 440 445

Asp Asp Gln Tyr Gln Pro Ile Asp Gln Ser Asp Phe Pro Asp Lys Ala
 450 455 460

Leu Arg Glu Ser Ile Ile Lys Gln Val Gly Thr Arg Arg Gly Asp Leu
 465 470 475 480

Glu Arg Phe Lys Gly Thr Leu Arg Leu Asp Asn Pro Glu Ile Lys Asp
 485 490 495

Leu Thr Gly Leu Asn Lys Leu Lys Arg Val Ala Lys Leu Glu Leu Ile
 500 505 510

Asn Leu Pro Lys Ile Thr Lys Ile Asp Lys Asp Asp Leu Pro Gln Asn
 515 520 525

Leu Lys Pro Leu Thr Asp Asn Gln Lys Ser Asn Leu Glu Ile Lys Gly
 530 535 540

Thr Tyr Asp Asp Ser Lys Leu Tyr Lys Asp Ile Pro Ala Phe Asp Leu
 545 550 555 560

Val Ile Ser Gly Leu Ser Gly Leu Glu Ser Leu Asp Ile Ser Gly His
 565 570 575

Gln Arg Asp Thr Leu Ser Gly Ile Asp Ala Ser Thr Leu Pro Ser Leu

580					585					590					
Lys	Ala	Ile	Asn	Ile	Ser	Asp	Asn	His	Phe	Asp	Leu	Ala	Gln	Gly	Thr
		595					600					605			
Glu	Asn	Arg	His	Ile	Leu	Asp	Thr	Ile	Leu	Ala	Thr	Leu	Ala	Lys	Asn
	610					615					620				
Gly	Ala	Ser	Thr	Ala	Ser	Phe	Asp	Lys	Gln	Lys	Pro	Lys	Gly	Leu	Tyr
625					630					635					640
Pro	Glu	Ser	Tyr	Ser	Thr	Ala	Pro	Leu	His	Leu	Gln	Val	Gly	Gln	Gly
				645					650					655	
Lys	Ile	Asn	Val	Ile	Asp	Asp	Leu	Ile	Phe	Gly	Thr	Arg	Thr	Asn	Gln
			660					665					670		
Asn	Thr	Leu	Ile	Asn	Thr	Glu	Asn	Asp	Phe	Glu	Ala	Tyr	Lys	Glu	Gln
		675					680					685			
Thr	Ile	Gln	Gly	Lys	Pro	Phe	Ile	Ala	Pro	Asp	Tyr	Leu	Tyr	Asp	Asn
	690					695					700				
Phe	Lys	Val	Ser	Tyr	Lys	Glu	Tyr	Ser	Ala	Ser	Ile	Val	Asp	Ser	Thr
705					710					715					720
Leu	Ala	Glu	Thr	Thr	Asp	Lys	Thr	Ile	Asp	Thr	Ala	Lys	Ala	Glu	Thr
				725					730					735	
Tyr	Gln	Val	Thr	Val	Ser	Asn	Lys	Asp	Gly	Lys	Thr	Val	His	Ser	Val
			740					745					750		
Lys	Val	Ile	Val	Gly	Asp	Glu	Lys	Pro	Met	Met	Val	Asn	Leu	Ala	Gln
		755					760					765			
Asp	Ala	Lys	Ile	Ile	Gly	Thr	Asp	Asn	Met	Thr	Gln	Ser	Ala	Lys	Val
	770					775					780				
Phe	Asp	Gly	Gln	Lys	Asp	Gln	Phe	Leu	Leu	Ser	Trp	Asn	Lys	Asp	Ser
785					790					795					800
Ser	Val	Ile	Phe	Glu	Leu	Lys	Thr	Pro	Gly	Thr	Ala	Lys	His	Trp	Arg
				805					810					815	

Phe Phe Asp Asp Gly Lys Asn Asp Ser Val Thr Leu Ser Val Phe Lys
820 825 830

Gly Asp Ala Ser Asn Phe Glu Thr Glu Lys Asp Lys Ala Glu Asn Trp
835 840 845

Val Glu Ile Thr Lys Asp Ser Arg Lys Asn Asp Asp Lys Val Phe Ser
850 855 860

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

Lys Glu Ala Lys Tyr Ile Tyr Phe Asn Glu Leu Gln Ile Leu Gly Tyr
885 890 895

Pro Gly Val Val Ala Lys Lys Thr Ala Asp Asp Leu Arg Pro Thr Glu
900 905 910

Ala Asp Lys Ser Asp Asp Lys Ser Asp Lys Asn Asp Thr Glu Ala Lys
915 920 925

<210> 11
<211> 928
<212> PRT
<213> Artificial

<220>
<223> Amino acid sequence of Endo-Si T190Q/D241M
<400> 11

Met Asn Lys Arg Leu Leu Val Lys Arg Thr Phe Gly Cys Val Cys Ala
1 5 10 15

Ala Ala Ile Leu Gly Val Ala Pro Leu Ser His Pro Thr Ile Val Glu
20 25 30

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

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

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

His Lys Pro Val Ser Pro Lys Gln Ala Leu Gln Asn Ala Lys Lys Ala
 85 90 95

Asp Ala Gln Ala Glu Arg Leu Ala Lys Met Thr Ile Pro Lys Lys Glu
 100 105 110

Glu Leu Lys Ala Leu Glu Gly Pro Leu Tyr Gly Gly Tyr Phe Arg Thr
 115 120 125

Trp Gln Asp Lys Thr Ser Asp Pro Thr Glu Thr Asn Lys Val Asn Ser
 130 135 140

Phe Gly Glu Leu Pro Lys Glu Val Asp Leu Ala Phe Val Phe His Asp
 145 150 155 160

Tyr Thr Lys Asp Tyr Ser Leu Phe Trp Glu Glu Leu Ala Thr Lys Gln
 165 170 175

Val Pro Lys Leu Asn Lys Gln Gly Thr Arg Val Ile Arg Gln Ile Pro
 180 185 190

Trp Arg Phe Leu Ser Gly Ala Asp His Ser Asp Ile Ser Ala Asp Lys
 195 200 205

Glu Lys Phe Pro Asn Thr Glu Ala Gly Asn Lys Ala Leu Ala Lys Ala
 210 215 220

Ile Val Asp Glu Tyr Val Tyr Lys Tyr Asn Leu Asp Gly Leu Asp Ile
 225 230 235 240

Met Ile Glu Arg Asp Ser Val Pro Lys Val Asn Asp Lys Glu Asp Pro
 245 250 255

Glu Ala Leu Ala Arg Thr Val Glu Val Phe Lys Glu Ile Gly Lys Leu
 260 265 270

Ile Gly Ala Asn Gly Ala Asp Lys Ser Arg Leu Leu Ile Met Asp Thr
 275 280 285

Thr Tyr Thr Ala Glu Glu Asn Pro Leu Ile Lys Glu Thr Ala Gln Tyr
 290 295 300

Leu Asn Leu Leu Leu Val Gln Val Tyr Gly Phe Ser Gly Glu Asn Gly

305		310		315		320
Asn Tyr Leu His	His 325	Lys Asn Ile Leu	Asp 330	Glu Thr Ser Ser	Met 335	Glu
Gly Arg Trp	Gln 340	Gly Tyr Ser Lys	Tyr 345	Ile Arg Pro Glu	Gln 350	Tyr Met
Val Gly Phe	Ser 355	Phe Tyr Glu	Glu 360	Lys Asp Phe Asn	Asn 365	Arg Trp Lys
Asp Ile	Asn 370	Glu Glu Asp	Pro 375	Ser Asp Pro His	Ile 380	Gly Glu Lys Ile
Gln 385	Gly Thr Arg	Ala Glu	Arg Tyr Ala	Lys Trp 395	Gln Pro Lys Thr	Gly 400
Gly Leu Lys	Gly 405	Gly Leu Phe Ser	Tyr Ala 410	Ile Asp Arg Asp	Gly 415	Val
Ala Gln Pro	Lys 420	Gln Lys Thr Glu	His 425	Pro Glu Leu Asp	Lys 430	Ile Val
Lys Ser	Glu 435	Tyr Lys Val Ser	Lys 440	Ala Leu Lys Lys	Leu 445	Met Met Thr
Asp Asp	Gln 450	Tyr Gln Pro	Ile 455	Asp Gln Ser Asp	Phe 460	Pro Asp Lys Ala
Leu 465	Arg Glu Ser	Ile Ile Lys	Gln Val Gly	Thr 475	Arg Arg Gly Asp	Leu 480
Glu Arg Phe	Lys 485	Gly Thr Leu Arg	Leu Asp 490	Asn Pro Glu Ile	Lys 495	Asp
Leu Thr Gly	Leu 500	Asn Lys Leu Lys	Arg 505	Val Ala Lys Leu	Glu 510	Leu Ile
Asn Leu Pro	Lys 515	Ile Thr Lys	Ile 520	Asp Lys Asp Asp	Leu 525	Pro Gln Asn
Leu Lys	Pro 530	Leu Thr Asp	Asn 535	Gln Lys Ser Asn	Leu 540	Glu Ile Lys Gly

Thr Tyr Asp Asp Ser Lys Leu Tyr Lys Asp Ile Pro Ala Phe Asp Leu
545 550 555 560

Val Ile Ser Gly Leu Ser Gly Leu Glu Ser Leu Asp Ile Ser Gly His
565 570 575

Gln Arg Asp Thr Leu Ser Gly Ile Asp Ala Ser Thr Leu Pro Ser Leu
580 585 590

Lys Ala Ile Asn Ile Ser Asp Asn His Phe Asp Leu Ala Gln Gly Thr
595 600 605

Glu Asn Arg His Ile Leu Asp Thr Ile Leu Ala Thr Leu Ala Lys Asn
610 615 620

Gly Ala Ser Thr Ala Ser Phe Asp Lys Gln Lys Pro Lys Gly Leu Tyr
625 630 635 640

Pro Glu Ser Tyr Ser Thr Ala Pro Leu His Leu Gln Val Gly Gln Gly
645 650 655

Lys Ile Asn Val Ile Asp Asp Leu Ile Phe Gly Thr Arg Thr Asn Gln
660 665 670

Asn Thr Leu Ile Asn Thr Glu Asn Asp Phe Glu Ala Tyr Lys Glu Gln
675 680 685

Thr Ile Gln Gly Lys Pro Phe Ile Ala Pro Asp Tyr Leu Tyr Asp Asn
690 695 700

Phe Lys Val Ser Tyr Lys Glu Tyr Ser Ala Ser Ile Val Asp Ser Thr
705 710 715 720

Leu Ala Glu Thr Thr Asp Lys Thr Ile Asp Thr Ala Lys Ala Glu Thr
725 730 735

Tyr Gln Val Thr Val Ser Asn Lys Asp Gly Lys Thr Val His Ser Val
740 745 750

Lys Val Ile Val Gly Asp Glu Lys Pro Met Met Val Asn Leu Ala Gln
755 760 765

Asp Ala Lys Ile Ile Gly Thr Asp Asn Met Thr Gln Ser Ala Lys Val

770

775

780

Phe Asp Gly Gln Lys Asp Gln Phe Leu Leu Ser Trp Asn Lys Asp Ser
 785 790 795 800

Ser Val Ile Phe Glu Leu Lys Thr Pro Gly Thr Ala Lys His Trp Arg
 805 810 815

Phe Phe Asp Asp Gly Lys Asn Asp Ser Val Thr Leu Ser Val Phe Lys
 820 825 830

Gly Asp Ala Ser Asn Phe Glu Thr Glu Lys Asp Lys Ala Glu Asn Trp
 835 840 845

Val Glu Ile Thr Lys Asp Ser Arg Lys Asn Asp Asp Lys Val Phe Ser
 850 855 860

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

Lys Glu Ala Lys Tyr Ile Tyr Phe Asn Glu Leu Gln Ile Leu Gly Tyr
 885 890 895

Pro Gly Val Val Ala Lys Lys Thr Ala Asp Asp Leu Arg Pro Thr Glu
 900 905 910

Ala Asp Lys Ser Asp Asp Lys Ser Asp Lys Asn Asp Thr Glu Ala Lys
 915 920 925

<210> 12

<211> 214

<212> PRT

<213> Artificial

<220>

<223> Amino acid sequence of a light chain of mAb2

<400> 12

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

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

Leu Asn Trp Tyr Gln Gln Lys Pro Gly Lys Ala Pro Lys Leu Leu Ile

35

40

45

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

Ser Gly Ser Gly Thr Asp Tyr Thr Leu Thr Ile Ser Ser Leu Gln Pro
 65 70 75 80

Glu Asp Phe Ala Thr Tyr Tyr Cys Gln Gln Gly Tyr Pro Leu Pro Trp
 85 90 95

Thr Phe Gly Gln Gly Thr Lys Val Glu Ile Lys Arg Thr Val Ala Ala
 100 105 110

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

Thr Ala Ser Val Val Cys Leu Leu Asn Asn Phe Tyr Pro Arg Glu Ala
 130 135 140

Lys Val Gln Trp Lys Val Asp Asn Ala Leu Gln Ser Gly Asn Ser Gln
 145 150 155 160

Glu Ser Val Thr Glu Gln Asp Ser Lys Asp Ser Thr Tyr Ser Leu Ser
 165 170 175

Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu Lys His Lys Val Tyr
 180 185 190

Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser Pro Val Thr Lys Ser
 195 200 205

Phe Asn Arg Gly Glu Cys
 210

<210> 13
 <211> 452
 <212> PRT
 <213> Artificial

<220>
 <223> Amino acid sequence of a heavy chain of mAb2

<400> 13

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

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

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

Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser
260 265 270

His Glu Asp Pro Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val Glu
275 280 285

Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr
290 295 300

Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln Asp Trp Leu Asn
305 310 315 320

Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala Pro
325 330 335

Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln
340 345 350

Val Tyr Thr Leu Pro Pro Ser Arg Glu Glu Met Thr Lys Asn Gln Val
355 360 365

Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile Ala Val
370 375 380

Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro
385 390 395 400

Pro Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr
405 410 415

Val Asp Lys Ser Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val
420 425 430

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

Ser Pro Gly Lys
450

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

<220>
 <223> Primer 1

<400> 14
 agcttcgatg caatttactg gtaag 25

<210> 15
 <211> 26
 <212> DNA
 <213> Artificial

<220>
 <223> Primer 2

<400> 15
 ggactttagt ctggcaaaac atactc 26

<210> 16
 <211> 2805
 <212> DNA
 <213> Artificial

<220>
 <223> Nucleotide sequence of EndoSi for E.coli

<400> 16
 atgaacaaac gcctgctggt taaacgtacc tttggttggtg tttgtgcagc agcaattctg 60
 ggtgttgac cgctgagcca tccgaccatt gttgaagcac gtgaagaact gaaaatgccg 120
 aatggtctgg aacagagcat tgcagatggt gaagccaaaa ttgatgcact gacctatctg 180
 agcaaaaaaca gcaaagatga attcaaacac agcatgtatg aaattccgag caaccgtgaa 240
 cataaaccgg ttagcccgaa acaggcactg cagaatgcaa aaaaagcaga tgcacaggca 300
 gaacgtctgg caaaaatgac cattccgaaa aaagaggaac tgaaagcact ggaaggtccg 360
 ctgtatggtg gttatcttcg tacctggcag gataaaacca gcgatccgac cgaaaccaat 420
 aaagttaata gctttggtga actgccgaaa gaagttgatc tggcctttgt gtttcacgat 480
 tataccaaag attatagcct gttttgggaa gaactggcaa ccaaacaggt tccgaaactg 540
 aataaacagg gcacccgtgt tattcgtacc attccgtggc gttttctgag cgggtgcagat 600
 catagcgata ttagcgcaga taaagaaaaa tttccgaata ccgaagccgg taataaagcc 660
 ctggcaaaaag caattgttga tgagtacgtg tacaatatata acctggatgg cctggatatt 720
 gatattgaac gtgatagcgt tccgaaggtg aacgataaag aagatccgga agcactggca 780

cgtaccgttg aagtttttaa agaaattggc aaactgatcg gtgcaaacgg tgccgataaa	840
agccgtctgc tgattatgga taccacctat accgcagaag aaaacccgct gattaaagaa	900
accgcacagt atctgaatct gctgctggtt caggtttatg gtttttagcgg tgaaaatggc	960
aactatctgc atcacaaaaa catcctggat gaaaccagca gtatggaagg tcgttggcag	1020
ggttatagca aatatatccg tccggaacag tatatggtgg gcttttagctt ttatgaagag	1080
aaagatttta acaaccgctg gaaggatatc aatgaagagg atccgagcga tccgcatatt	1140
ggtgaaaaaa ttcagggtac acgtgcagaa cgttatgcaa aatggcagcc gaaaaccggt	1200
ggtctgaaag gtggtctggt tagctatgca attgatcgtg atggtgttgc ccagccgaaa	1260
cagaaaaccg aacatccgga actggataag attgtgaaaa gcgaatacaa agtttagcaaa	1320
gccctgaaaa aactgatgat gaccgatgat cagtatcagc cgattgatca gagcgatttt	1380
ccggataaag cactgcgtga aagcatcatt aaacaggttg gcacccgtcg tggatgatctg	1440
gaacgtttta aaggcacctt gcgtctggat aatccggaat tttaaagatct gaccggtctg	1500
aacaaactga aacgtgttgc aaaactggaa ctgattaacc tgccgaaaat caccaaaatc	1560
gataaagatg acctgccgca gaatctgaaa ccgctgacag ataatcagaa aagcaacctg	1620
gaaatcaaag gcacctatga tgatagcaaa ctgtacaaag atattccggc atttgatctg	1680
gttattagtg gtctgtcagg tctggaaagt ctggatatatt caggatcatca gcgtgatacc	1740
ctgagcggta ttgatgcaag caccctgccg agcctgaaag caattaacat tagcgataac	1800
catttcgatc tggcccaggg caccgaaaat cgtcatattc tggataccat tctggcaacc	1860
ctggccaaaa atggtgccag caccgcaagc tttgataaac agaaacctaa aggtctgtac	1920
ccggaaaagct atagcaccgc accgctgcat ctgcaggttg gtcagggtaa aatcaatggt	1980
attgacgatc tgatttttgg cacgcgcacc aatcagaata ccctgattaa taccgaaaac	2040
gatttcgagg cctataaaga acagacaatt cagggcaaac cgttttattgc accggattac	2100
ctgtatgaca atttcaaggt tagctataaa gagtacagcg ccagcattgt ggatagcacc	2160
ctggcagaaa ccaccgataa aacaattgat accgcaaaag ccgaaacctc tcaggttacc	2220
gtgagcaata aagatggtaa aaccgttcat agcgtgaaag tgattgtggg tgatgaaaaa	2280
ccaatgatgg ttaatctggc acaggatgca aaaatcattg gcaccgataa tatgaccag	2340
agcgcaaaag tttttgatgg tcagaaagat cagtttctgc tgagctggaa taaagatagc	2400
agcgtgattt ttgagctgaa aaccctggc accgcaaaac attggcgttt ttttgatgat	2460
ggcaaaaacg atagcgttac gctgagcgtg tttaaagggtg atgccagcaa ttttgaaacc	2520

gagaaagata aagcggaata ctgggtcgaa attacgaaag atagccgtaa aaacgacgac 2580
 aaagttttta gcagccctct ggaagttgat aacgccaaat atctgaaagt gacgatcaag 2640
 aaagaggcca agtatatcta tttcaacgaa ctgcagattc tgggttatcc ggggtgttgtt 2700
 gccaaaaaaaa ccgcagacga tctgcgtccg actgaagcag ataaaagtga tgataaaagc 2760
 gacaaaaatg ataccgaggc caaacaccac catcaccatc cactga 2805

<210> 17
 <211> 696
 <212> PRT
 <213> Artificial

<220>
 <223> Amino acid sequence of Endo-RP N172Q

<400> 17

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile

145		150		155		160
Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Gln Ile Glu Ser Asp						
		165		170		175
Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala						
		180		185		190
Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly						
		195		200		205
Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln						
		210		215		220
Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala						
		225		230		235
Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu						
		245		250		255
Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr						
		260		265		270
Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe						
		275		280		285
Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser						
		290		295		300
Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp						
		305		310		315
Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu						
		325		330		335
Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser						
		340		345		350
His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser						
		355		360		365
Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly						
		370		375		380

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
385 390 395 400

His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
405 410 415

Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala
420 425 430

Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
435 440 445

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
450 455 460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met

610

615

620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
 625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
 645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
 660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
 675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
 690 695

<210> 18
 <211> 696
 <212> PRT
 <213> Artificial

<220>
 <223> Amino acid sequence of Endo-RP N172H

<400> 18

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
 1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
 20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
 35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
 50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
 65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
 85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys

100

105

110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
 115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
 130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
 145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu His Ile Glu Ser Asp
 165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
 180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
 195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
 210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
 225 230 235 240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
 245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
 260 265 270

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
 275 280 285

Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
 290 295 300

Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
 305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
 325 330 335

Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
 340 345 350

His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
 355 360 365

Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
 370 375 380

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
 385 390 395 400

His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
 405 410 415

Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala
 420 425 430

Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
 435 440 445

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
 450 455 460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
 465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
 485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
 500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
 515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
 530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
 545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu

565

570

575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
 580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
 595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
 610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
 625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
 645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
 660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
 675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
 690 695

<210> 19
 <211> 696
 <212> PRT
 <213> Artificial

<220>
 <223> Amino acid sequence of Endo-RP N172A

<400> 19

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
 1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
 20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
 35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala

50

55

60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
 65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
 85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
 100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
 115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
 130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
 145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Ala Ile Glu Ser Asp
 165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
 180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
 195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
 210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
 225 230 235 240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
 245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
 260 265 270

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
 275 280 285

Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
 290 295 300

Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
 305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
 325 330 335

Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
 340 345 350

His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
 355 360 365

Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
 370 375 380

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
 385 390 395 400

His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
 405 410 415

Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala
 420 425 430

Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
 435 440 445

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
 450 455 460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
 465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
 485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
 500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr

515

520

525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
 530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
 545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
 565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
 580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
 595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
 610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
 625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
 645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
 660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
 675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
 690 695

<210> 20
 <211> 696
 <212> PRT
 <213> Artificial

<220>
 <223> Amino acid sequence of Endo-RP N172C

<400> 20

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu

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

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
260 265 270

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
275 280 285

Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
290 295 300

Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
325 330 335

Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
340 345 350

His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
355 360 365

Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
370 375 380

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
385 390 395 400

His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
405 410 415

Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala
420 425 430

Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
435 440 445

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
450 455 460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys

465		470		475		480
Ile Asp Ile Tyr	Leu Asn Leu Gln Val	Thr Asp Ile Leu Pro	Asp Glu			
	485	490	495			
Leu Ala Phe Tyr	Trp Gln Asp Val	Thr Asp Ala Ser Ser	Gln Ala Asp			
	500	505	510			
Ala Thr Thr Ala	Met Arg Leu Tyr	Leu Asn Glu Asn	Thr Val Ile Tyr			
	515	520	525			
Leu Lys Pro Ser	Arg Lys Gln Glu	Leu Ala Glu Gly	Trp Leu Leu Cys			
	530	535	540			
Ser Val Arg Val	Pro Pro Thr Tyr	Pro Leu Gly Ile	Ala Thr Ile Lys			
	545	550	555			560
Glu Leu Gly Ile	His Val Asp Gly	Lys Glu Thr Val	Leu Phe Arg Leu			
	565	570	575			
Gly Leu Leu Thr	Ile Ile Pro Leu	Gly Asp Ala Pro	Ser Ala Leu Ser			
	580	585	590			
Arg Ile Thr Gln	Val Gln Leu Gln	Arg Asp Glu Asp	Ile His Ser Lys			
	595	600	605			
Cys Pro Ser Ser	Ser Cys Glu Leu	Trp Ala Thr Leu	Ser Trp Met Met			
	610	615	620			
Glu His Asn Ser	Lys Glu Asp Trp	Asp Gln Val Asp	His Tyr Met Ile			
	625	630	635			640
Phe Phe Lys Asn	Val Asp Ser Lys	Ala Glu Pro Ile	Phe Leu Gly Thr			
	645	650	655			
Ser Phe Ser Thr	Glu Tyr Arg Ile	Ser Gly Leu Glu	Ile Lys Lys His			
	660	665	670			
Gly Asn Ser Ile	Glu Ile Trp Ala	Val Asn Arg Leu	Gly Thr Val Ile			
	675	680	685			
Ala Arg Gln Asp	Ile Asp Ile Gln					
	690	695				

<210> 21
 <211> 696
 <212> PRT
 <213> Artificial

<220>
 <223> Amino acid sequence of Endo-RP N172D

<400> 21

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
 1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
 20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
 35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
 50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
 65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
 85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
 100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
 115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
 130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
 145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Asp Ile Glu Ser Asp
 165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
 180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
 195 200 205
 Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
 210 215 220
 Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
 225 230 235 240
 Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
 245 250 255
 Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
 260 265 270
 Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
 275 280 285
 Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
 290 295 300
 Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
 305 310 315 320
 Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
 325 330 335
 Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
 340 345 350
 His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
 355 360 365
 Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
 370 375 380
 Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
 385 390 395 400
 His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
 405 410 415
 Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala

420

425

430

Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
 435 440 445

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
 450 455 460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
 465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
 485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
 500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
 515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
 530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
 455 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
 565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
 580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
 595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
 610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
 625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
 645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
 660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
 675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
 690 695

<210> 22
 <211> 696
 <212> PRT
 <213> Artificial

<220>
 <223> Amino acid sequence of Endo-RP N172E

<400> 22

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
 1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
 20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
 35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
 50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
 65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
 85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
 100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
 115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
 130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Glu Ile Glu Ser Asp
165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
225 230 235 240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
260 265 270

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
275 280 285

Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
290 295 300

Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
325 330 335

Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
340 345 350

His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
355 360 365

Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly

370

375

380

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
 385 390 395 400

His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
 405 410 415

Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala
 420 425 430

Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
 435 440 445

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
 450 455 460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
 465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
 485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
 500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
 515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
 530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
 545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
 565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
 580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
 595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
690 695

<210> 23
<211> 696
<212> PRT
<213> Artificial

<220>
<223> Amino acid sequence of Endo-RP N172F

<400> 23

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
 100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
 115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
 130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
 145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Phe Ile Glu Ser Asp
 165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
 180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
 195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
 210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
 225 230 235 240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
 245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
 260 265 270

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
 275 280 285

Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
 290 295 300

Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
 305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu

				325						330					335
Tyr	Pro	Ala	Gln	Glu	Gly	Glu	Gln	Asn	Arg	Thr	Val	Lys	Val	Thr	Ser
			340					345					350		
His	Leu	Gly	Arg	His	Pro	Gly	Ile	Ala	Asp	Val	Ser	Pro	Val	Arg	Ser
		355					360					365			
Ala	Pro	Gly	Lys	Thr	Trp	Phe	Ala	Thr	Trp	Phe	Asp	Arg	Gly	Tyr	Gly
	370					375					380				
Thr	Gly	Phe	Tyr	Tyr	Gln	Gly	Lys	Lys	Leu	Leu	Ser	Gln	Pro	Trp	Ser
385					390					395					400
His	Leu	Ser	His	Gln	Ser	Ile	Pro	Pro	Asn	Leu	Ile	Ala	Arg	Leu	Gln
				405					410					415	
Arg	Glu	Glu	Asn	His	Gly	Leu	Ser	Tyr	Phe	Leu	Ala	Asp	Asp	Asp	Ala
			420					425					430		
Tyr	Ile	Gly	Gly	Thr	Ser	Leu	Leu	Ile	Ala	Ala	Glu	Ile	Thr	Gln	Glu
		435					440					445			
Arg	Gln	Leu	Pro	Leu	Tyr	Gln	Leu	Glu	Tyr	Asp	Val	Thr	Glu	Gly	Cys
	450					455					460				
Glu	Val	Gln	Phe	Ile	Tyr	Lys	Ser	Pro	Glu	Pro	Asp	Met	Gln	Gly	Lys
465					470					475					480
Ile	Asp	Ile	Tyr	Leu	Asn	Leu	Gln	Val	Thr	Asp	Ile	Leu	Pro	Asp	Glu
				485					490					495	
Leu	Ala	Phe	Tyr	Trp	Gln	Asp	Val	Thr	Asp	Ala	Ser	Ser	Gln	Ala	Asp
			500					505					510		
Ala	Thr	Thr	Ala	Met	Arg	Leu	Tyr	Leu	Asn	Glu	Asn	Thr	Val	Ile	Tyr
		515					520					525			
Leu	Lys	Pro	Ser	Arg	Lys	Gln	Glu	Leu	Ala	Glu	Gly	Trp	Leu	Leu	Cys
	530					535					540				
Ser	Val	Arg	Val	Pro	Pro	Thr	Tyr	Pro	Leu	Gly	Ile	Ala	Thr	Ile	Lys
545					550					555					560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
690 695

$\langle 210 \rangle$	24
$\langle 211 \rangle$	696
$\langle 212 \rangle$	PRT
$\langle 213 \rangle$	Artificial

<220>
<223> Amino acid sequence of Endo-RP N172G

<400> 24

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Gly Ile Glu Ser Asp
165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
225 230 235 240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
260 265 270

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe

275		280		285
Asp 290	Ser	Tyr	Leu	Ala
				Val
			Gly 295	Thr
				Ala
				Arg
				Ala
				Phe 300
				Lys
				Thr
				Ser
				Ser
Ala 305	Leu	Phe	Gly	Thr
				Ala
				Trp
				Ile
				Tyr
				Glu
				His 315
				Phe
				Gly
				Lys
				Lys
				Asp 320
Phe	Glu	Leu	Met	Asp 325
				Arg
				Leu
				Leu
				Trp
				Leu 330
				Gly
				Gly
				Asp
				Gln
				Ser 335
				Glu
Tyr	Pro	Ala	Gln 340	Glu
				Gly
				Glu
				Gln
				Asn 345
				Arg
				Thr
				Val
				Lys
				Val 350
				Thr
				Ser
His	Leu	Gly 355	Arg	His
				Pro
				Gly
				Ile 360
				Ala
				Asp
				Val
				Ser
				Pro 365
				Val
				Arg
				Ser
Ala 370	Pro	Gly	Lys	Thr
				Trp
				Phe
				Ala
				Thr
				Trp
				Phe
				Asp 380
				Arg
				Gly
				Tyr
				Gly
Thr 385	Gly	Phe	Tyr	Tyr
				Gln
				Gly
				Lys
				Lys
				Leu
				Leu 395
				Ser
				Gln
				Pro
				Trp
				Ser 400
His	Leu	Ser	His	Gln 405
				Ser
				Ile
				Pro
				Pro
				Asn 410
				Leu
				Ile
				Ala
				Arg
				Leu 415
				Gln
Arg	Glu	Glu	Asn 420	His
				Gly
				Leu
				Ser
				Tyr 425
				Phe
				Leu
				Ala
				Asp
				Asp 430
				Asp
				Ala
Tyr	Ile	Gly 435	Gly	Thr
				Ser
				Leu
				Leu 440
				Ile
				Ala
				Ala
				Glu
				Ile 445
				Thr
				Gln
				Glu
Arg 450	Gln	Leu	Pro	Leu
				Tyr
				Gln
				Leu
				Glu
				Tyr
				Asp 460
				Val
				Thr
				Glu
				Gly
				Cys
Glu 465	Val	Gln	Phe	Ile
				Tyr
				Lys
				Ser
				Pro
				Glu
				Pro 475
				Asp
				Met
				Gln
				Gly
				Lys 480
Ile	Asp	Ile	Tyr	Leu
				Asn
				Leu
				Gln
				Val
				Thr 490
				Asp
				Ile
				Leu
				Pro
				Asp 495
				Glu
Leu	Ala	Phe	Tyr 500	Trp
				Gln
				Asp
				Val
				Thr 505
				Asp
				Ala
				Ser
				Ser
				Gln 510
				Ala
				Asp

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
 515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
 530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
 545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
 565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
 580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
 595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
 610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
 625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
 645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
 660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
 675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
 690 695

<210> 25
 <211> 696
 <212> PRT
 <213> Artificial

<220>
 <223> Amino acid sequence of Endo-RP N172I

<400> 25

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Ile Ile Glu Ser Asp
165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala

225		230		235		240
Asp Gly Ile Phe	Leu 245	Asn Tyr Trp Trp	Asn 250	Ala Thr Val	Pro 255	Pro Leu
Ala Leu Gln Val	Ala 260	His Arg Leu	Gly 265	Arg Gln Gly	Ser 270	Asp Val Tyr
Phe Gly Thr Asp	Val 275	Trp Gly Arg	Gly 280	Thr Phe Gly	Gly 285	Gly Gly Phe
Asp Ser Tyr Leu	Ala 290	Val Gly 295	Thr Ala Arg	Ala Phe 300	Lys Thr	Ser Ser
Ala Leu Phe Gly	Thr 305	Ala Trp Ile	Tyr Glu 310	His Phe Gly	Lys 315	Lys Asp 320
Phe Glu Leu Met	Asp 325	Arg Leu Leu	Trp Leu 330	Gly Gly Asp	Gln 335	Ser Glu
Tyr Pro Ala Gln	Glu 340	Gly Glu Gln	Asn 345	Arg Thr Val	Lys 350	Val Thr Ser
His Leu Gly Arg	His 355	Pro Gly Ile	Ala 360	Asp Val Ser	Pro 365	Val Arg Ser
Ala Pro Gly Lys	Thr 370	Trp Phe Ala	Thr 375	Trp Phe Asp	Arg 380	Gly Tyr Gly
Thr Gly Phe Tyr	Tyr 385	Gln Gly Lys	Lys 390	Leu Leu 395	Ser Gln	Pro Trp Ser 400
His Leu Ser His	Gln 405	Ser Ile Pro	Pro 410	Asn Leu Ile	Ala 415	Arg Leu Gln
Arg Glu Glu Asn	His 420	Gly Leu Ser	Tyr 425	Phe Leu Ala	Asp 430	Asp Asp Ala
Tyr Ile Gly Gly	Thr 435	Ser Leu Leu	Ile 440	Ala Ala Glu	Ile 445	Thr Gln Glu
Arg Gln Leu Pro	Leu 450	Tyr Gln 455	Leu Glu Tyr	Asp Val 460	Thr Glu	Gly Cys

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln

690

695

<210> 26
 <211> 696
 <212> PRT
 <213> Artificial

<220>
 <223> Amino acid sequence of Endo-RP N172K

<400> 26

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
 1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
 20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
 35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
 50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
 65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
 85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
 100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
 115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
 130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
 145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Lys Ile Glu Ser Asp
 165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala

His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
405 410 415

Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala
 420 425 430

Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
 435 440 445

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
 450 455 460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
 465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
 485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
 500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
 515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
 530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
 545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
 565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
 580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
 595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
 610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
 625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr

645

650

655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
 660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
 675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
 690 695

<210> 27
 <211> 696
 <212> PRT
 <213> Artificial

<220>
 <223> Amino acid sequence of Endo-RP N172L
 <400> 27

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
 1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
 20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
 35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
 50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
 65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
 85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
 100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
 115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly

130

135

140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
 145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Leu Ile Glu Ser Asp
 165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
 180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
 195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
 210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
 225 230 235 240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
 245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
 260 265 270

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
 275 280 285

Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
 290 295 300

Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
 305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
 325 330 335

Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
 340 345 350

His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
 355 360 365

Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
 370 375 380

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
 385 390 395 400

His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
 405 410 415

Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala
 420 425 430

Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
 435 440 445

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
 450 455 460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
 465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
 485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
 500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
 515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
 530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
 545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
 565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
 580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys

595

600

605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
 610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
 625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
 645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
 660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
 675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
 690 695

<210> 28
 <211> 696
 <212> PRT
 <213> Artificial

<220>
 <223> Amino acid sequence of Endo-RP N172M
 <400> 28

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
 1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
 20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
 35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
 50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
 65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe

85

90

95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
 100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
 115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
 130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
 145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Met Ile Glu Ser Asp
 165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
 180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
 195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
 210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
 225 230 235 240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
 245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
 260 265 270

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
 275 280 285

Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
 290 295 300

Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
 305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
 325 330 335

Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
 340 345 350

His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
 355 360 365

Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
 370 375 380

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
 385 390 395 400

His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
 405 410 415

Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala
 420 425 430

Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
 435 440 445

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
 450 455 460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
 465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
 485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
 500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
 515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
 530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys

545	550										555					560				
Glu	Leu	Gly	Ile	His	Val	Asp	Gly	Lys	Glu	Thr	Val	Leu	Phe	Arg	Leu					
				565					570											
Gly	Leu	Leu	Thr	Ile	Ile	Pro	Leu	Gly	Asp	Ala	Pro	Ser	Ala	Leu	Ser					
			580						585											
Arg	Ile	Thr	Gln	Val	Gln	Leu	Gln	Arg	Asp	Glu	Asp	Ile	His	Ser	Lys					
		595					600													
Cys	Pro	Ser	Ser	Ser	Cys	Glu	Leu	Trp	Ala	Thr	Leu	Ser	Trp	Met	Met					
		610					615													
Glu	His	Asn	Ser	Lys	Glu	Asp	Trp	Asp	Gln	Val	Asp	His	Tyr	Met	Ile					
		625					630													
Phe	Phe	Lys	Asn	Val	Asp	Ser	Lys	Ala	Glu	Pro	Ile	Phe	Leu	Gly	Thr					
			645					650												
Ser	Phe	Ser	Thr	Glu	Tyr	Arg	Ile	Ser	Gly	Leu	Glu	Ile	Lys	Lys	His					
			660					665												
Gly	Asn	Ser	Ile	Glu	Ile	Trp	Ala	Val	Asn	Arg	Leu	Gly	Thr	Val	Ile					
		675					680													
Ala	Arg	Gln	Asp	Ile	Asp	Ile	Gln													
		690					695													

$\langle 210 \rangle$	29
$\langle 211 \rangle$	696
$\langle 212 \rangle$	PRT
$\langle 213 \rangle$	Artificial

<220>
<223> Amino acid sequence of Endo-RP N172P

<400> 29

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser

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

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
 275 280 285

Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
 290 295 300

Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
 305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
 325 330 335

Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
 340 345 350

His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
 355 360 365

Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
 370 375 380

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
 385 390 395 400

His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
 405 410 415

Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala
 420 425 430

Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
 435 440 445

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
 450 455 460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
 465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
 485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp

500

505

510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
 515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
 530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
 545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
 565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
 580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
 595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
 610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
 625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
 645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
 660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
 675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
 690 695

<210> 30

<211> 696

<212> PRT

<213> Artificial

<220>

<223> Amino acid sequence of Endo-RP N172R

<400> 30

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Arg Ile Glu Ser Asp
165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
 225 230 235 240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
 245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
 260 265 270

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
 275 280 285

Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
 290 295 300

Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
 305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
 325 330 335

Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
 340 345 350

His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
 355 360 365

Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
 370 375 380

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
 385 390 395 400

His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
 405 410 415

Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala
 420 425 430

Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
 435 440 445

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys

450

455

460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
 465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
 485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
 500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
 515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
 530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
 545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
 565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
 580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
 595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
 610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
 625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
 645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
 660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
 675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
690 695

<210> 31
<211> 696
<212> PRT
<213> Artificial

<220>
<223> Amino acid sequence of Endo-RP N172S

<400> 31

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Ser Ile Glu Ser Asp
165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
 180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
 195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
 210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
 225 230 235 240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
 245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
 260 265 270

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
 275 280 285

Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
 290 295 300

Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
 305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
 325 330 335

Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
 340 345 350

His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
 355 360 365

Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
 370 375 380

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
 385 390 395 400

His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln

405

410

415

Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala
 420 425 430

Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
 435 440 445

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
 450 455 460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
 465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
 485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
 500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
 515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
 530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
 545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
 565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
 580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
 595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
 610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
 625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
 645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
 660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
 675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
 690 695

<210> 32

<211> 696

<212> PRT

<213> Artificial

<220>

<223> Amino acid sequence of Endo-RP N172T

<400> 32

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
 1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
 20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
 35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
 50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
 65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
 85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
 100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
 115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
 130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
 145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Thr Ile Glu Ser Asp
 165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
 180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
 195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
 210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
 225 230 235 240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
 245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
 260 265 270

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
 275 280 285

Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
 290 295 300

Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
 305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
 325 330 335

Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
 340 345 350

His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser

355	360	365
Ala Pro Gly Lys Thr Trp Phe	Ala Thr Trp Phe	Asp Arg Gly Tyr Gly
370	375	380
Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser		
385	390	395
His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln		
	405	410
Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala		
	420	425
		430
Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu		
	435	440
		445
Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys		
	450	455
		460
Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys		
	465	470
		475
Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu		
	485	490
		495
Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp		
	500	505
		510
Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr		
	515	520
		525
Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys		
	530	535
		540
Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys		
	545	550
		555
Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu		
	565	570
		575
Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser		
	580	585
		590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
690 695

$\langle 210 \rangle$	33
$\langle 211 \rangle$	696
$\langle 212 \rangle$	PRT
$\langle 213 \rangle$	Artificial

<220>
<223> Amino acid sequence of Endo-RP N172V
<400> 33

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
 85 90 95
 Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
 100 105 110
 His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
 115 120 125
 Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
 130 135 140
 Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
 145 150 155 160
 Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Val Ile Glu Ser Asp
 165 170 175
 Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
 180 185 190
 Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
 195 200 205
 Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
 210 215 220
 Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
 225 230 235 240
 Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
 245 250 255
 Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
 260 265 270
 Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
 275 280 285
 Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
 290 295 300
 Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp

305		310		315		320									
Phe	Glu	Leu	Met	Asp 325	Arg	Leu	Leu	Trp	Leu 330	Gly	Gly	Asp	Gln	Ser 335	Glu
Tyr	Pro	Ala	Gln 340	Glu	Gly	Glu	Gln	Asn 345	Arg	Thr	Val	Lys	Val 350	Thr	Ser
His	Leu	Gly 355	Arg	His	Pro	Gly	Ile 360	Ala	Asp	Val	Ser	Pro 365	Val	Arg	Ser
Ala	Pro 370	Gly	Lys	Thr	Trp	Phe 375	Ala	Thr	Trp	Phe	Asp 380	Arg	Gly	Tyr	Gly
Thr 385	Gly	Phe	Tyr	Tyr	Gln 390	Gly	Lys	Lys	Leu	Leu 395	Ser	Gln	Pro	Trp	Ser 400
His	Leu	Ser	His	Gln 405	Ser	Ile	Pro	Pro	Asn 410	Leu	Ile	Ala	Arg	Leu 415	Gln
Arg	Glu	Glu	Asn 420	His	Gly	Leu	Ser	Tyr 425	Phe	Leu	Ala	Asp	Asp 430	Asp	Ala
Tyr	Ile	Gly 435	Gly	Thr	Ser	Leu	Leu 440	Ile	Ala	Ala	Glu	Ile 445	Thr	Gln	Glu
Arg	Gln 450	Leu	Pro	Leu	Tyr	Gln 455	Leu	Glu	Tyr	Asp	Val 460	Thr	Glu	Gly	Cys
Glu 465	Val	Gln	Phe	Ile	Tyr 470	Lys	Ser	Pro	Glu	Pro 475	Asp	Met	Gln	Gly	Lys 480
Ile	Asp	Ile	Tyr	Leu 485	Asn	Leu	Gln	Val	Thr 490	Asp	Ile	Leu	Pro	Asp 495	Glu
Leu	Ala	Phe	Tyr 500	Trp	Gln	Asp	Val	Thr 505	Asp	Ala	Ser	Ser	Gln 510	Ala	Asp
Ala	Thr	Thr 515	Ala	Met	Arg	Leu	Tyr 520	Leu	Asn	Glu	Asn 525	Thr	Val	Ile	Tyr
Leu	Lys 530	Pro	Ser	Arg	Lys	Gln 535	Glu	Leu	Ala	Glu	Gly 540	Trp	Leu	Leu	Cys

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
690 695

<210> 34
<211> 696
<212> PRT
<213> Artificial

<220>
<223> Amino acid sequence of Endo-RP N172W

<400> 34

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
 35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
 50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
 65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
 85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
 100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
 115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
 130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
 145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Trp Ile Glu Ser Asp
 165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
 180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
 195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
 210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
 225 230 235 240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
 245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr

260						265						270					
Phe	Gly	Thr	Asp	Val	Trp	Gly	Arg	Gly	Thr	Phe	Gly	Gly	Gly	Gly	Phe		
	275						280					285					
Asp	Ser	Tyr	Leu	Ala	Val	Gly	Thr	Ala	Arg	Ala	Phe	Lys	Thr	Ser	Ser		
	290						295				300						
Ala	Leu	Phe	Gly	Thr	Ala	Trp	Ile	Tyr	Glu	His	Phe	Gly	Lys	Lys	Asp		
305					310					315					320		
Phe	Glu	Leu	Met	Asp	Arg	Leu	Leu	Trp	Leu	Gly	Gly	Asp	Gln	Ser	Glu		
				325					330					335			
Tyr	Pro	Ala	Gln	Glu	Gly	Glu	Gln	Asn	Arg	Thr	Val	Lys	Val	Thr	Ser		
			340					345					350				
His	Leu	Gly	Arg	His	Pro	Gly	Ile	Ala	Asp	Val	Ser	Pro	Val	Arg	Ser		
		355					360					365					
Ala	Pro	Gly	Lys	Thr	Trp	Phe	Ala	Thr	Trp	Phe	Asp	Arg	Gly	Tyr	Gly		
	370					375					380						
Thr	Gly	Phe	Tyr	Tyr	Gln	Gly	Lys	Lys	Leu	Leu	Ser	Gln	Pro	Trp	Ser		
385					390					395					400		
His	Leu	Ser	His	Gln	Ser	Ile	Pro	Pro	Asn	Leu	Ile	Ala	Arg	Leu	Gln		
				405					410					415			
Arg	Glu	Glu	Asn	His	Gly	Leu	Ser	Tyr	Phe	Leu	Ala	Asp	Asp	Asp	Ala		
			420					425					430				
Tyr	Ile	Gly	Gly	Thr	Ser	Leu	Leu	Ile	Ala	Ala	Glu	Ile	Thr	Gln	Glu		
		435					440					445					
Arg	Gln	Leu	Pro	Leu	Tyr	Gln	Leu	Glu	Tyr	Asp	Val	Thr	Glu	Gly	Cys		
	450					455					460						
Glu	Val	Gln	Phe	Ile	Tyr	Lys	Ser	Pro	Glu	Pro	Asp	Met	Gln	Gly	Lys		
465					470					475					480		
Ile	Asp	Ile	Tyr	Leu	Asn	Leu	Gln	Val	Thr	Asp	Ile	Leu	Pro	Asp	Glu		
				485					490					495			

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
 500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
 515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
 530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
 545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
 565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
 580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
 595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
 610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
 625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
 645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
 660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
 675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
 690 695

<210> 35
 <211> 696
 <212> PRT
 <213> Artificial

<220>

<223> Amino acid sequence of Endo-RP N172Y

<400> 35

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
 1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
 20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
 35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
 50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
 65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
 85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
 100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
 115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
 130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
 145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Tyr Ile Glu Ser Asp
 165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
 180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
 195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln

210	215	220
Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala 225 230 235 240		
Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu 245 250 255		
Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr 260 265 270		
Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe 275 280 285		
Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser 290 295 300		
Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp 305 310 315 320		
Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu 325 330 335		
Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser 340 345 350		
His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser 355 360 365		
Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly 370 375 380		
Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser 385 390 395 400		
His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln 405 410 415		
Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala 420 425 430		
Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu 435 440 445		

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
 450 455 460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
 465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
 485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
 500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
 515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
 530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
 545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
 565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
 580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
 595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
 610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
 625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
 645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
 660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile

675

680

685

Ala Arg Gln Asp Ile Asp Ile Gln
690 695

<210> 36

<211> 696

<212> PRT

<213> Artificial

<220>

<223> Amino acid sequence of Endo-RP W278F/S216V

<400> 36

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Asn Ile Glu Ser Asp

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
385 390 395 400

His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
 405 410 415

Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala
 420 425 430

Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
 435 440 445

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
 450 455 460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
 465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
 485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
 500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
 515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
 530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
 545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
 565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
 580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
 595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
 610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile

625 630 635 640
 Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
 645 650 655
 Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
 660 665 670
 Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
 675 680 685
 Ala Arg Gln Asp Ile Asp Ile Gln
 690 695

 <210> 37
 <211> 696
 <212> PRT
 <213> Artificial

 <220>
 <223> Amino acid sequence of Endo-RP W278F/N246D

 <400> 37
 Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
 1 5 10 15
 Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
 20 25 30
 Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
 35 40 45
 Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
 50 55 60
 Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
 65 70 75 80
 Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
 85 90 95
 Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
 100 105 110
 His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala

115					120					125					
Ala	Gly	Met	Phe	Ala	Leu	Glu	Arg	Phe	Val	Tyr	Gly	Pro	Glu	Pro	Gly
	130					135					140				
Gln	Arg	Asn	Ser	Trp	Ser	Pro	Tyr	Tyr	Ala	Asp	Lys	Leu	Val	Asp	Ile
145					150					155					160
Ala	Glu	Phe	Tyr	Gly	Phe	Asp	Gly	Trp	Leu	Leu	Asn	Ile	Glu	Ser	Asp
				165					170					175	
Phe	Phe	Pro	Leu	Tyr	Arg	Asn	Pro	Ser	Leu	Lys	Ala	Ile	His	Leu	Ala
			180					185					190		
Lys	Leu	Leu	Arg	Tyr	Leu	Lys	Asn	Ala	Met	His	Ala	Arg	Val	Pro	Gly
		195					200					205			
Ser	Glu	Ile	Ile	Trp	Tyr	Asp	Ser	Met	Thr	Thr	Asn	Gly	Ser	Val	Gln
	210					215					220				
Trp	Gln	Asn	Asn	Ile	Thr	Pro	Lys	Asn	Ser	Ile	Phe	Phe	Glu	Ala	Ala
225					230					235					240
Asp	Gly	Ile	Phe	Leu	Asp	Tyr	Trp	Trp	Asn	Ala	Thr	Val	Pro	Pro	Leu
				245					250					255	
Ala	Leu	Gln	Val	Ala	His	Arg	Leu	Gly	Arg	Gln	Gly	Ser	Asp	Val	Tyr
			260					265					270		
Phe	Gly	Thr	Asp	Val	Trp	Gly	Arg	Gly	Thr	Phe	Gly	Gly	Gly	Gly	Phe
		275					280					285			
Asp	Ser	Tyr	Leu	Ala	Val	Gly	Thr	Ala	Arg	Ala	Phe	Lys	Thr	Ser	Ser
	290					295					300				
Ala	Leu	Phe	Gly	Thr	Ala	Trp	Ile	Tyr	Glu	His	Phe	Gly	Lys	Lys	Asp
305					310					315					320
Phe	Glu	Leu	Met	Asp	Arg	Leu	Leu	Trp	Leu	Gly	Gly	Asp	Gln	Ser	Glu
				325					330					335	
Tyr	Pro	Ala	Gln	Glu	Gly	Glu	Gln	Asn	Arg	Thr	Val	Lys	Val	Thr	Ser
			340					345					350		

His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
355 360 365

Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
370 375 380

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
385 390 395 400

His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
405 410 415

Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala
420 425 430

Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
435 440 445

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
450 455 460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser

580

585

590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
 595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
 610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
 625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
 645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
 660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
 675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
 690 695

<210> 38
 <211> 696
 <212> PRT
 <213> Artificial

<220>
 <223> Amino acid sequence of Endo-RP W278F/D276N

<400> 38

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
 1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
 20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
 35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
 50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr

65					70					75					80
Ile	Tyr	Ser	Cys	Gln	Tyr	Trp	Gln	Tyr	Val	Asp	Thr	Phe	Ile	Tyr	Phe
				85					90					95	
Ser	His	His	Arg	Val	Thr	Ile	Pro	Pro	Val	Asn	Trp	Ile	Asn	Ala	Cys
			100					105					110		
His	Arg	Asn	Gly	Val	Lys	Thr	Leu	Gly	Thr	Phe	Ile	Val	Glu	Gly	Ala
		115					120					125			
Ala	Gly	Met	Phe	Ala	Leu	Glu	Arg	Phe	Val	Tyr	Gly	Pro	Glu	Pro	Gly
	130					135					140				
Gln	Arg	Asn	Ser	Trp	Ser	Pro	Tyr	Tyr	Ala	Asp	Lys	Leu	Val	Asp	Ile
145					150					155					160
Ala	Glu	Phe	Tyr	Gly	Phe	Asp	Gly	Trp	Leu	Leu	Asn	Ile	Glu	Ser	Asp
				165					170					175	
Phe	Phe	Pro	Leu	Tyr	Arg	Asn	Pro	Ser	Leu	Lys	Ala	Ile	His	Leu	Ala
			180					185					190		
Lys	Leu	Leu	Arg	Tyr	Leu	Lys	Asn	Ala	Met	His	Ala	Arg	Val	Pro	Gly
		195					200					205			
Ser	Glu	Ile	Ile	Trp	Tyr	Asp	Ser	Met	Thr	Thr	Asn	Gly	Ser	Val	Gln
	210					215					220				
Trp	Gln	Asn	Asn	Ile	Thr	Pro	Lys	Asn	Ser	Ile	Phe	Phe	Glu	Ala	Ala
225					230					235					240
Asp	Gly	Ile	Phe	Leu	Asn	Tyr	Trp	Trp	Asn	Ala	Thr	Val	Pro	Pro	Leu
				245					250					255	
Ala	Leu	Gln	Val	Ala	His	Arg	Leu	Gly	Arg	Gln	Gly	Ser	Asp	Val	Tyr
			260					265					270		
Phe	Gly	Thr	Asn	Val	Trp	Gly	Arg	Gly	Thr	Phe	Gly	Gly	Gly	Gly	Phe
		275					280					285			
Asp	Ser	Tyr	Leu	Ala	Val	Gly	Thr	Ala	Arg	Ala	Phe	Lys	Thr	Ser	Ser
	290					295					300				

Ala Leu Phe Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
325 330 335

Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
340 345 350

His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
355 360 365

Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
370 375 380

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
385 390 395 400

His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
405 410 415

Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala
420 425 430

Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
435 440 445

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
450 455 460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu
485 490 495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys

530

535

540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
 545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
 565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
 580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
 595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
 610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
 625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
 645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
 660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
 675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
 690 695

<210> 39

<211> 696

<212> PRT

<213> Artificial

<220>

<223> Amino acid sequence of Endo-RP W278F/A310D

<400> 39

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
 1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser

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

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
260 265 270

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
275 280 285

Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
290 295 300

Ala Leu Phe Gly Thr Asp Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
325 330 335

Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
340 345 350

His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
355 360 365

Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
370 375 380

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
385 390 395 400

His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
405 410 415

Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala
420 425 430

Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu
435 440 445

Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys
450 455 460

Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys
465 470 475 480

Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu

485

490

495

Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp
 500 505 510

Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr
 515 520 525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
 530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
 545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
 565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
 580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
 595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
 610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
 625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
 645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
 660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
 675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
 690 695

<210> 40
 <211> 696
 <212> PRT

<213> Artificial

<220>

<223> Amino acid sequence of Endo-RP W278F/N172D/F307Y

<400> 40

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Asp Ile Glu Ser Asp
165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
 210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
 225 230 235 240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
 245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
 260 265 270

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
 275 280 285

Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
 290 295 300

Ala Leu Tyr Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
 305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
 325 330 335

Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
 340 345 350

His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
 355 360 365

Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
 370 375 380

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser
 385 390 395 400

His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln
 405 410 415

Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala
 420 425 430

Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu

435		440		445
Arg Gln Leu Pro Leu Tyr	Gln Leu Glu Tyr Asp	Val Thr Glu Gly Cys		
450	455	460		
Glu Val Gln Phe Ile Tyr	Lys Ser Pro Glu Pro	Asp Met Gln Gly Lys		
465	470	475		480
Ile Asp Ile Tyr Leu	Asn Leu Gln Val Thr	Asp Ile Leu Pro Asp	Glu	
	485	490	495	
Leu Ala Phe Tyr Trp	Gln Asp Val Thr	Asp Ala Ser Ser	Gln Ala Asp	
	500	505	510	
Ala Thr Thr Ala Met	Arg Leu Tyr Leu	Asn Glu Asn Thr	Val Ile Tyr	
	515	520	525	
Leu Lys Pro Ser Arg	Lys Gln Glu Leu Ala	Glu Gly Trp Leu Leu	Cys	
	530	535	540	
Ser Val Arg Val Pro	Pro Thr Tyr Pro Leu	Gly Ile Ala Thr Ile	Lys	
545	550	555	560	
Glu Leu Gly Ile His	Val Asp Gly Lys Glu	Thr Val Leu Phe Arg	Leu	
	565	570	575	
Gly Leu Leu Thr Ile	Ile Pro Leu Gly Asp	Ala Pro Ser Ala	Leu Ser	
	580	585	590	
Arg Ile Thr Gln Val	Gln Leu Gln Arg	Asp Glu Asp Ile	His Ser Lys	
	595	600	605	
Cys Pro Ser Ser Ser	Cys Glu Leu Trp Ala	Thr Leu Ser Trp Met	Met	
	610	615	620	
Glu His Asn Ser Lys	Glu Asp Trp Asp Gln	Val Asp His Tyr Met	Ile	
625	630	635	640	
Phe Phe Lys Asn Val	Asp Ser Lys Ala Glu	Pro Ile Phe Leu Gly	Thr	
	645	650	655	
Ser Phe Ser Thr Glu	Tyr Arg Ile Ser	Gly Leu Glu Ile Lys	Lys His	
	660	665	670	

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
 675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
 690 695

<210> 41
 <211> 696
 <212> PRT
 <213> Artificial

<220>
 <223> Amino acid sequence of Endo-RP W278F/N172D/F307H

<400> 41

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
 1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
 20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
 35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
 50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
 65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
 85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
 100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
 115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
 130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
 145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Asp Ile Glu Ser Asp
 165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
 180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
 195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
 210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
 225 230 235 240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
 245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
 260 265 270

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
 275 280 285

Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
 290 295 300

Ala Leu His Gly Thr Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
 305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
 325 330 335

Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser
 340 345 350

His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser
 355 360 365

Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly
 370 375 380

Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser

385		390		395		400									
His	Leu	Ser	His	Gln	Ser	Ile	Pro	Pro	Asn	Leu	Ile	Ala	Arg	Leu	Gln
				405					410					415	
Arg	Glu	Glu	Asn	His	Gly	Leu	Ser	Tyr	Phe	Leu	Ala	Asp	Asp	Asp	Ala
			420					425					430		
Tyr	Ile	Gly	Gly	Thr	Ser	Leu	Leu	Ile	Ala	Ala	Glu	Ile	Thr	Gln	Glu
		435					440					445			
Arg	Gln	Leu	Pro	Leu	Tyr	Gln	Leu	Glu	Tyr	Asp	Val	Thr	Glu	Gly	Cys
	450					455					460				
Glu	Val	Gln	Phe	Ile	Tyr	Lys	Ser	Pro	Glu	Pro	Asp	Met	Gln	Gly	Lys
465					470					475					480
Ile	Asp	Ile	Tyr	Leu	Asn	Leu	Gln	Val	Thr	Asp	Ile	Leu	Pro	Asp	Glu
				485					490					495	
Leu	Ala	Phe	Tyr	Trp	Gln	Asp	Val	Thr	Asp	Ala	Ser	Ser	Gln	Ala	Asp
			500					505					510		
Ala	Thr	Thr	Ala	Met	Arg	Leu	Tyr	Leu	Asn	Glu	Asn	Thr	Val	Ile	Tyr
		515					520					525			
Leu	Lys	Pro	Ser	Arg	Lys	Gln	Glu	Leu	Ala	Glu	Gly	Trp	Leu	Leu	Cys
	530					535					540				
Ser	Val	Arg	Val	Pro	Pro	Thr	Tyr	Pro	Leu	Gly	Ile	Ala	Thr	Ile	Lys
545					550					555					560
Glu	Leu	Gly	Ile	His	Val	Asp	Gly	Lys	Glu	Thr	Val	Leu	Phe	Arg	Leu
				565					570					575	
Gly	Leu	Leu	Thr	Ile	Ile	Pro	Leu	Gly	Asp	Ala	Pro	Ser	Ala	Leu	Ser
			580					585					590		
Arg	Ile	Thr	Gln	Val	Gln	Leu	Gln	Arg	Asp	Glu	Asp	Ile	His	Ser	Lys
		595					600					605			
Cys	Pro	Ser	Ser	Ser	Cys	Glu	Leu	Trp	Ala	Thr	Leu	Ser	Trp	Met	Met
	610					615					620				

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
690 695

<210> 42
<211> 696
<212> PRT
<213> Artificial

<220>

<223> Amino acid sequence of Endo-RP W278F/N172D/A310D

<400> 42

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
 115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
 130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
 145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Asp Ile Glu Ser Asp
 165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
 180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
 195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
 210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
 225 230 235 240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
 245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
 260 265 270

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
 275 280 285

Asp Ser Tyr Leu Ala Val Gly Thr Ala Arg Ala Phe Lys Thr Ser Ser
 290 295 300

Ala Leu Phe Gly Thr Asp Trp Ile Tyr Glu His Phe Gly Lys Lys Asp
 305 310 315 320

Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu
 325 330 335

Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser

340				345				350							
His	Leu	Gly 355	Arg	His	Pro	Gly	Ile 360	Ala	Asp	Val	Ser	Pro 365	Val	Arg	Ser
Ala	Pro 370	Gly	Lys	Thr	Trp	Phe 375	Ala	Thr	Trp	Phe	Asp 380	Arg	Gly	Tyr	Gly
Thr 385	Gly	Phe	Tyr	Tyr	Gln 390	Gly	Lys	Lys	Leu	Leu 395	Ser	Gln	Pro	Trp	Ser 400
His	Leu	Ser	His	Gln 405	Ser	Ile	Pro	Pro	Asn 410	Leu	Ile	Ala	Arg	Leu 415	Gln
Arg	Glu	Glu	Asn 420	His	Gly	Leu	Ser	Tyr 425	Phe	Leu	Ala	Asp	Asp 430	Asp	Ala
Tyr	Ile	Gly 435	Gly	Thr	Ser	Leu	Leu 440	Ile	Ala	Ala	Glu	Ile 445	Thr	Gln	Glu
Arg	Gln 450	Leu	Pro	Leu	Tyr	Gln 455	Leu	Glu	Tyr	Asp	Val 460	Thr	Glu	Gly	Cys
Glu 465	Val	Gln	Phe	Ile	Tyr 470	Lys	Ser	Pro	Glu	Pro 475	Asp	Met	Gln	Gly	Lys 480
Ile	Asp	Ile	Tyr	Leu 485	Asn	Leu	Gln	Val	Thr 490	Asp	Ile	Leu	Pro	Asp 495	Glu
Leu	Ala	Phe	Tyr 500	Trp	Gln	Asp	Val	Thr 505	Asp	Ala	Ser	Ser	Gln 510	Ala	Asp
Ala	Thr	Thr 515	Ala	Met	Arg	Leu	Tyr 520	Leu	Asn	Glu	Asn	Thr 525	Val	Ile	Tyr
Leu	Lys 530	Pro	Ser	Arg	Lys	Gln 535	Glu	Leu	Ala	Glu	Gly 540	Trp	Leu	Leu	Cys
Ser 545	Val	Arg	Val	Pro	Pro 550	Thr	Tyr	Pro	Leu	Gly 555	Ile	Ala	Thr	Ile	Lys 560
Glu	Leu	Gly	Ile	His 565	Val	Asp	Gly	Lys	Glu 570	Thr	Val	Leu	Phe	Arg 575	Leu

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
 580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
 595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
 610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
 625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
 645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
 660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
 675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
 690 695

<210> 43
 <211> 696
 <212> PRT
 <213> Artificial

<220>
 <223> Amino acid sequence of Endo-RP W278F/F307Y/L306I

<400> 43

Met Pro Ser Leu Glu Leu Gln Gln Ala Ala Asp Thr Arg Leu Phe Glu
 1 5 10 15

Ser Met Pro Leu Gln Thr Met Asn Glu Leu Gly Ser Trp Glu Pro Ser
 20 25 30

Asn Ala Ser Arg Ala Asn Ile Ala Thr Ile Pro Leu His Gln Arg Ser
 35 40 45

Asn Leu Asp Pro Ala Glu Pro Arg Leu Ile Val Thr His Asp Met Ala
 50 55 60

Gly Gly Tyr Lys Glu Asp Ser Asn Ile Gln Gly Asn Thr Tyr Asp Thr
65 70 75 80

Ile Tyr Ser Cys Gln Tyr Trp Gln Tyr Val Asp Thr Phe Ile Tyr Phe
85 90 95

Ser His His Arg Val Thr Ile Pro Pro Val Asn Trp Ile Asn Ala Cys
100 105 110

His Arg Asn Gly Val Lys Thr Leu Gly Thr Phe Ile Val Glu Gly Ala
115 120 125

Ala Gly Met Phe Ala Leu Glu Arg Phe Val Tyr Gly Pro Glu Pro Gly
130 135 140

Gln Arg Asn Ser Trp Ser Pro Tyr Tyr Ala Asp Lys Leu Val Asp Ile
145 150 155 160

Ala Glu Phe Tyr Gly Phe Asp Gly Trp Leu Leu Asn Ile Glu Ser Asp
165 170 175

Phe Phe Pro Leu Tyr Arg Asn Pro Ser Leu Lys Ala Ile His Leu Ala
180 185 190

Lys Leu Leu Arg Tyr Leu Lys Asn Ala Met His Ala Arg Val Pro Gly
195 200 205

Ser Glu Ile Ile Trp Tyr Asp Ser Met Thr Thr Asn Gly Ser Val Gln
210 215 220

Trp Gln Asn Asn Ile Thr Pro Lys Asn Ser Ile Phe Phe Glu Ala Ala
225 230 235 240

Asp Gly Ile Phe Leu Asn Tyr Trp Trp Asn Ala Thr Val Pro Pro Leu
245 250 255

Ala Leu Gln Val Ala His Arg Leu Gly Arg Gln Gly Ser Asp Val Tyr
260 265 270

Phe Gly Thr Asp Val Trp Gly Arg Gly Thr Phe Gly Gly Gly Gly Phe
275 280 285

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

290		295		300
Ala Ile Tyr Gly Thr	Ala Trp Ile Tyr Glu His Phe Gly Lys Lys Asp			
305	310	315		320
Phe Glu Leu Met Asp Arg Leu Leu Trp Leu Gly Gly Asp Gln Ser Glu				
	325	330		335
Tyr Pro Ala Gln Glu Gly Glu Gln Asn Arg Thr Val Lys Val Thr Ser				
	340	345		350
His Leu Gly Arg His Pro Gly Ile Ala Asp Val Ser Pro Val Arg Ser				
	355	360		365
Ala Pro Gly Lys Thr Trp Phe Ala Thr Trp Phe Asp Arg Gly Tyr Gly				
	370	375		380
Thr Gly Phe Tyr Tyr Gln Gly Lys Lys Leu Leu Ser Gln Pro Trp Ser				
385	390	395		400
His Leu Ser His Gln Ser Ile Pro Pro Asn Leu Ile Ala Arg Leu Gln				
	405	410		415
Arg Glu Glu Asn His Gly Leu Ser Tyr Phe Leu Ala Asp Asp Asp Ala				
	420	425		430
Tyr Ile Gly Gly Thr Ser Leu Leu Ile Ala Ala Glu Ile Thr Gln Glu				
	435	440		445
Arg Gln Leu Pro Leu Tyr Gln Leu Glu Tyr Asp Val Thr Glu Gly Cys				
	450	455		460
Glu Val Gln Phe Ile Tyr Lys Ser Pro Glu Pro Asp Met Gln Gly Lys				
465	470	475		480
Ile Asp Ile Tyr Leu Asn Leu Gln Val Thr Asp Ile Leu Pro Asp Glu				
	485	490		495
Leu Ala Phe Tyr Trp Gln Asp Val Thr Asp Ala Ser Ser Gln Ala Asp				
	500	505		510
Ala Thr Thr Ala Met Arg Leu Tyr Leu Asn Glu Asn Thr Val Ile Tyr				
	515	520		525

Leu Lys Pro Ser Arg Lys Gln Glu Leu Ala Glu Gly Trp Leu Leu Cys
 530 535 540

Ser Val Arg Val Pro Pro Thr Tyr Pro Leu Gly Ile Ala Thr Ile Lys
 545 550 555 560

Glu Leu Gly Ile His Val Asp Gly Lys Glu Thr Val Leu Phe Arg Leu
 565 570 575

Gly Leu Leu Thr Ile Ile Pro Leu Gly Asp Ala Pro Ser Ala Leu Ser
 580 585 590

Arg Ile Thr Gln Val Gln Leu Gln Arg Asp Glu Asp Ile His Ser Lys
 595 600 605

Cys Pro Ser Ser Ser Cys Glu Leu Trp Ala Thr Leu Ser Trp Met Met
 610 615 620

Glu His Asn Ser Lys Glu Asp Trp Asp Gln Val Asp His Tyr Met Ile
 625 630 635 640

Phe Phe Lys Asn Val Asp Ser Lys Ala Glu Pro Ile Phe Leu Gly Thr
 645 650 655

Ser Phe Ser Thr Glu Tyr Arg Ile Ser Gly Leu Glu Ile Lys Lys His
 660 665 670

Gly Asn Ser Ile Glu Ile Trp Ala Val Asn Arg Leu Gly Thr Val Ile
 675 680 685

Ala Arg Gln Asp Ile Asp Ile Gln
 690 695

<210> 44
 <211> 744
 <212> PRT
 <213> Artificial

<220>
 <223> Amino acid sequence of Endo-M

<400> 44

Met Pro Ser Leu Gln Leu Gln Pro Asp Asp Lys Leu Ala Pro Val Ser
 1 5 10 15

Phe Ala Leu Lys Ser Met Asn Glu Leu Arg Asp Trp Thr Pro Asp Glu
20 25 30

Lys Ile Lys Phe Asn Val Ser Ser Val Ala Leu Gln Pro Arg Val Lys
35 40 45

Asn Ala Leu Lys Pro Gln Leu Leu Leu Thr His Asp Met Ala Gly Gly
50 55 60

Tyr Lys Glu Asp Lys Asn Ile Gln Gly Asn Asn Tyr Lys Asp Ile Tyr
65 70 75 80

Asn Ile Gln Tyr Trp His Leu Ala Asp Thr Phe Val Tyr Phe Ser His
85 90 95

Glu Arg Val Ser Ile Pro Pro Val Asn Trp Thr Asn Ala Cys His Arg
100 105 110

Asn Gly Val Lys Cys Leu Gly Thr Phe Leu Val Glu Gly Asn Asn Gln
115 120 125

Met His Glu Met Glu Ala Leu Leu His Gly Pro Pro Leu Leu Asn Asn
130 135 140

Thr Asp Asp Pro Met Arg Leu Trp Ser Pro Tyr Tyr Ala Asp Gln Leu
145 150 155 160

Val Ala Ile Ala Lys His Tyr Gly Phe Asp Gly Trp Leu Phe Asn Ile
165 170 175

Glu Cys Glu Phe Phe Pro Phe Pro Thr Asn Pro Lys Phe Lys Ala Glu
180 185 190

Glu Leu Ala Lys Phe Leu His Tyr Phe Lys Glu Lys Leu His Asn Glu
195 200 205

Ile Pro Gly Ser Gln Leu Ile Trp Tyr Asp Ser Met Thr Asn Glu Gly
210 215 220

Glu Ile His Trp Gln Asn Gln Leu Thr Trp Lys Asn Glu Leu Phe Phe
225 230 235 240

Lys Asn Thr Asp Gly Ile Phe Leu Asn Tyr Trp Trp Lys Lys Glu Tyr

245							250							255						
Pro	Glu	Met	Ala 260	Arg	Arg	Val	Ala	Glu 265	Gly	Ile	Gly	Arg	Ser 270	Gly	Leu					
Glu	Val	Tyr 275	Phe	Gly	Thr	Asp	Val 280	Trp	Gly	Arg	His	Thr 285	Tyr	Gly	Gly					
Gly	Gly 290	Phe	Lys	Ser	Tyr	Lys 295	Gly	Val	Lys	Thr	Ala 300	Tyr	Ser	Ala	Met					
Thr 305	Ser	Ser	Ala	Leu	Phe 310	Gly	Met	Ala	Trp	Thr 315	Tyr	Glu	His	Phe	Glu 320					
Lys	Ser	Glu	Phe	Glu 325	Lys	Met	Asp	Arg	Leu 330	Phe	Trp	Cys	Gly	Gly 335	Lys					
Tyr	Ser	Asp	Tyr 340	Pro	Pro	Pro	Pro	Pro 345	Lys	Asn	Pro	Asp	Asp 350	Glu	Lys					
Glu	Val	Glu 355	Ser	Asp	Asp	Ser	Glu 360	Asp	Glu	Leu	Met	Tyr 365	Gly	His	Lys					
Lys	Gly 370	Ile	Ala	Asp	Thr	Val 375	Glu	Ser	Ile	Pro	Val 380	Pro	Gly	Thr	Asp					
Trp 385	Phe	Val	Thr	Asn	Phe 390	Asp	Arg	Gly	Phe	Gly 395	Asn	Arg	Phe	Tyr	Tyr 400					
Arg	Gly	Lys	Arg	Leu 405	Leu	Ser	Gln	Pro	Trp 410	Ser	His	Leu	Ser	His 415	Gln					
Ala	Ile	Leu	Pro 420	Asn	Lys	Ser	Tyr	Arg 425	Asn	Pro	Glu	Ile	Tyr 430	Pro	Thr					
Asp	Gln	Asn 435	Ile	Lys	Ile	Thr	Ser 440	Ser	Leu	Asp	Cys	Asp 445	His	Gly	Ala					
Phe	Leu 450	Gly	Gly	Thr	Ser	Leu 455	Ile	Ile	Lys	Gly	Gln 460	Arg	Phe	Asn	His					
Arg 465	Glu	Ser	His	Asp	Val 470	Glu	Thr	Glu	Ile	Ser 475	Ile	Pro	Leu	Tyr	Lys 480					

Leu Ser Leu Asp Ala Ser Lys Gly Cys Ser Leu Arg Tyr Ile Tyr Arg
 485 490 495

Thr Leu Leu Met Lys Asp Val Lys Leu Thr Val Ala Cys His Phe Ser
 500 505 510

Leu Lys Thr Asn Asp Ser Val Asn Phe Phe Lys Val Trp Gln Pro Asp
 515 520 525

Glu Asn Phe Ser Phe Glu Tyr Asp Asp Gly Met Arg Ala Thr Val Thr
 530 535 540

Thr Glu Asn Ser Thr Glu Ser Arg Cys Phe Leu Leu Arg Thr Thr Glu
 545 550 555 560

Glu Asp Thr Gly Glu Asn Asp Trp Ile Thr Lys Thr Ile Asn Val Pro
 565 570 575

Ala Val Pro Glu Gly Ser Gln Leu Tyr Ile Thr Arg Leu Glu Val Ser
 580 585 590

Val Val Leu Asp Thr Ala Gly Leu Val Gly Leu Val Asn Gln Val Ile
 595 600 605

Ala Cys Leu Gly Tyr Ile Ser Ile Ile Pro Thr Ile Asn Ser Gly Ile
 610 615 620

Lys Thr Asp Ser Ser Arg Ile Ile Gln Asp Leu Phe Trp Lys Asp Gln
 625 630 635 640

Lys Tyr Thr Lys Ile Gly Lys Glu Ser Leu Asp Asp Ile Ala Gln Glu
 645 650 655

Glu Val His Arg Tyr Tyr Gly Thr Leu Asn Trp Glu Asn Thr Ala Asn
 660 665 670

Val Val Asn Ala Trp Glu Glu Ile Asp Tyr Tyr Asn Val Phe Tyr Lys
 675 680 685

Glu Ser Asp Asp Ser Ala Thr Arg Ile Phe Leu Gly Thr Ala Phe Cys
 690 695 700

Asn Gln Phe Arg Val Ser Gly Leu Asp Ile Ile Leu Ser Lys Leu Pro

705					710				715				720			
Lys	Ile	Val	Ile	Glu	Ala	Val	Asn	Lys	Glu	Gly	Tyr	Ile	Ser	Ser	Ser	
				725					730					735		

Gly Ser Ile Asp Leu Ser Leu Asn
740

$\langle 210 \rangle$	45
$\langle 211 \rangle$	772
$\langle 212 \rangle$	PRT
$\langle 213 \rangle$	Artificial

<220>
<223> Amino acid sequence of Endo-0m

<400> 45

Met Ala Gln Ser Gln Leu Leu Gly Gly Ala Val Arg Pro Val Phe Phe
1 5 10 15

Asp Lys Leu Glu Glu Leu Arg Arg Trp His Thr Gln Ser Ala Asn Leu
20 25 30

Ser Arg Glu Ser Glu Leu Asp Ser Leu Asn Val Ala Thr Glu Pro Phe
35 40 45

Ser Ser Tyr Glu Arg Ala Gln Thr Gly Ser Gly Ser Arg Ser Ser Glu
50 55 60

Pro Val Pro Gly Asp Lys Glu Asp Pro Pro Ile Lys Leu Met Val Cys
65 70 75 80

His Asp Phe Lys Gly Gly Tyr Gln Asp Tyr Glu Asp Ala Gln Pro Leu
85 90 95

Gly Tyr Phe Pro His Pro Thr Gly Ser Arg Tyr Phe Leu Gln Tyr Pro
100 105 110

Gln Leu Ile Asp Gln Phe Val Tyr Phe Ser His His Arg Val Thr Val
115 120 125

Pro Pro Val Asn Trp Ile Asn Phe Cys His Arg Asn Gly Ile Lys Cys
130 135 140

Phe Gly Thr Val Ile Phe Glu Gly Asn Ala Ser Lys Asp Phe Glu Glu

145		150		155		160
Leu Asp Arg Leu Val Ser Arg Asp Glu Lys Gly Asp Phe Val Phe Val						
		165		170		175
Asp Ala Leu Ile Lys Leu Ala Ala His Tyr Gly Phe Asp Gly Tyr Leu						
		180		185		190
Leu Asn Ile Glu Thr Thr Phe Ser Asn Thr Lys Ile Ala Ala Asp Leu						
		195		200		205
Glu Pro Phe Ala Glu Gln Leu Lys Ser Gly Leu His Cys Leu Asp Ser						
		210		215		220
Lys Asn Glu Leu Ile Trp Tyr Asp Ser Tyr Val Phe Pro Ala Asn Lys						
225		230		235		240
Val Ser Tyr Thr Asn Gly Val Thr Glu Ser Asn Tyr Asn Phe Phe Ser						
		245		250		255
Leu Ser Asp Ala Phe Phe Ser Asn Tyr Trp Trp Asn Ile Lys Asn Leu						
		260		265		270
Gln Glu Asn Ile Lys Asn Val Gly Val Leu Gly Val Gln Lys Lys Ile						
		275		280		285
Tyr Val Gly Tyr Asp Val Trp Gly Arg Gly Thr Leu Val Gly Lys Gly						
		290		295		300
Gly Phe Asp Ser Ser Leu Ala Cys Lys Met Ile Ala Lys Phe Lys Ser						
305		310		315		320
Asn Val Ala Leu Phe Ala Pro Ala Trp Thr Tyr Glu Ser Leu Gly Pro						
		325		330		335
Lys Asp Phe Asn Gln Asn Asp Ala Arg Phe Trp Ile Gly Leu Phe Glu						
		340		345		350
Asn Glu Ser Ser Ile Ser Ser Thr Val Pro Pro His Ser Ser Ala Val						
		355		360		365
Tyr Lys Ile Asn Glu Ser Ser Phe Ile Phe Tyr Thr Asn Phe Ser Ser						
		370		375		380

Gly Glu Gly Asn Arg Phe Phe Ser Lys Gly Ser Glu Val Tyr Arg Lys
385 390 395 400

Asn Trp Val Asn Gly Ser Leu Gln Phe Asp Leu Pro Ile Asp Leu His
405 410 415

Arg Lys Asp Lys Asn Gly Leu Gln Trp Ala Leu Asp Lys Ser Asp Ala
420 425 430

Phe His Gly Gly Ala Cys Leu Glu Ile Lys Tyr Ser Glu Ile Lys Asp
435 440 445

Glu Asn Gly Tyr Gln Ile Phe Asn Asn Gln Met Val Ser Asp Phe Thr
450 455 460

Leu Phe Asn Phe Thr Lys Glu Cys His Phe Pro Thr Val Asn Val Lys
465 470 475 480

Val Thr Tyr Lys Leu Asn His Lys Thr Lys Ser Thr Phe Lys Ile Lys
485 490 495

Ile Lys Tyr Ile Ile Glu Arg Arg Phe Arg Ser Val Gln Thr Val Arg
500 505 510

Thr Gly Tyr Leu Thr Ile Pro Leu Leu Ser Thr Ser Gly Lys Trp Phe
515 520 525

Thr Val Glu Glu Ser Phe Gln Ile Asn Leu Gln Thr Ser His Glu Tyr
530 535 540

Ile Val Leu Glu Ser Ala His Val Thr Tyr Asp Glu Asp Arg Ser Ala
545 550 555 560

Asp Ser Phe Phe Arg Ser Tyr Ile Val Glu Asp Ser Ala Ile Thr Ser
565 570 575

Val Ile Asp Asn Glu Glu Tyr Glu Lys Leu Ile Asn Ser Glu Ile Tyr
580 585 590

Asn Asp Asp Glu Asp Glu Asp Trp Ile Leu Val Pro Ser Asp Val Ser
595 600 605

Ile Ser Ser Ser Glu Ser Gln Ser Asn Asp Ser Lys Thr Gln Tyr Leu

610

615

620

Gly Arg Lys Leu Phe Gly Asn Lys Ser Thr Pro Lys Thr Arg Thr Leu
 625 630 635 640

Glu Gly Thr Ala Pro Leu Leu Arg Ile Gly Glu Phe Ala Ile Ile Ser
 645 650 655

Ala Asn Asn Tyr Pro Ser Ser Asn Phe Leu Ala Val Thr Ser Val Lys
 660 665 670

Ser Ile Glu Ser Ser Arg Leu Glu Gly Asp Ser Leu Val Leu Leu Asn
 675 680 685

Trp Gln Val Gly Glu Gly His Gln Lys Gly Val Cys Tyr Tyr Ile Ile
 690 695 700

Tyr Val Asn Gly Ala Val Val Gly Leu Ser Val Ala Pro Lys Phe Ile
 705 710 715 720

Tyr Gln Asp Thr Glu Leu Ala Ser Glu Asn Ser Ala Ser Ala Arg Ser
 725 730 735

Asn Tyr Lys Lys Ser Gly Leu Gly Ser Ser Ser Asp Arg Lys Ser Lys
 740 745 750

Val Arg Val Asp Ser Val Asp Lys Leu Gly Asn Val Phe Thr Gly Ser
 755 760 765

Glu Val Trp Val
 770

<210> 46
 <211> 787
 <212> PRT
 <213> Artificial

<220>
 <223> Amino acid sequence of Endo-CC

<400> 46

Met Pro Ile Ala Gly Lys Lys Phe His Pro Arg Ala Leu Pro Glu Phe
 1 5 10 15

Trp Arg Thr Phe Arg Glu Met Asp Glu Trp Arg Ala Thr Gln Thr Gly

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

Asp Ala Pro Gln Lys Gln Ile Asp Phe Leu Ser Arg Val Asp Pro Asn
 260 265 270

Leu Thr Gly Gln Thr Ala Glu Pro His Gln Tyr Asn Leu Gln Lys Thr
 275 280 285

Ile Gln Asp Ile Tyr Ile Gly Val Asp Val Trp Gly Arg Gly Ser His
 290 295 300

Gly Gly Gly Gly Phe Gly Ala Tyr Lys Ala Ile Glu His Ala Asp Pro
 305 310 315 320

Lys Gly Leu Gly Phe Ser Val Ala Leu Phe Ala Gln Gly Trp Thr Trp
 325 330 335

Glu Thr Glu Glu Glu Lys Pro Gly Trp Asn Trp Ala Gln Phe Trp Asp
 340 345 350

Tyr Asp Ser Lys Leu Trp Val Gly Pro Pro Gly Val Val Glu Ala Pro
 355 360 365

Asp His Thr Val Lys Pro Gly Glu Tyr Pro Cys Val His Gly Pro Phe
 370 375 380

Gln Pro Ile Ser Ser Phe Phe Leu Thr Tyr Pro Pro Pro Asp Pro Leu
 385 390 395 400

Asp Leu Pro Phe Tyr Thr Asn Phe Cys Pro Gly Ile Gly Asp Ala Trp
 405 410 415

Phe Val Glu Gly Lys Glu Val Phe Arg Ser Glu Thr Gly Trp Thr Asp
 420 425 430

Met Asp Lys Gln Thr Thr Val Gly Asp Leu Val Trp Pro Arg Pro Lys
 435 440 445

Ile Tyr Asp Leu Pro Ser Gln Asn Ala Ser Gln Ala Thr Leu Asn Ala
 450 455 460

Ala Phe Asn Phe Asn Asp Ala Trp Asn Gly Gly Asn Ser Leu Gln Ile
 465 470 475 480

Asn Leu Thr Val Pro Gly Gly Ala Thr Thr Tyr Gly Ala Tyr Trp Val

485

490

495

Pro Ile Gln Thr Phe Thr Phe Ser Ser Arg Arg Gln Tyr Glu Ala Ser
 500 505 510

Ile Val Tyr Lys Pro Gly Leu Ser Gly Lys Thr Arg Phe Asp Ala Lys
 515 520 525

Tyr Glu Val Gly Ile Arg Thr Ile Thr Gly Glu Asp Gln Gly Lys Ile
 530 535 540

Ile Ser Asn Thr Thr Thr Glu Val Gly Asn Gly Trp Arg Lys Val His
 545 550 555 560

Ile Leu Phe Glu Ile Glu Thr Pro Val Glu Gly Gly Ser Ile Ile Val
 565 570 575

Pro Ser Ser Ile Gly Leu Val Ile Ala Val Ser Asn Val Ser Thr Thr
 580 585 590

Glu Gln Phe Glu Phe Pro Phe Leu Val Gly Gln Ile Thr Ile His Pro
 595 600 605

His Leu Pro Asp Arg Tyr Lys Glu Phe Lys Pro Ala Leu Leu Trp Leu
 610 615 620

Leu Phe Thr Pro Ser Ala Gly Thr Asn Ser Leu Asp Gly Thr Leu Thr
 625 630 635 640

Trp Asp Val Val Ala Ala Ile Glu Arg Pro Pro Pro Val Glu Ile Asn
 645 650 655

Asn Pro Asp Asp Ala Gln Ile Pro Trp Asn Leu Gln Pro Thr Lys Gln
 660 665 670

Glu Trp Phe Pro Asp Phe Leu Tyr Phe Asn Val Tyr Val Leu Glu Leu
 675 680 685

Leu Asp Gly Gly Gly Gln Gly Pro Pro Gln Trp Ile Gly Thr Thr Gly
 690 695 700

Tyr Asp Gly Glu Lys Lys Arg Phe Phe Ile Tyr Asp Glu Ser Leu Pro
 705 710 715 720

Pro Thr Ser Gly Leu Arg Arg Phe Thr Phe Gln Ile Glu Gly Val Leu
 725 730 735

Glu Thr Gly Glu Ser Thr His Trp Tyr Asp Ala Pro Ala Ala Pro Ser
 740 745 750

Ala Thr Ala Gly Gly Glu Gln Lys Arg Thr Arg Arg Thr Ser Leu Lys
 755 760 765

Ser Val Leu Ser Pro Leu Arg Arg Lys Lys Ser Lys Gly Asp Ile Ser
 770 775 780

Val Ala Lys
 785