

F2367025.txt
SEQUENCE LISTING

<110> FOUNDATION MEDICINE, INC.
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<141> 2012-08-23
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<151> 2012-02-03
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Phe Gln Gly Glu Asp Thr Val Val Ile Ala Ser Lys Pro Tyr Ala Phe	
35 40 45	
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Asp Arg Val Phe Gln Ser Ser Thr Ser Gln Glu Gln Val Tyr Asn Asp	
50 55 60	
tgt gca aag aag att gtt aaa gat gta ctt gaa gga tat aat gga aca	240
Cys Ala Lys Lys Ile Val Lys Asp Val Leu Glu Gly Tyr Asn Gly Thr	
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ata ttt gca tat gga caa aca tcc tct ggg aag aca cac aca atg gag	288
Ile Phe Ala Tyr Gly Gln Thr Ser Ser Gly Lys Thr His Thr Met Glu	
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cat	att	aag	gtt	tca	tat	ttt	gaa	ata	tat	ttg	gat	aag	ata	agg	gac	432	
His	Ile 130	Lys	Val	Ser	Tyr	Phe 135	Glu	Ile	Tyr	Leu	Asp 140	Lys	Ile	Arg	Asp		
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Ala	Val	Thr 195	Asn	Met	Asn	Glu	His 200	Ser	Ser	Arg	Ser	His 205	Ser	Ile	Phe		
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Thr	Gly	Ala	Glu	Gly 245	Ala	Val	Leu	Asp	Glu 250	Ala	Lys	Asn	Ile	Asn 255	Lys		
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Arg	Ala	Lys	Thr 325	Ile	Lys	Asn	Thr	Val	Cys 330	Val	Asn	Val	Glu	Leu 335	Thr		
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Ala	Glu	Gln	Trp 340	Lys	Lys	Lys	Tyr	Glu 345	Lys	Glu	Lys	Glu	Lys 350	Asn	Lys		
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ggc act aac act ggg ttt cca aga tat cca aat gat agt gta tat gct Gly Thr Asn Thr Gly Phe Pro Arg Tyr Pro Asn Asp Ser Val Tyr Ala 945 950 955 960			2880
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Asp Arg Val Phe Gln Ser Ser Thr Ser Gln Glu Gln Val Tyr Asn Asp
 50 55 60

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

Gly Lys Leu His Asp Pro Glu Gly Met Gly Ile Ile Pro Arg Ile Val
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Gln Asp Ile Phe Asn Tyr Ile Tyr Ser Met Asp Glu Asn Leu Glu Phe
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His Ile Lys Val Ser Tyr Phe Glu Ile Tyr Leu Asp Lys Ile Arg Asp
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Leu Leu Asp Val Ser Lys Thr Asn Leu Ser Val His Glu Asp Lys Asn
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 Arg Val Pro Tyr Val Lys Gly Cys Thr Glu Arg Phe Val Cys Ser Pro
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 Asp Glu Val Met Asp Thr Ile Asp Glu Gly Lys Ser Asn Arg His Val
 180 185 190
 Ala Val Thr Asn Met Asn Glu His Ser Ser Arg Ser His Ser Ile Phe
 195 200 205
 Leu Ile Asn Val Lys Gln Glu Asn Thr Gln Thr Glu Gln Lys Leu Ser
 210 215 220
 Gly Lys Leu Tyr Leu Val Asp Leu Ala Gly Ser Glu Lys Val Ser Lys
 225 230 235 240
 Thr Gly Ala Glu Gly Ala Val Leu Asp Glu Ala Lys Asn Ile Asn Lys
 245 250 255
 Ser Leu Ser Ala Leu Gly Asn Val Ile Ser Ala Leu Ala Glu Gly Ser
 260 265 270
 Thr Tyr Val Pro Tyr Arg Asp Ser Lys Met Thr Arg Ile Leu Gln Asp
 275 280 285
 Ser Leu Gly Gly Asn Cys Arg Thr Thr Ile Val Ile Cys Cys Ser Pro
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 Ser Ser Tyr Asn Glu Ser Glu Thr Lys Ser Thr Leu Leu Phe Gly Gln
 305 310 315 320
 Arg Ala Lys Thr Ile Lys Asn Thr Val Cys Val Asn Val Glu Leu Thr
 325 330 335
 Ala Glu Gln Trp Lys Lys Lys Tyr Glu Lys Glu Lys Glu Lys Asn Lys
 340 345 350
 Ile Leu Arg Asn Thr Ile Gln Trp Leu Glu Asn Glu Leu Asn Arg Trp
 355 360 365
 Arg Asn Gly Glu Thr Val Pro Ile Asp Glu Gln Phe Asp Lys Glu Lys
 370 375 380
 Ala Asn Leu Glu Ala Phe Thr Val Asp Lys Asp Ile Thr Leu Thr Asn
 385 390 395 400

405 410 415
 Glu Arg Arg Lys Cys Glu Glu Glu Ile Ala Lys Leu Tyr Lys Gln Leu
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 435 440 445
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 450 455 460
 Arg Asp Gln Asp Asn Met Gln Ala Glu Leu Asn Arg Leu Gln Ala Glu
 465 470 475 480
 Asn Asp Ala Ser Lys Glu Glu Val Lys Glu Val Leu Gln Ala Leu Glu
 485 490 495
 Glu Leu Ala Val Asn Tyr Asp Gln Lys Ser Gln Glu Val Glu Asp Lys
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 Thr Lys Glu Tyr Glu Leu Leu Ser Asp Glu Leu Asn Gln Lys Ser Ala
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 530 535 540
 Asn His Gln Lys Lys Arg Ala Ala Glu Met Met Ala Ser Leu Leu Lys
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 580 585 590
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 Cys Ser Gln Asp Gly Pro Leu Leu Leu Ile Val Glu Tyr Ala Lys Tyr
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Gly Ser Leu Arg Gly Phe Leu Arg Glu Ser Arg Lys Val Gly Pro Gly
 675 680 685
 Tyr Leu Gly Ser Gly Gly Ser Arg Asn Ser Ser Ser Leu Asp His Pro
 690 695 700
 Asp Glu Arg Ala Leu Thr Met Gly Asp Leu Ile Ser Phe Ala Trp Gln
 705 710 715 720
 Ile Ser Gln Gly Met Gln Tyr Leu Ala Glu Met Lys Leu Val His Arg
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 Asp Leu Ala Ala Arg Asn Ile Leu Val Ala Glu Gly Arg Lys Met Lys
 740 745 750
 Ile Ser Asp Phe Gly Leu Ser Arg Asp Val Tyr Glu Glu Asp Ser Tyr
 755 760 765
 Val Lys Arg Ser Gln Gly Arg Ile Pro Val Lys Trp Met Ala Ile Glu
 770 775 780
 Ser Leu Phe Asp His Ile Tyr Thr Thr Gln Ser Asp Val Trp Ser Phe
 785 790 795 800
 Gly Val Leu Leu Trp Glu Ile Val Thr Leu Gly Gly Asn Pro Tyr Pro
 805 810 815
 Gly Ile Pro Pro Glu Arg Leu Phe Asn Leu Leu Lys Thr Gly His Arg
 820 825 830
 Met Glu Arg Pro Asp Asn Cys Ser Glu Glu Met Tyr Arg Leu Met Leu
 835 840 845
 Gln Cys Trp Lys Gln Glu Pro Asp Lys Arg Pro Val Phe Ala Asp Ile
 850 855 860
 Ser Lys Asp Leu Glu Lys Met Met Val Lys Arg Arg Asp Tyr Leu Asp
 865 870 875 880
 Leu Ala Ala Ser Thr Pro Ser Asp Ser Leu Ile Tyr Asp Asp Gly Leu
 885 890 895
 Ser Glu Glu Glu Thr Pro Leu Val Asp Cys Asn Asn Ala Pro Leu Pro
 900 905 910
 Arg Ala Leu Pro Ser Thr Trp Ile Glu Asn Lys Leu Tyr Gly Met Ser
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 Asp Pro Asn Trp Pro Gly Glu Ser Pro Val Pro Leu Thr Arg Ala Asp
 930 935 940

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Gly Thr Asn Thr Gly Phe Pro Arg Tyr Pro Asn Asp Ser Val Tyr Ala
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Ser

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Leu Leu Leu Pro Leu Leu Gly Lys Val Ala Leu Gly Leu Tyr Phe Ser	
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Pro Leu Leu Tyr Val His Ala Leu Arg Asp Ala Pro Glu Glu Val Pro	
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agc ttc cgc ctg ggc cag cat ctc tac ggc acg tac cgc aca cgg ctg	240
Ser Phe Arg Leu Gly Gln His Leu Tyr Gly Thr Tyr Arg Thr Arg Leu	
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His Glu Asn Asn Trp Ile Cys Ile Gln Glu Asp Thr Gly Leu Leu Tyr	
85 90 95	
ctt aac cgg agc ctg gac cat agc tcc tgg gag aag ctc agt gtc cgc	336
Leu Asn Arg Ser Leu Asp His Ser Ser Trp Glu Lys Leu Ser Val Arg	
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aac cgc ggc ttt ccc ctg ctc acc gtc tac ctc aag gtc ttc ctg tca	384
Asn Arg Gly Phe Pro Leu Leu Thr Val Tyr Leu Lys Val Phe Leu Ser	
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ccc aca tcc ctt cgt gag ggc gag tgc cag tgg cca ggc tgt gcc cgc	432
Pro Thr Ser Leu Arg Glu Gly Glu Cys Gln Trp Pro Gly Cys Ala Arg	
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gta tac ttc tcc ttc ttc aac acc tcc ttt cca gcc tgc agc tcc ctc	480
Val Tyr Phe Ser Phe Phe Asn Thr Ser Phe Pro Ala Cys Ser Ser Leu	
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cg Arg	gag Glu	aac Asn	cga Arg 180	ccc Pro	cca Pro	ggc Gly	acc Thr	ttc Phe 185	cac His	cag Gln	ttc Phe	cg Arg	ctg Leu 190	ctg Leu	cct Pro	576
gtg Val	cag Gln	ttc Phe 195	ttg Leu	tgc Cys	ccc Pro	aac Asn	atc Ile 200	agc Ser	gtg Val	gcc Ala	tac Tyr	agg Arg 205	ctc Leu	ctg Leu	gag Glu	624
ggt Gly	gag Glu 210	ggt Gly	ctg Leu	ccc Pro	ttc Phe	cg Arg 215	tgc Cys	gcc Ala	ccg Pro	gac Asp	agc Ser 220	ctg Leu	gag Glu	gtg Val	agc Ser	672
acg Thr 225	cg Arg	tgg Trp	gcc Ala	ctg Leu	gac Asp 230	cg Arg	gag Glu	cag Gln	cg Arg	gag Glu 235	aag Lys	tac Tyr	gag Glu	ctg Leu	gtg Val 240	720
gcc Ala	gtg Val	tgc Cys	acc Thr	gtg Val 245	cac His	gcc Ala	ggc Gly	gcg Ala	cg Arg 250	gag Glu	gag Glu	gtg Val	gtg Val	atg Met 255	gtg Val	768
ccc Pro	ttc Phe	ccg Pro	gtg Val 260	acc Thr	gtg Val	tac Tyr	gac Asp	gag Glu 265	gac Asp	gac Asp	tgc Ser	gcg Ala	ccc Pro 270	acc Thr	ttc Phe	816
ccc Pro	gcg Ala	ggc Gly 275	gtc Val	gac Asp	acc Thr	gcc Ala	agc Ser 280	gcc Ala	gtg Val	gtg Val	gag Glu	ttc Phe 285	aag Lys	cg Arg	aag Lys	864
gag Glu	gac Asp 290	acc Thr	gtg Val	gtg Val	gcc Ala	acg Thr 295	ctg Leu	cgt Arg	gtc Val	ttc Phe	gat Asp 300	gca Ala	gac Asp	gtg Val	gta Val	912
cct Pro 305	gca Ala	tca Ser	ggg Gly	gag Glu	ctg Leu 310	gtg Val	agg Arg	cg Arg	tac Tyr	aca Thr 315	agc Ser	acg Thr	ctg Leu	ctc Leu	ccc Pro 320	960
ggg Gly	gac Asp	acc Thr	tgg Trp	gcc Ala 325	cag Gln	cag Gln	acc Thr	ttc Phe	cg Arg 330	gtg Val	gaa Glu	cac His	tgg Trp	ccc Pro 335	aac Asn	1008
gag Glu	acc Thr	tgc Ser	gtc Val 340	cag Gln	gcc Ala	aac Asn	ggc Gly	agc Ser 345	ttc Phe	gtg Val	cg Arg	gcg Ala	acc Thr 350	gta Val	cat His	1056
gac Asp	tat Tyr	agg Arg 355	ctg Leu	gtt Val	ctc Leu	aac Asn	cg Arg 360	aac Asn	ctc Leu	tcc Ser	atc Ile	tgc Ser 365	gag Glu	aac Asn	cg Arg	1104
acc Thr 370	atg Met	cag Gln	ctg Leu	gcg Ala	gtg Val	ctg Leu 375	gtc Val	aat Asn	gac Asp	tca Ser	gac Asp 380	ttc Phe	cag Gln	ggc Gly	cca Pro	1152
gga Gly 385	gcg Ala	ggc Gly	gtc Val	ctc Leu	ttg Leu 390	ctc Leu	cac His	ttc Phe	aac Asn	gtg Val 395	tgc Ser	gtg Val	ctg Leu	ccg Pro	gtc Val 400	1200
agc Ser	ctg Leu	cac His	ctg Leu	ccc Pro 405	agt Ser	acc Thr	tac Tyr	tcc Ser	ctc Leu 410	tcc Ser	gtg Val	agc Ser	agg Arg	agg Arg 415	gct Ala	1248
cg Arg	cga Arg	ttt Phe	gcc Ala	cag Gln	atc Ile	ggg Gly	aaa Lys	gtc Val	tgt Cys	gtg Val	gaa Glu	aac Asn	tgc Cys	cag Gln	gca Ala	1296

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Gln	Ala	Gln	Leu	Leu	Val	Thr	Val	Glu	Gly	Ser	Tyr	Val	Ala	Glu	Glu															
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Glu	Glu	Cys	Gly	Gly	Leu	Gly	Ser	Pro	Thr	Gly	Arg	Cys	Glu	Trp	Arg															
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Gln	Gly	Asp	Gly	Lys	Gly	Ile	Thr	Arg	Asn	Phe	Ser	Thr	Cys	Ser	Pro															
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Ser	Thr	Lys	Thr	Cys	Pro	Asp	Gly	His	Cys	Asp	Val	Val	Glu	Thr	Gln															
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gac	atc	aac	att	tgc	cct	cag	gac	tgc	ctc	cgg	ggc	agc	att	ggt	ggg		1776													
Asp	Ile	Asn	Ile	Cys	Pro	Gln	Asp	Cys	Leu	Arg	Gly	Ser	Ile	Val	Gly															
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Gly	His	Glu	Pro	Gly	Glu	Pro	Arg	Gly	Ile	Lys	Ala	Gly	Tyr	Gly	Thr															
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Cys	Asn	Cys	Phe	Pro	Glu	Glu	Glu	Lys	Cys	Phe	Cys	Glu	Pro	Glu	Asp															
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Ile	Gln	Asp	Pro	Leu	Cys	Asp	Glu	Leu	Cys	Arg	Thr	Val	Ile	Ala	Ala															
625				630						635				640																
gct	gtc	ctc	ttc	tcc	ttc	atc	gtc	tcg	gtg	ctg	ctg	tct	gcc	ttc	tgc		1968													
Ala	Val	Leu	Phe	Ser	Phe	Ile	Val	Ser	Val	Leu	Leu	Ser	Ala	Phe	Cys															
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atc	cac	tgc	tac	cac	aag	ttt	gcc	cac	aag	cca	ccc	atc	tcc	tca	gct		2016													
Ile	His	Cys	Tyr	His	Lys	Phe	Ala	His	Lys	Pro	Pro	Ile	Ser	Ser	Ala															
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gag	atg	acc	ttc	cgg	agg	ccc	gcc	cag	gcc	ttc	ccg	gtc	agc	tac	tcc		2064													
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Ser	Ser	Gly	Ala	Arg	Arg	Pro	Ser	Leu	Asp	Ser	Met	Glu	Asn	Gln	Val		
690						695					700						
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Ser	Val	Asp	Ala	Phe	Lys	Ile	Leu	Gln	Pro	Glu	Gly	Thr	Gly	Met	Ile		
705					710					715					720		
gat	gaa	gag	ttc	act	gtt	gca	aga	ctc	tac	att	agc	aaa	atg	aag	tca		2208
Asp	Glu	Glu	Phe	Thr	Val	Ala	Arg	Leu	Tyr	Ile	Ser	Lys	Met	Lys	Ser		
				725					730					735			
gaa	gta	aaa	acc	atg	gtg	aaa	cgt	tgc	aag	cag	tta	gaa	agc	aca	caa		2256
Glu	Val	Lys	Thr	Met	Val	Lys	Arg	Cys	Lys	Gln	Leu	Glu	Ser	Thr	Gln		
			740					745					750				
act	gag	agc	aac	aaa	aaa	atg	gaa	gaa	aat	gaa	aag	gag	tta	gca	gca		2304
Thr	Glu	Ser	Asn	Lys	Lys	Met	Glu	Glu	Asn	Glu	Lys	Glu	Leu	Ala	Ala		
		755					760					765					
tgt	cag	ctt	cgt	atc	tct	caa	cat	gaa	gcc	aaa	atc	aag	tca	ttg	act		2352
Cys	Gln	Leu	Arg	Ile	Ser	Gln	His	Glu	Ala	Lys	Ile	Lys	Ser	Leu	Thr		
	770					775					780						
gaa	tac	ctt	caa	aat	gtg	gaa	caa	aag	aaa	aga	cag	ttg	gag	gaa	tct		2400
Glu	Tyr	Leu	Gln	Asn	Val	Glu	Gln	Lys	Lys	Arg	Gln	Leu	Glu	Glu	Ser		
785					790					795					800		
gtc	gat	gcc	ctc	agt	gaa	gaa	cta	gtc	cag	ctt	cga	gca	caa	gag	aaa		2448
Val	Asp	Ala	Leu	Ser	Glu	Glu	Leu	Val	Gln	Leu	Arg	Ala	Gln	Glu	Lys		
				805					810					815			
gtc	cat	gaa	atg	gaa	aag	gag	cac	tta	aat	aag	gtt	cag	act	gca	aat		2496
Val	His	Glu	Met	Glu	Lys	Glu	His	Leu	Asn	Lys	Val	Gln	Thr	Ala	Asn		
			820					825					830				
gaa	gtt	aag	caa	gct	gtt	gaa	cag	cag	atc	cag	agc	cat	aga	gaa	act		2544
Glu	Val	Lys	Gln	Ala	Val	Glu	Gln	Gln	Ile	Gln	Ser	His	Arg	Glu	Thr		
		835					840					845					
cat	caa	aaa	cag	atc	agt	agt	ttg	aga	gat	gaa	gta	gaa	gca	aaa	gca		2592
His	Gln	Lys	Gln	Ile	Ser	Ser	Leu	Arg	Asp	Glu	Val	Glu	Ala	Lys	Ala		
	850					855					860						
aaa	ctt	att	act	gat	ctt	caa	gac	caa	aac	cag	aaa	atg	atg	tta	gag		2640
Lys	Leu	Ile	Thr	Asp	Leu	Gln	Asp	Gln	Asn	Gln	Lys	Met	Met	Leu	Glu		
865					870					875					880		
cag	gaa	cgt	cta	aga	gta	gaa	cat	gag	aag	ttg	aaa	gcc	aca	gat	cag		2688
Gln	Glu	Arg	Leu	Arg	Val	Glu	His	Glu	Lys	Leu	Lys	Ala	Thr	Asp	Gln		
				885					890					895			
gaa	aag	agc	aga	aaa	cta	cat	gaa	ctt	acg	gtt	atg	caa	gat	aga	cga		2736
Glu	Lys	Ser	Arg	Lys	Leu	His	Glu	Leu	Thr	Val	Met	Gln	Asp	Arg	Arg		
			900					905					910				
gaa	caa	gca	aga	caa	gac	ttg	aag	ggt	ttg	gaa	gag	aca	gtg	gca	aaa		2784
Glu	Gln	Ala	Arg	Gln	Asp	Leu	Lys	Gly	Leu	Glu	Glu	Thr	Val	Ala	Lys		
		915					920					925					
gaa	ctt	cag	act	tta	cac	aac	ctg	cgc	aaa	ctc	ttt	gtt	cag	gac	ctg		2832
Glu	Leu	Gln	Thr	Leu	His	Asn	Leu	Arg	Lys	Leu	Phe	Val	Gln	Asp	Leu		
	930					935					940						
gct	aca	aga	gtt	aaa	aag	agt	gct	gag	att	gat	tct	gat	gac	acc	gga		2880
Ala	Thr	Arg	Val	Lys	Lys	Ser	Ala	Glu	Ile	Asp	Ser	Asp	Asp	Thr	Gly		
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ggc agc gct gct cag aag caa aaa atc tcc ttt ctt gaa aat aat ctt Gly Ser Ala Ala Gln Lys Gln Lys Ile Ser Phe Leu Glu Asn Asn Leu 965 970 975	2928
gaa cag ctc act aaa gtg cac aaa cag ttg gta cgt gat aat gca gat Glu Gln Leu Thr Lys Val His Lys Gln Leu Val Arg Asp Asn Ala Asp 980 985 990	2976
ctc cgc tgt gaa ctt cct aag ttg gaa aag cga ctt cga gct aca gct Leu Arg Cys Glu Leu Pro Lys Leu Glu Lys Arg Leu Arg Ala Thr Ala 995 1000 1005	3024
gag aga gtg aaa gct ttg gaa tca gca ctg aaa gaa gct aaa gaa Glu Arg Val Lys Ala Leu Glu Ser Ala Leu Lys Glu Ala Lys Glu 1010 1015 1020	3069
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tct gca cag att gct aaa cct att cgt ccc ggg caa cat cca gca Ser Ala Gln Ile Ala Lys Pro Ile Arg Pro Gly Gln His Pro Ala 1055 1060 1065	3204
gct tct cca act cac cca agt gca att cgt gga gga ggt gca ttt Ala Ser Pro Thr His Pro Ser Ala Ile Arg Gly Gly Gly Ala Phe 1070 1075 1080	3249
gtt cag aac agc cag cca gtg gca gtg cga ggt gga gga ggc aaa Val Gln Asn Ser Gln Pro Val Ala Val Arg Gly Gly Gly Gly Lys 1085 1090 1095	3294
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 <212> PRT
 <213> Artificial Sequence

<220>
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 Arg Asp Ala Tyr Trp Glu Lys Leu Tyr Val Asp Gln Ala Ala Gly Thr
 35 40 45
 Pro Leu Leu Tyr Val His Ala Leu Arg Asp Ala Pro Glu Glu Val Pro
 50 55 60

Ser Phe Arg Leu Gly Gln His Leu Tyr Gly Thr Tyr Arg Thr Arg Leu
 65 70 75 80
 His Glu Asn Asn Trp Ile Cys Ile Gln Glu Asp Thr Gly Leu Leu Tyr
 85 90 95
 Leu Asn Arg Ser Leu Asp His Ser Ser Trp Glu Lys Leu Ser Val Arg
 100 105 110
 Asn Arg Gly Phe Pro Leu Leu Thr Val Tyr Leu Lys Val Phe Leu Ser
 115 120 125
 Pro Thr Ser Leu Arg Glu Gly Glu Cys Gln Trp Pro Gly Cys Ala Arg
 130 135 140
 Val Tyr Phe Ser Phe Phe Asn Thr Ser Phe Pro Ala Cys Ser Ser Leu
 145 150 155 160
 Lys Pro Arg Glu Leu Cys Phe Pro Glu Thr Arg Pro Ser Phe Arg Ile
 165 170 175
 Arg Glu Asn Arg Pro Pro Gly Thr Phe His Gln Phe Arg Leu Leu Pro
 180 185 190
 Val Gln Phe Leu Cys Pro Asn Ile Ser Val Ala Tyr Arg Leu Leu Glu
 195 200 205
 Gly Glu Gly Leu Pro Phe Arg Cys Ala Pro Asp Ser Leu Glu Val Ser
 210 215 220
 Thr Arg Trp Ala Leu Asp Arg Glu Gln Arg Glu Lys Tyr Glu Leu Val
 225 230 235 240
 Ala Val Cys Thr Val His Ala Gly Ala Arg Glu Glu Val Val Met Val
 245 250 255
 Pro Phe Pro Val Thr Val Tyr Asp Glu Asp Asp Ser Ala Pro Thr Phe
 260 265 270
 Pro Ala Gly Val Asp Thr Ala Ser Ala Val Val Glu Phe Lys Arg Lys
 275 280 285
 Glu Asp Thr Val Val Ala Thr Leu Arg Val Phe Asp Ala Asp Val Val
 290 295 300
 Pro Ala Ser Gly Glu Leu Val Arg Arg Tyr Thr Ser Thr Leu Leu Pro
 305 310 315 320
 Gly Asp Thr Trp Ala Gln Gln Thr Phe Arg Val Glu His Trp Pro Asn
 325 330 335

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Glu Thr Ser Val Gln Ala Asn Gly Ser Phe Val Arg Ala Thr Val His
 340 345 350
 Asp Tyr Arg Leu Val Leu Asn Arg Asn Leu Ser Ile Ser Glu Asn Arg
 355 360 365
 Thr Met Gln Leu Ala Val Leu Val Asn Asp Ser Asp Phe Gln Gly Pro
 370 375 380
 Gly Ala Gly Val Leu Leu Leu His Phe Asn Val Ser Val Leu Pro Val
 385 390 395 400
 Ser Leu His Leu Pro Ser Thr Tyr Ser Leu Ser Val Ser Arg Arg Ala
 405 410 415
 Arg Arg Phe Ala Gln Ile Gly Lys Val Cys Val Glu Asn Cys Gln Ala
 420 425 430
 Phe Ser Gly Ile Asn Val Gln Tyr Lys Leu His Ser Ser Gly Ala Asn
 435 440 445
 Cys Ser Thr Leu Gly Val Val Thr Ser Ala Glu Asp Thr Ser Gly Ile
 450 455 460
 Leu Phe Val Asn Asp Thr Lys Ala Leu Arg Arg Pro Lys Cys Ala Glu
 465 470 475 480
 Leu His Tyr Met Val Val Ala Thr Asp Gln Gln Thr Ser Arg Gln Ala
 485 490 495
 Gln Ala Gln Leu Leu Val Thr Val Glu Gly Ser Tyr Val Ala Glu Glu
 500 505 510
 Ala Gly Cys Pro Leu Ser Cys Ala Val Ser Lys Arg Arg Leu Glu Cys
 515 520 525
 Glu Glu Cys Gly Gly Leu Gly Ser Pro Thr Gly Arg Cys Glu Trp Arg
 530 535 540
 Gln Gly Asp Gly Lys Gly Ile Thr Arg Asn Phe Ser Thr Cys Ser Pro
 545 550 555 560
 Ser Thr Lys Thr Cys Pro Asp Gly His Cys Asp Val Val Glu Thr Gln
 565 570 575
 Asp Ile Asn Ile Cys Pro Gln Asp Cys Leu Arg Gly Ser Ile Val Gly
 580 585 590
 Gly His Glu Pro Gly Glu Pro Arg Gly Ile Lys Ala Gly Tyr Gly Thr
 595 600 605

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Cys Asn Cys Phe Pro Glu Glu Glu Lys Cys Phe Cys Glu Pro Glu Asp
 610 615 620
 Ile Gln Asp Pro Leu Cys Asp Glu Leu Cys Arg Thr Val Ile Ala Ala
 625 630 635 640
 Ala Val Leu Phe Ser Phe Ile Val Ser Val Leu Leu Ser Ala Phe Cys
 645 650 655
 Ile His Cys Tyr His Lys Phe Ala His Lys Pro Pro Ile Ser Ser Ala
 660 665 670
 Glu Met Thr Phe Arg Arg Pro Ala Gln Ala Phe Pro Val Ser Tyr Ser
 675 680 685
 Ser Ser Gly Ala Arg Arg Pro Ser Leu Asp Ser Met Glu Asn Gln Val
 690 695 700
 Ser Val Asp Ala Phe Lys Ile Leu Gln Pro Glu Gly Thr Gly Met Ile
 705 710 715 720
 Asp Glu Glu Phe Thr Val Ala Arg Leu Tyr Ile Ser Lys Met Lys Ser
 725 730 735
 Glu Val Lys Thr Met Val Lys Arg Cys Lys Gln Leu Glu Ser Thr Gln
 740 745 750
 Thr Glu Ser Asn Lys Lys Met Glu Glu Asn Glu Lys Glu Leu Ala Ala
 755 760 765
 Cys Gln Leu Arg Ile Ser Gln His Glu Ala Lys Ile Lys Ser Leu Thr
 770 775 780
 Glu Tyr Leu Gln Asn Val Glu Gln Lys Lys Arg Gln Leu Glu Glu Ser
 785 790 795 800
 Val Asp Ala Leu Ser Glu Glu Leu Val Gln Leu Arg Ala Gln Glu Lys
 805 810 815
 Val His Glu Met Glu Lys Glu His Leu Asn Lys Val Gln Thr Ala Asn
 820 825 830
 Glu Val Lys Gln Ala Val Glu Gln Gln Ile Gln Ser His Arg Glu Thr
 835 840 845
 His Gln Lys Gln Ile Ser Ser Leu Arg Asp Glu Val Glu Ala Lys Ala
 850 855 860

Lys Leu Ile Thr Asp Leu Gln Asp Gln Asn Gln Lys Met Met Leu Glu
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<220>
 <223> Description of Artificial Sequence: Synthetic polynucleotide

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 <222> (16)..(185)
 <223> a, c, t, g, unknown or other

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 nnnnnnnnnn nnnnnnnnnn nnnnnnnnnn nnnnnnnnnn nnnnnnnnnn nnnnnnnnnn 120
 nnnnnnnnnn nnnnnnnnnn nnnnnnnnnn nnnnnnnnnn nnnnnnnnnn nnnnnnnnnn 180
 nnnnncactg cggctcctca 200

<210> 6
 <211> 16
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic peptide

<400> 6
 Lys Val Asp Asn Asn Gly Val Ala Ile Gly Ile Glu Ala Leu Asp Lys
 1 5 10 15

<210> 7
 <211> 17
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic peptide

<400> 7
 Glu Asp Pro Lys Trp Glu Phe Pro Arg Lys Asn Leu Val Leu Gly Lys
 1 5 10 15

Thr

<210> 8
 <211> 14
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Synthetic oligonucleotide

<400> 8
 tgtaaaggag gatc 14

<210> 9

<211> 976

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Synthetic polypeptide

<400> 9

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 1 5 10 15

Pro Leu Asn Glu Ser Glu Val Asn Arg Gly Asp Lys Tyr Ile Ala Lys
 20 25 30

Phe Gln Gly Glu Asp Thr Val Val Ile Ala Ser Lys Pro Tyr Ala Phe
 35 40 45

Asp Arg Val Phe Gln Ser Ser Thr Ser Gln Glu Gln Val Tyr Asn Asp
 50 55 60

Cys Ala Lys Lys Ile Val Lys Asp Val Leu Glu Gly Tyr Asn Gly Thr
 65 70 75 80

Ile Phe Ala Tyr Gly Gln Thr Ser Ser Gly Lys Thr His Thr Met Glu
 85 90 95

Gly Lys Leu His Asp Pro Glu Gly Met Gly Ile Ile Pro Arg Ile Val
 100 105 110

Gln Asp Ile Phe Asn Tyr Ile Tyr Ser Met Asp Glu Asn Leu Glu Phe
 115 120 125

His Ile Lys Val Ser Tyr Phe Glu Ile Tyr Leu Asp Lys Ile Arg Asp
 130 135 140

Leu Leu Asp Val Ser Lys Thr Asn Leu Ser Val His Glu Asp Lys Asn
 145 150 155 160

Arg Val Pro Tyr Val Lys Gly Cys Thr Glu Arg Phe Val Cys Ser Pro
 165 170 175

Asp Glu Val Met Asp Thr Ile Asp Glu Gly Lys Ser Asn Arg His Val
 180 185 190

Ala Val Thr Asn Met Asn Glu His Ser Ser Arg Ser His Ser Ile Phe
 195 200 205

Leu Ile Asn Val Lys Gln Glu Asn Thr Gln Thr Glu Gln Lys Leu Ser
 210 215 220

Gly Lys Leu Tyr Leu Val Asp Leu Ala Gly Ser Glu Lys Val Ser Lys
 225 230 235 240

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Thr Gly Ala Glu Gly Ala Val Leu Asp Glu Ala Lys Asn Ile Asn Lys
245 250 255

Ser Leu Ser Ala Leu Gly Asn Val Ile Ser Ala Leu Ala Glu Gly Ser
260 265 270

Thr Tyr Val Pro Tyr Arg Asp Ser Lys Met Thr Arg Ile Leu Gln Asp
275 280 285

Ser Leu Gly Gly Asn Cys Arg Thr Thr Ile Ile Cys Cys Ser Pro Ser
290 295 300

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

Ala Lys Thr Ile Lys Asn Thr Val Cys Val Asn Val Glu Leu Thr Ala
325 330 335

Glu Gln Trp Lys Lys Lys Tyr Glu Lys Glu Lys Glu Lys Asn Lys Ile
340 345 350

Leu Arg Asn Thr Ile Gln Trp Leu Glu Asn Glu Leu Asn Arg Trp Arg
355 360 365

Asn Gly Glu Thr Val Pro Ile Asp Glu Gln Phe Asp Lys Glu Lys Ala
370 375 380

Asn Leu Glu Ala Phe Thr Val Asp Lys Asp Ile Thr Leu Thr Asn Asp
385 390 395 400

Lys Pro Ala Thr Ala Ile Gly Val Ile Gly Asn Phe Thr Asp Ala Glu
405 410 415

Arg Arg Lys Cys Glu Glu Glu Ile Ala Lys Leu Tyr Lys Gln Leu Asp
420 425 430

Asp Lys Asp Glu Glu Ile Asn Gln Gln Ser Gln Leu Val Glu Lys Leu
435 440 445

Lys Thr Gln Met Leu Asp Gln Glu Glu Leu Leu Ala Ser Thr Arg Arg
450 455 460

Asp Gln Asp Asn Met Gln Ala Glu Leu Asn Arg Leu Gln Ala Glu Asn
465 470 475 480

Asp Ala Ser Lys Glu Glu Val Lys Glu Val Leu Gln Ala Leu Glu Glu
485 490 495

Leu Ala Val Asn Tyr Asp Gln Lys Ser Gln Glu Val Glu Asp Lys Thr

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500	505	510
Lys Glu Tyr Glu Leu Leu Ser Asp Glu Leu Asn Gln Lys Ser Ala Thr		
515	520	525
Leu Ala Ser Ile Asp Ala Glu Leu Gln Lys Leu Lys Glu Met Thr Asn		
530	535	540
His Gln Lys Lys Arg Ala Ala Glu Met Met Ala Ser Leu Leu Lys Asp		
545	550	555
Leu Ala Glu Ile Gly Ile Ala Val Gly Asn Asn Asp Val Lys Glu Asp		
565	570	575
Pro Lys Trp Glu Phe Pro Arg Lys Asn Leu Val Leu Gly Lys Thr Leu		
580	585	590
Gly Glu Gly Glu Phe Gly Lys Val Val Lys Ala Thr Ala Phe His Leu		
595	600	605
Lys Gly Arg Ala Gly Tyr Thr Thr Val Ala Val Lys Met Leu Lys Glu		
610	615	620
Asn Ala Ser Pro Ser Glu Leu Arg Asp Leu Leu Ser Glu Phe Asn Val		
625	630	635
Leu Lys Gln Val Asn His Pro His Val Ile Lys Leu Tyr Gly Ala Cys		
645	650	655
Ser Gln Asp Gly Pro Leu Leu Leu Ile Val Glu Tyr Ala Lys Tyr Gly		
660	665	670
Ser Leu Arg Gly Phe Leu Arg Glu Ser Arg Lys Val Gly Pro Gly Tyr		
675	680	685
Leu Gly Ser Gly Gly Ser Arg Asn Ser Ser Ser Leu Asp His Pro Asp		
690	695	700
Glu Arg Ala Leu Thr Met Gly Asp Leu Ile Ser Phe Ala Trp Gln Ile		
705	710	715
Ser Gln Gly Met Gln Tyr Leu Ala Glu Met Lys Leu Val His Arg Asp		
725	730	735
Leu Ala Ala Arg Asn Ile Leu Val Ala Glu Gly Arg Lys Met Lys Ile		
740	745	750
Ser Asp Phe Gly Leu Ser Arg Asp Val Tyr Glu Glu Asp Ser Tyr Val		
755	760	765

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

Leu Phe Asp His Ile Tyr Thr Thr Gln Ser Asp Val Trp Ser Phe Gly
 785 790 795 800

Val Leu Leu Trp Glu Ile Val Thr Leu Gly Gly Asn Pro Tyr Pro Gly
 805 810 815

Ile Pro Pro Glu Arg Leu Phe Asn Leu Leu Lys Thr Gly His Arg Met
 820 825 830

Glu Arg Pro Asp Asn Cys Ser Glu Glu Met Tyr Arg Leu Met Leu Gln
 835 840 845

Cys Trp Lys Gln Glu Pro Asp Lys Arg Pro Val Phe Ala Asp Ile Ser
 850 855 860

Lys Asp Leu Glu Lys Met Met Val Lys Arg Arg Asp Tyr Leu Asp Leu
 865 870 875 880

Ala Ala Ser Thr Pro Ser Asp Ser Leu Ile Tyr Asp Asp Gly Leu Ser
 885 890 895

Glu Glu Glu Thr Pro Leu Val Asp Cys Asn Asn Ala Pro Leu Pro Arg
 900 905 910

Ala Leu Pro Ser Thr Trp Ile Glu Asn Lys Leu Tyr Gly Met Ser Asp
 915 920 925

Pro Asn Trp Pro Gly Glu Ser Pro Val Pro Leu Thr Arg Ala Asp Gly
 930 935 940

Thr Asn Thr Gly Phe Pro Arg Tyr Pro Asn Asp Ser Val Tyr Ala Asn
 945 950 955 960

Trp Met Leu Ser Pro Ser Ala Ala Lys Leu Met Asp Thr Phe Asp Ser
 965 970 975