

820233-02315_Seq_Listing_ST25
SEQUENCE LISTING

<110> Ma, Jian-Xing
Gennadiy, Moiseyev
Takahashi, Yusuke

<120> HIGH ISOMEROHYDROLASE ACTIVITY MUTANTS OF MAMMALIAN RPE65

<130> 820233.02315

<150> 62/031,472
<151> 2014-07-31

<160> 42

<170> PatentIn version 3.5

<210> 1
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<212> PRT
<213> Homo sapiens

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Arg Ile Pro Leu Trp Leu Thr Gly Ser Leu Leu Arg Cys Gly Pro Gly
35 40 45

Leu Phe Glu Val Gly Ser Glu Pro Phe Tyr His Leu Phe Asp Gly Gln
50 55 60

Ala Leu Leu His Lys Phe Asp Phe Lys Glu Gly His Val Thr Tyr His
65 70 75 80

Arg Arg Phe Ile Arg Thr Asp Ala Tyr Val Arg Ala Met Thr Glu Lys
85 90 95

Arg Ile Val Ile Thr Glu Phe Gly Thr Cys Ala Phe Pro Asp Pro Cys
100 105 110

Lys Asn Ile Phe Ser Arg Phe Phe Ser Tyr Phe Arg Gly Val Glu Val
115 120 125

Thr Asp Asn Ala Leu Val Asn Val Tyr Pro Val Gly Glu Asp Tyr Tyr
130 135 140

Ala Cys Thr Glu Thr Asn Phe Ile Thr Lys Ile Asn Pro Glu Thr Leu
145 150 155 160

Glu Thr Ile Lys Gln Val Asp Leu Cys Asn Tyr Val Ser Val Asn Gly
165 170 175

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Ile	Val	Val	Gln	Phe	Pro	Cys	Ser	Asp	Arg	Phe	Lys	Pro	Ser	Tyr	Val
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His	Ser	Phe	Gly	Leu	Thr	Pro	Asn	Tyr	Ile	Val	Phe	Val	Glu	Thr	Pro
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Val	Lys	Ile	Asn	Leu	Phe	Lys	Phe	Leu	Ser	Ser	Trp	Ser	Leu	Trp	Gly
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Ala	Asn	Tyr	Met	Asp	Cys	Phe	Glu	Ser	Asn	Glu	Thr	Met	Gly	Val	Trp
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Leu	His	Ile	Ala	Asp	Lys	Lys	Arg	Lys	Lys	Tyr	Leu	Asn	Asn	Lys	Tyr
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Arg	Thr	Ser	Pro	Phe	Asn	Leu	Phe	His	His	Ile	Asn	Thr	Tyr	Glu	Asp
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Asn	Gly	Phe	Leu	Ile	Val	Asp	Leu	Cys	Cys	Trp	Lys	Gly	Phe	Glu	Phe
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Val	Tyr	Asn	Tyr	Leu	Tyr	Leu	Ala	Asn	Leu	Arg	Glu	Asn	Trp	Glu	Glu
			340					345					350		
Val	Lys	Lys	Asn	Ala	Arg	Lys	Ala	Pro	Gln	Pro	Glu	Val	Arg	Arg	Tyr
		355					360					365			
Val	Leu	Pro	Leu	Asn	Ile	Asp	Lys	Ala	Asp	Thr	Gly	Lys	Asn	Leu	Val
	370					375					380				
Thr	Leu	Pro	Asn	Thr	Thr	Ala	Thr	Ala	Ile	Leu	Cys	Ser	Asp	Glu	Thr
385					390					395					400
Ile	Trp	Leu	Glu	Pro	Glu	Val	Leu	Phe	Ser	Gly	Pro	Arg	Gln	Ala	Phe
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Glu	Phe	Pro	Gln	Ile	Asn	Tyr	Gln	Lys	Tyr	Cys	Gly	Lys	Pro	Tyr	Thr
			420					425					430		
Tyr	Ala	Tyr	Gly	Leu	Gly	Leu	Asn	His	Phe	Val	Pro	Asp	Arg	Leu	Cys
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Lys Leu Asn Val Lys Thr Lys Glu Thr Trp Val Trp Gln Glu Pro Asp
450 455 460

Ser Tyr Pro Ser Glu Pro Ile Phe Val Ser His Pro Asp Ala Leu Glu
465 470 475 480

Glu Asp Asp Gly Val Val Leu Ser Val Val Val Ser Pro Gly Ala Gly
485 490 495

Gln Lys Pro Ala Tyr Leu Leu Ile Leu Asn Ala Lys Asp Leu Ser Glu
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Val Ala Arg Ala Glu Val Glu Ile Asn Ile Pro Val Thr Phe His Gly
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Leu Phe Lys Lys Ser
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<212> DNA
<213> Homo sapiens

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 <211> 533
 <212> PRT
 <213> Chicken

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Arg Ile Pro Thr Trp Leu Arg Gly Ser Leu Leu Arg Cys Gly Pro Gly	
35 40 45	

Leu Phe Glu Val Gly Ala Glu Pro Phe Tyr His Leu Phe Asp Gly Gln	
50 55 60	

Ala Leu Leu His Lys Phe Asp Phe Lys Glu Gly His Val Thr Tyr His	
65 70 75 80	

Arg Arg Phe Val Arg Thr Asp Ala Tyr Val Arg Ala Met Thr Glu Lys	
85 90 95	

Arg Ile Val Ile Thr Glu Phe Gly Thr Tyr Ala Tyr Pro Asp Pro Cys	
100 105 110	

Lys Asn Ile Phe Ser Arg Phe Phe Ser Tyr Phe Lys Gly Val Glu Val	
115 120 125	

Thr Asp Asn Ala Leu Val Asn Val Tyr Pro Val Gly Glu Asp Tyr Tyr	
130 135 140	

Ala Cys Thr Glu Thr Asn Phe Ile Thr Lys Ile Asn Pro Asp Thr Leu	
145 150 155 160	

Glu Thr Ile Lys Gln Val Asp Leu Cys Lys Tyr Val Ser Val Asn Gly	
165 170 175	

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Ala Thr Ala His Pro His Val Glu Asn Asp Gly Thr Val Tyr Asn Ile
180 185 190

Gly Asn Cys Phe Gly Lys Asn Phe Ser Leu Ala Tyr Asn Ile Ile Arg
195 200 205

Ile Pro Pro Leu Gln Ala Asp Lys Glu Asp Pro Met Asn Lys Ser Glu
210 215 220

Val Val Val Gln Phe Pro Cys Ser Asp Arg Phe Lys Pro Ser Tyr Val
225 230 235 240

His Ser Phe Gly Leu Thr Pro Asn Tyr Ile Val Phe Val Glu Thr Pro
245 250 255

Val Lys Ile Asn Leu Leu Lys Phe Leu Ser Ser Trp Ser Leu Trp Gly
260 265 270

Ala Asn Tyr Met Asp Cys Phe Glu Ser Asn Glu Thr Met Gly Val Trp
275 280 285

Leu His Val Ala Glu Lys Lys Lys Gly Arg Leu Leu Asn Ile Lys Tyr
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Arg Thr Ser Ala Phe Asn Leu Phe His His Ile Asn Thr Phe Glu Asp
305 310 315 320

Asn Gly Phe Leu Ile Val Asp Leu Cys Thr Trp Lys Gly Phe Glu Phe
325 330 335

Val Tyr Asn Tyr Leu Tyr Leu Ala Asn Leu Arg Ala Asn Trp Asp Glu
340 345 350

Val Lys Lys Gln Ala Glu Lys Ala Pro Gln Pro Glu Ala Arg Arg Tyr
355 360 365

Val Leu Pro Leu Arg Ile Asp Lys Ala Asp Thr Gly Lys Asn Leu Val
370 375 380

Thr Leu Pro Tyr Thr Thr Ala Thr Ala Thr Leu Arg Ser Asp Glu Thr
385 390 395 400

Val Trp Leu Glu Pro Glu Val Ile Phe Ser Gly Pro Arg His Ala Phe
405 410 415

Glu Phe Pro Gln Ile Asn Tyr Lys Lys Tyr Gly Gly Lys Pro Tyr Thr
420 425 430

Tyr Thr Tyr Gly Leu Gly Leu Asn His Phe Val Pro Asp Arg Leu Cys
435 440 445

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Lys Leu Asn Val Lys Thr Lys Glu Thr Trp Val Trp Gln Glu Pro Asp
 450 455 460

Ser Tyr Pro Ser Glu Pro Ile Phe Val Ser His Pro Asp Ala Leu Glu
 465 470 475 480

Glu Asp Asp Gly Val Val Leu Ser Ile Val Ile Ser Pro Gly Ser Gly
 485 490 495

Pro Lys Pro Ala Tyr Leu Leu Ile Leu Asn Ala Lys Asp Met Ser Glu
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Leu Phe Lys Arg Ala
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 <212> DNA
 <213> Chicken

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 aatgggttcc tcattgtcga cctctgcaca tggaagggat tcgagttcgt ttacaattac 1020
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cactttgttc cagacaggct ttgcaagctg aatgttaaaa caaaggagac ctgggtgtgg	1380
caggagccag attcataccc atcagagcca atcttcgttt cccatccaga tgctctggag	1440
gaggatgatg ggggtggtgct gagcattgtg atcagccctg gctcagggcc gaagcctgcc	1500
tacctcctga tcctgaatgc caaggacatg agtgaagtgg ccagggcaga agtggaggtg	1560
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<210> 5
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 <212> PRT
 <213> Crab-eating macaque

<400> 5

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Leu Phe Glu Val Gly Ser Glu Pro Phe Tyr His Leu Phe Asp Gly Gln	50	55	60	
Ala Leu Leu His Lys Phe Asp Phe Lys Glu Gly His Val Thr Tyr His	65	70	75	80
Arg Arg Phe Ile Arg Thr Asp Ala Tyr Val Arg Ala Met Thr Glu Lys	85	90	95	
Arg Ile Val Ile Thr Glu Phe Gly Thr Cys Ala Phe Pro Asp Pro Cys	100	105	110	
Lys Asn Ile Phe Ser Arg Phe Phe Ser Tyr Phe Arg Gly Val Glu Val	115	120	125	
Thr Asp Asn Ala Leu Val Asn Val Tyr Pro Val Gly Glu Asp Tyr Tyr	130	135	140	
Ala Cys Thr Glu Thr Asn Phe Ile Thr Lys Ile Asn Pro Glu Thr Leu	145	150	155	160
Glu Thr Ile Lys Gln Val Asp Leu Cys Asn Tyr Val Ser Val Asn Gly	165	170	175	

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Ala	Thr	Ala	His	Pro	His	Ile	Glu	Asn	Asp	Gly	Thr	Val	Tyr	Asn	Ile
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Gly	Asn	Cys	Phe	Gly	Lys	Asn	Phe	Ser	Ile	Ala	Tyr	Asn	Ile	Val	Lys
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Ile	Pro	Pro	Leu	Gln	Ala	Asp	Lys	Glu	Asp	Pro	Ile	Ser	Lys	Ser	Glu
	210					215					220				
Ile	Val	Val	Gln	Phe	Pro	Cys	Ser	Asp	Arg	Phe	Lys	Pro	Ser	Tyr	Val
225					230					235					240
His	Ser	Phe	Gly	Leu	Thr	Pro	Asn	Tyr	Ile	Val	Phe	Val	Glu	Thr	Pro
				245					250					255	
Val	Lys	Ile	Asn	Leu	Phe	Lys	Phe	Leu	Ser	Ser	Trp	Ser	Leu	Trp	Gly
			260					265					270		
Ala	Asn	Tyr	Met	Asp	Cys	Phe	Glu	Ser	Asn	Glu	Thr	Met	Gly	Val	Trp
		275					280					285			
Leu	His	Ile	Ala	Asp	Lys	Lys	Arg	Lys	Lys	Tyr	Leu	Asn	Asn	Lys	Tyr
	290					295					300				
Arg	Thr	Ser	Pro	Phe	Asn	Leu	Phe	His	His	Ile	Asn	Thr	Tyr	Glu	Asp
305					310					315					320
Asn	Gly	Phe	Leu	Ile	Val	Asp	Leu	Cys	Cys	Trp	Lys	Gly	Phe	Glu	Phe
				325					330					335	
Val	Tyr	Asn	Tyr	Leu	Tyr	Leu	Ala	Asn	Leu	Arg	Glu	Asn	Trp	Glu	Glu
			340					345					350		
Val	Lys	Lys	Asn	Ala	Arg	Lys	Ala	Pro	Gln	Pro	Glu	Val	Arg	Arg	Tyr
		355					360					365			
Val	Leu	Pro	Leu	Asn	Ile	Asp	Lys	Ala	Asp	Thr	Gly	Lys	Asn	Leu	Ile
	370					375					380				
Thr	Leu	Pro	Asn	Thr	Thr	Ala	Thr	Ala	Ile	Leu	Cys	Ser	Asp	Glu	Thr
385					390					395					400
Ile	Trp	Leu	Glu	Pro	Glu	Val	Leu	Phe	Ser	Gly	Pro	Arg	Gln	Ala	Phe
				405					410					415	
Glu	Phe	Pro	Gln	Ile	Asn	Tyr	Gln	Lys	Tyr	Cys	Gly	Lys	Pro	Tyr	Thr
			420					425					430		
Tyr	Ala	Tyr	Gly	Leu	Gly	Leu	Asn	His	Phe	Val	Pro	Asp	Arg	Leu	Cys
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820233-02315_Seq_Listing_ST25

Lys Leu Asn Val Lys Thr Lys Glu Thr Trp Val Trp Gln Glu Pro Asp
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Ser Tyr Pro Ser Glu Pro Ile Phe Val Ser His Pro Asp Ala Leu Glu
 465 470 475 480

Glu Asp Asp Gly Val Val Leu Ser Val Val Val Ser Pro Gly Ala Gly
 485 490 495

Gln Lys Pro Ala Tyr Leu Leu Ile Leu Asn Ala Lys Asp Leu Ser Glu
 500 505 510

Val Ala Arg Ala Glu Val Glu Ile Asn Ile Pro Val Thr Phe His Gly
 515 520 525

Leu Phe Lys Lys Ser
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 <213> Crab-eating macaque

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 <212> PRT
 <213> Green monkey

<400> 7

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

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Gly	Asn	Cys	Phe	Gly	Lys	Asn	Phe	Ser	Ile	Ala	Tyr	Asn	Ile	Val	Lys
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Ile	Pro	Pro	Leu	Gln	Ala	Asp	Lys	Glu	Asp	Pro	Ile	Ser	Lys	Ser	Glu
	210					215					220				
Ile	Val	Val	Gln	Phe	Pro	Cys	Ser	Asp	Arg	Phe	Lys	Pro	Ser	Tyr	Val
225					230					235					240
His	Ser	Phe	Gly	Leu	Thr	Pro	Asn	Tyr	Ile	Val	Phe	Val	Glu	Thr	Pro
				245					250					255	
Val	Lys	Ile	Asn	Leu	Phe	Lys	Phe	Leu	Ser	Ser	Trp	Ser	Leu	Trp	Gly
			260					265					270		
Ala	Asn	Tyr	Met	Asp	Cys	Phe	Glu	Ser	Asn	Glu	Thr	Met	Gly	Val	Trp
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Leu	His	Ile	Ala	Asp	Lys	Lys	Arg	Lys	Lys	Tyr	Leu	Asn	Asn	Lys	Tyr
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Arg	Thr	Ser	Pro	Phe	Asn	Leu	Phe	His	His	Ile	Asn	Thr	Tyr	Glu	Asp
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Asn	Gly	Phe	Leu	Ile	Val	Asp	Leu	Cys	Cys	Trp	Lys	Gly	Phe	Glu	Phe
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Val	Tyr	Asn	Tyr	Leu	Tyr	Leu	Ala	Asn	Leu	Arg	Glu	Asn	Trp	Glu	Glu
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Val	Lys	Lys	Asn	Ala	Arg	Lys	Ala	Pro	Gln	Pro	Glu	Val	Arg	Arg	Tyr
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Val	Leu	Pro	Leu	Asn	Ile	Asp	Lys	Ala	Asp	Thr	Gly	Lys	Asn	Leu	Ile
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Thr	Leu	Pro	Asn	Thr	Thr	Ala	Thr	Ala	Ile	Leu	Cys	Ser	Asp	Glu	Thr
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Ile	Trp	Leu	Glu	Pro	Glu	Val	Leu	Phe	Ser	Gly	Pro	Arg	Gln	Ala	Phe
				405					410					415	
Glu	Phe	Pro	Gln	Ile	Asn	Tyr	Gln	Lys	Tyr	Cys	Gly	Lys	Pro	Tyr	Thr
			420					425					430		
Tyr	Ala	Tyr	Gly	Leu	Gly	Leu	Asn	His	Phe	Val	Pro	Asp	Arg	Leu	Cys
		435					440					445			

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Lys Leu Asn Val Lys Thr Lys Glu Thr Trp Val Trp Gln Glu Pro Asp
450 455 460

Ser Tyr Pro Ser Glu Pro Ile Phe Val Ser His Pro Asp Ala Leu Glu
465 470 475 480

Glu Asp Asp Gly Val Val Leu Ser Val Val Val Ser Pro Gly Ala Gly
485 490 495

Gln Lys Pro Ala Tyr Leu Leu Ile Leu Asn Ala Lys Asp Leu Ser Glu
500 505 510

Val Ala Arg Ala Glu Val Glu Ile Asn Ile Pro Val Thr Phe His Gly
515 520 525

Leu Phe Lys Lys Ser
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<211> 1602
<212> DNA
<213> Green monkey

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<210> 9
 <211> 533
 <212> PRT
 <213> Bovine

<400> 9

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

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		195					200					205			
Ile	Pro	Pro	Leu	Gln	Ala	Asp	Lys	Glu	Asp	Pro	Ile	Ser	Lys	Ser	Glu
	210					215					220				
Ile	Val	Val	Gln	Phe	Pro	Cys	Ser	Asp	Arg	Phe	Lys	Pro	Ser	Tyr	Val
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His	Ser	Phe	Gly	Leu	Thr	Pro	Asn	Tyr	Ile	Val	Phe	Val	Glu	Thr	Pro
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			260					265					270		
Ala	Asn	Tyr	Met	Asp	Cys	Phe	Glu	Ser	Asn	Glu	Thr	Met	Gly	Val	Trp
		275					280					285			
Leu	His	Ile	Ala	Asp	Lys	Lys	Arg	Lys	Lys	Tyr	Ile	Asn	Asn	Lys	Tyr
	290					295					300				
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His	Glu	Phe	Leu	Ile	Val	Asp	Leu	Cys	Cys	Trp	Lys	Gly	Phe	Glu	Phe
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Val	Tyr	Asn	Tyr	Ser	Tyr	Leu	Ala	Asn	Leu	Arg	Glu	Asn	Trp	Glu	Glu
			340					345					350		
Val	Lys	Lys	Asn	Ala	Arg	Lys	Ala	Pro	Gln	Pro	Glu	Val	Arg	Arg	Tyr
		355					360					365			
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	370					375					380				
Thr	Leu	Pro	Asn	Thr	Thr	Ala	Thr	Ala	Ile	Leu	Cys	Ser	Asp	Glu	Thr
385					390					395					400
Ile	Trp	Leu	Glu	Pro	Glu	Val	Leu	Phe	Ser	Gly	Pro	Arg	Gln	Ala	Phe
				405					410					415	
Glu	Phe	Pro	Gln	Ile	Asn	Tyr	Gln	Lys	Tyr	Gly	Gly	Lys	Pro	Tyr	Thr
			420					425					430		
Tyr	Ala	Tyr	Gly	Leu	Gly	Leu	Asn	His	Phe	Val	Pro	Asp	Arg	Leu	Cys
		435					440					445			

820233-02315_Seq_Listing_ST25

Lys Leu Asn Val Lys Thr Lys Glu Thr Trp Val Trp Gln Glu Pro Asp
450 455 460

Ser Tyr Pro Ser Glu Pro Ile Phe Val Ser His Pro Asp Ala Leu Glu
465 470 475 480

Glu Asp Asp Gly Val Val Leu Ser Val Val Val Ser Pro Gly Ala Gly
485 490 495

Gln Lys Pro Ala Tyr Leu Leu Ile Leu Asn Ala Lys Asp Leu Ser Glu
500 505 510

Val Ala Arg Ala Glu Val Glu Ile Asn Ile Pro Val Thr Phe His Gly
515 520 525

Leu Phe Lys Lys Ser
530

<210> 10
<211> 1602
<212> DNA
<213> Bovine

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<210> 11
 <211> 533
 <212> PRT
 <213> Goat

<400> 11

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Glu Thr Val Glu Glu Leu Ser Ser Pro Leu Thr Ala His Val Thr Gly
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35 40 45

Leu Phe Glu Val Gly Ser Glu Pro Phe Tyr His Leu Phe Asp Gly Gln
50 55 60

Ala Leu Leu His Lys Phe Asp Phe Lys Glu Gly His Val Thr Tyr His
65 70 75 80

Arg Arg Phe Ile Arg Thr Asp Ala Tyr Val Arg Ala Met Thr Glu Lys
85 90 95

Arg Ile Val Ile Thr Glu Phe Gly Thr Cys Ala Phe Pro Asp Pro Cys
100 105 110

Lys Asn Ile Phe Ser Arg Phe Phe Ser Tyr Phe Arg Gly Val Glu Val
115 120 125

Thr Asp Asn Ala Leu Val Asn Ile Tyr Pro Val Gly Glu Asp Tyr Tyr
130 135 140

Ala Cys Thr Glu Thr Asn Phe Ile Thr Lys Ile Asn Pro Glu Thr Leu
145 150 155 160

Glu Thr Ile Lys Gln Val Asp Leu Cys Asn Tyr Val Ser Val Asn Gly
165 170 175

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Ala Thr Ala His Pro His Ile Glu Asn Asp Gly Thr Val Tyr Asn Ile
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Gly Asn Cys Phe Gly Lys Asn Phe Ser Ile Ala Tyr Asn Ile Val Lys
195 200 205

Ile Pro Pro Leu Gln Ala Asp Lys Glu Asp Pro Ile Ser Lys Ser Glu
210 215 220

Ile Val Val Gln Phe Pro Cys Ser Asp Arg Phe Lys Pro Ser Tyr Val
225 230 235 240

His Ser Phe Gly Leu Thr Pro Asn Tyr Ile Val Phe Val Glu Thr Pro
245 250 255

Val Lys Ile Asn Leu Phe Lys Phe Leu Ser Ser Trp Ser Leu Trp Gly
260 265 270

Ala Asn Tyr Met Asp Cys Phe Glu Ser Asn Glu Thr Met Gly Val Trp
275 280 285

Leu His Ile Ala Asp Lys Lys Arg Lys Lys Tyr Ile Asn Asn Lys Tyr
290 295 300

Arg Thr Ser Pro Phe Asn Leu Phe His His Ile Asn Thr Tyr Glu Asp
305 310 315 320

His Glu Phe Leu Ile Val Asp Leu Cys Cys Trp Lys Gly Phe Glu Phe
325 330 335

Val Tyr Asn Tyr Leu Tyr Leu Ala Asn Leu Arg Glu Asn Trp Glu Glu
340 345 350

Val Lys Lys Asn Ala Arg Lys Ala Pro Gln Pro Glu Val Arg Arg Tyr
355 360 365

Val Leu Pro Leu Asn Ile Asp Lys Ala Asp Thr Gly Lys Asn Leu Val
370 375 380

Thr Leu Pro Asn Thr Thr Ala Thr Ala Ile Leu Cys Ser Asp Glu Thr
385 390 395 400

Ile Trp Leu Glu Pro Glu Val Leu Phe Ser Gly Pro Arg Gln Ala Phe
405 410 415

Glu Phe Pro Gln Ile Asn Tyr Gln Lys Tyr Gly Gly Lys Pro Tyr Thr
420 425 430

Tyr Ala Tyr Gly Leu Gly Leu Asn His Phe Val Pro Asp Arg Leu Cys
435 440 445

820233-02315_Seq_Listing_ST25

Lys Leu Asn Val Lys Thr Lys Glu Thr Trp Val Trp Gln Glu Pro Asp
450 455 460

Ser Tyr Pro Ser Glu Pro Ile Phe Val Ser His Pro Asp Ala Leu Glu
465 470 475 480

Glu Asp Asp Gly Val Val Leu Ser Val Val Val Ser Pro Gly Ala Gly
485 490 495

Gln Lys Pro Ala Tyr Leu Leu Ile Leu Asn Ala Lys Asp Leu Ser Glu
500 505 510

Val Ala Arg Ala Glu Val Glu Ile Asn Ile Pro Val Thr Phe His Gly
515 520 525

Leu Phe Lys Lys Ser
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<211> 1602
<212> DNA
<213> Goat

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<210> 13
 <211> 533
 <212> PRT
 <213> Dog

<400> 13

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Glu Thr Val Glu Glu Leu Ser Ser Pro Leu Thr Ala His Val Thr Gly
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Arg Ile Pro Leu Trp Leu Thr Gly Ser Leu Leu Arg Cys Gly Pro Gly
35 40 45

Leu Phe Glu Val Gly Ser Glu Pro Phe Tyr His Leu Phe Asp Gly Gln
50 55 60

Ala Leu Leu His Lys Phe Asp Phe Lys Glu Gly His Val Thr Tyr His
65 70 75 80

Arg Arg Phe Ile Arg Thr Asp Ala Tyr Val Arg Ala Met Thr Glu Lys
85 90 95

Arg Ile Val Ile Thr Glu Phe Gly Thr Cys Ala Phe Pro Asp Pro Cys
100 105 110

Lys Asn Ile Phe Ser Arg Phe Phe Ser Tyr Phe Arg Gly Val Glu Val
115 120 125

Thr Asp Asn Ala Leu Val Asn Val Tyr Pro Val Gly Glu Asp Tyr Tyr
130 135 140

Ala Cys Thr Glu Thr Asn Phe Ile Thr Lys Ile Asn Pro Glu Thr Leu
145 150 155 160

Glu Thr Ile Lys Gln Val Asp Leu Cys Asn Tyr Val Ser Val Asn Gly
165 170 175

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		195					200					205			
Ile	Pro	Pro	Leu	Gln	Ala	Asp	Lys	Glu	Asp	Pro	Ile	Ser	Lys	Ser	Glu
	210					215					220				
Val	Val	Val	Gln	Phe	Pro	Cys	Ser	Asp	Arg	Phe	Lys	Pro	Ser	Tyr	Val
225					230					235					240
His	Ser	Phe	Gly	Leu	Thr	Pro	Asn	Tyr	Ile	Val	Phe	Val	Glu	Thr	Pro
				245					250					255	
Val	Lys	Ile	Asn	Leu	Leu	Lys	Phe	Leu	Ser	Ser	Trp	Ser	Leu	Trp	Gly
			260					265					270		
Ala	Asn	Tyr	Met	Asp	Cys	Phe	Glu	Ser	Asn	Glu	Thr	Met	Gly	Val	Trp
		275					280					285			
Leu	His	Ile	Ala	Asp	Lys	Lys	Arg	Lys	Lys	Tyr	Leu	Asn	Asn	Lys	Tyr
	290					295					300				
Arg	Thr	Ser	Ser	Phe	Asn	Leu	Phe	His	His	Ile	Asn	Thr	Tyr	Glu	Asp
305					310					315					320
Asn	Glu	Phe	Leu	Ile	Val	Asp	Leu	Cys	Cys	Trp	Lys	Gly	Phe	Glu	Phe
				325					330					335	
Val	Tyr	Asn	Tyr	Leu	Tyr	Leu	Ala	Asn	Leu	Arg	Glu	Asn	Trp	Glu	Glu
			340					345					350		
Val	Lys	Lys	Asn	Ala	Arg	Lys	Ala	Pro	Gln	Pro	Glu	Val	Arg	Arg	Tyr
		355					360					365			
Val	Leu	Pro	Leu	Asn	Ile	Asp	Lys	Ala	Asp	Thr	Gly	Lys	Asn	Leu	Val
	370					375					380				
Thr	Leu	Pro	Asn	Thr	Thr	Ala	Thr	Ala	Thr	Leu	Arg	Ser	Asp	Glu	Thr
385					390					395					400
Ile	Trp	Leu	Glu	Pro	Glu	Val	Leu	Phe	Ser	Gly	Pro	Arg	Gln	Ala	Phe
				405					410					415	
Glu	Phe	Pro	Gln	Ile	Asn	Tyr	Gln	Lys	Ser	Gly	Gly	Lys	Pro	Tyr	Thr
			420					425					430		
Tyr	Ala	Tyr	Gly	Leu	Gly	Leu	Asn	His	Phe	Val	Pro	Asp	Arg	Leu	Cys
		435					440					445			

820233-02315_Seq_Listing_ST25

Lys Leu Asn Val Lys Thr Lys Glu Thr Trp Val Trp Gln Glu Pro Asp
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Ser Tyr Pro Ser Glu Pro Ile Phe Val Ser His Pro Asp Ala Leu Glu
 465 470 475 480

Glu Asp Asp Gly Val Val Leu Ser Val Val Val Ser Pro Gly Ala Gly
 485 490 495

Gln Lys Pro Ala Tyr Leu Leu Ile Leu Asn Ala Lys Asp Leu Ser Glu
 500 505 510

Val Ala Arg Ala Glu Val Glu Ile Asn Ile Pro Val Thr Phe His Gly
 515 520 525

Leu Phe Lys Lys Ser
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 <211> 1602
 <212> DNA
 <213> Dog

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<210> 15
 <211> 533
 <212> PRT
 <213> Domestic cat

<400> 15

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

Arg Ile Val Ile Thr Glu Phe Gly Thr Cys Ala Phe Pro Asp Pro Cys
100 105 110

Lys Asn Ile Phe Ser Arg Phe Phe Ser Tyr Phe Arg Gly Val Glu Val
115 120 125

Thr Asp Asn Ala Leu Val Asn Ile Tyr Pro Val Gly Glu Asp Tyr Tyr
130 135 140

Ala Cys Thr Glu Thr Asn Phe Ile Thr Lys Ile Asn Pro Glu Thr Leu
145 150 155 160

Glu Thr Ile Lys Gln Val Asp Leu Cys Asn Tyr Val Ser Val Asn Gly
165 170 175

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Ala Thr Ala His Pro His Ile Glu Ser Asp Gly Thr Val Tyr Asn Ile
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Gly Asn Cys Phe Gly Lys Asn Phe Ser Ile Ala Tyr Asn Ile Val Lys
195 200 205

Ile Pro Pro Leu Gln Ala Asp Lys Glu Asp Pro Ile Ser Lys Ser Glu
210 215 220

Val Val Val Gln Phe Pro Cys Ser Asp Arg Phe Lys Pro Ser Tyr Val
225 230 235 240

His Ser Phe Gly Leu Thr Pro Asn Tyr Ile Val Phe Val Glu Thr Pro
245 250 255

Val Lys Ile Asn Leu Phe Lys Phe Leu Ser Ser Trp Ser Leu Trp Gly
260 265 270

Ala Asn Tyr Met Asp Cys Phe Glu Ser Asn Glu Thr Met Gly Val Trp
275 280 285

Leu His Ile Ala Asp Lys Lys Arg Arg Lys Tyr Leu Asn Asn Lys Tyr
290 295 300

Arg Thr Ser Ser Phe Asn Leu Phe His His Ile Asn Thr Tyr Glu Asp
305 310 315 320

Ser Glu Phe Leu Ile Val Asp Leu Cys Cys Trp Lys Gly Phe Glu Phe
325 330 335

Val Tyr Asn Tyr Leu Tyr Leu Ala Asn Leu Arg Glu Asn Trp Glu Glu
340 345 350

Val Lys Lys Asn Ala Arg Lys Ala Pro Gln Pro Glu Val Arg Arg Tyr
355 360 365

Val Leu Pro Leu Asn Ile Asp Lys Ala Asp Thr Gly Lys Asn Leu Val
370 375 380

Thr Leu Pro Asn Thr Thr Ala Thr Ala Ile Leu Cys Ser Asp Glu Thr
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Ile Trp Leu Glu Pro Glu Val Leu Phe Ser Gly Pro Arg Gln Ala Phe
405 410 415

Glu Phe Pro Gln Ile Asn Tyr Gln Lys Tyr Gly Gly Lys Pro Tyr Thr
420 425 430

Tyr Ala Tyr Gly Leu Gly Leu Asn His Phe Val Pro Asp Arg Leu Cys
435 440 445

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Lys Leu Asn Val Lys Thr Lys Glu Thr Trp Val Trp Gln Glu Pro Asp
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Ser Tyr Pro Ser Glu Pro Ile Phe Val Ser His Pro Asp Ala Leu Glu
 465 470 475 480

Glu Asp Asp Gly Val Val Leu Ser Val Val Val Ser Pro Gly Ala Gly
 485 490 495

Gln Lys Pro Ala Tyr Leu Leu Ile Leu Asn Ala Lys Asp Leu Ser Glu
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Val Ala Arg Ala Glu Val Glu Ile Asn Ile Pro Val Thr Phe His Gly
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Leu Phe Lys Lys Ser
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 agaaggttca tccgcactga tgcttacggt cgggcaatga ctgagaaaag gatcgtcata 300
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 ccccatattg aaagtgatgg aactgtgtac aacattggta attgcttttg gaaaaatttt 600
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Arg Ile Pro Leu Trp Leu Thr Gly Ser Leu Leu Arg Cys Gly Pro Gly
 35 40 45

Leu Phe Glu Val Gly Ser Glu Pro Phe Tyr His Leu Phe Asp Gly Gln
 50 55 60

Ala Leu Leu His Lys Phe Asp Phe Lys Glu Gly His Val Thr Tyr Tyr
 65 70 75 80

Arg Arg Phe Ile Arg Thr Asp Ala Tyr Val Arg Ala Met Thr Glu Lys
 85 90 95

Arg Ile Val Ile Thr Glu Phe Gly Thr Cys Ala Phe Pro Asp Pro Cys
 100 105 110

Lys Asn Ile Phe Ser Arg Phe Phe Ser Tyr Phe Arg Gly Val Glu Val
 115 120 125

Thr Asp Asn Ala Leu Val Asn Ile Tyr Pro Val Gly Glu Asp Tyr Tyr
 130 135 140

Ala Cys Thr Glu Thr Asn Phe Ile Thr Lys Ile Asn Pro Glu Thr Leu
 145 150 155 160

Glu Thr Ile Lys Gln Val Asp Leu Cys Asn Tyr Val Ser Val Asn Gly
 165 170 175

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Ala Thr Ala His Pro His Ile Glu Ser Asp Gly Thr Val Tyr Asn Ile
180 185 190

Gly Asn Cys Phe Gly Lys Asn Phe Thr Val Ala Tyr Asn Ile Ile Lys
195 200 205

Ile Pro Pro Leu Lys Ala Asp Lys Glu Asp Pro Ile Asn Lys Ser Glu
210 215 220

Val Val Val Gln Phe Pro Cys Ser Asp Arg Phe Lys Pro Ser Tyr Val
225 230 235 240

His Ser Phe Gly Leu Thr Pro Asn Tyr Ile Val Phe Val Glu Thr Pro
245 250 255

Val Lys Ile Asn Leu Phe Lys Phe Leu Ser Ser Trp Ser Leu Trp Gly
260 265 270

Ala Asn Tyr Met Asp Cys Phe Glu Ser Asn Glu Ser Met Gly Val Trp
275 280 285

Leu His Val Ala Asp Lys Lys Arg Arg Lys Tyr Phe Asn Asn Lys Tyr
290 295 300

Arg Thr Ser Pro Phe Asn Leu Phe His His Ile Asn Thr Tyr Glu Asp
305 310 315 320

Asn Gly Phe Leu Ile Val Asp Leu Cys Cys Trp Lys Gly Phe Glu Phe
325 330 335

Val Tyr Asn Tyr Leu Tyr Leu Ala Asn Leu Arg Glu Asn Trp Glu Glu
340 345 350

Val Lys Arg Asn Ala Met Lys Ala Pro Gln Pro Glu Val Arg Arg Tyr
355 360 365

Val Leu Pro Leu Thr Ile Asp Lys Ala Asp Thr Gly Arg Asn Leu Val
370 375 380

Thr Leu Pro His Thr Thr Ala Thr Ala Ile Leu Cys Ser Asp Glu Thr
385 390 395 400

Ile Trp Leu Glu Pro Glu Val Leu Phe Ser Gly Pro Arg Gln Ala Phe
405 410 415

Glu Phe Pro Gln Ile Asn Tyr Gln Lys Cys Gly Gly Lys Pro Tyr Thr
420 425 430

Tyr Ala Tyr Gly Leu Gly Leu Asn His Phe Val Pro Asp Lys Leu Cys
435 440 445

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Lys Leu Asn Val Lys Thr Lys Glu Ile Trp Met Trp Gln Glu Pro Asp
450 455 460

Ser Tyr Pro Ser Glu Pro Ile Phe Val Ser Gln Pro Asp Ala Leu Glu
465 470 475 480

Glu Asp Asp Gly Val Val Leu Ser Val Val Val Ser Pro Gly Ala Gly
485 490 495

Gln Lys Pro Ala Tyr Leu Leu Val Leu Asn Ala Lys Asp Leu Ser Glu
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Ile Ala Arg Ala Glu Val Glu Thr Asn Ile Pro Val Thr Phe His Gly
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Leu Phe Lys Lys Pro
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<210> 22
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<210> 38
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<400> 41
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<400> 42
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