

SEQUENCE LISTING

<110> BHARAT BIOTECH INTERNATIONAL LIMITED

<120> VACCINE COMBINATIONS FOR PROPHYLAXIS AGAINST ARBOVIRAL INFECTIONS

<130> P 15-309-IN

<140> 3652/CHE/2015

<141> 2015-07-16

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<170> PatentIn version 3.5

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<212> DNA

<213> prME, Zika Asian genotype

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 <212> PRT
 <213> prME, Zika Asian genotype

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Gly Met Asn Lys Cys Tyr Ile Gln Ile Met Asp Leu Gly His Met Cys
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Asp Ala Thr Met Ser Tyr Glu Cys Pro Met Leu Asp Glu Gly Val Glu
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Pro Asp Asp Val Asp Cys Trp Cys Asn Thr Thr Ser Thr Trp Val Val
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Tyr Gly Thr Cys His His Lys Lys Gly Glu Ala Arg Arg Ser Arg Arg
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Ala Val Thr Leu Pro Ser His Ser Thr Arg Lys Leu Gln Thr Arg Ser
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Gln Thr Trp Leu Glu Ser Arg Glu Tyr Thr Lys His Leu Ile Arg Val
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Ile Ala Trp Leu Leu Gly Ser Ser Thr Ser Gln Lys Val Ile Tyr Leu
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Val Met Ile Leu Leu Ile Ala Pro Ala Tyr Ser Ile Arg Cys Ile Gly
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Val Ser Asn Arg Asp Phe Val Glu Gly Met Ser Gly Gly Thr Trp Val
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His Lys Glu Trp Phe His Asp Ile Pro Leu Pro Trp His Ala Gly Ala
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Asp Thr Gly Thr Pro His Trp Asn Asn Lys Glu Ala Leu Val Glu Phe
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Pro Ala Gln Met Ala Val Asp Met Gln Thr Leu Thr Pro Val Gly Arg
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Met Met Leu Glu Leu Asp Pro Pro Phe Gly Asp Ser Tyr Ile Val Ile
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Gly Val Gly Glu Lys Lys Ile Thr His His Trp His Arg Ser Gly Ser
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Thr Ile Gly Lys Ala Phe Glu Ala Thr Val Arg Gly Ala Lys Arg Met
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Leu Asn Ser Leu Gly Lys Gly Ile His Gln Ile Phe Gly Ala Ala Phe
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Lys Ser Leu Phe Gly Gly Met Ser Trp Phe Ser Gln Ile Leu Ile Gly
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Thr Leu Leu Met Trp Leu Gly Leu Asn Thr Lys Asn Gly Ser Ile Ser
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Leu Met Cys Leu Ala Leu Gly Gly Val Leu Ile Phe Leu Ser Thr Ala
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Val Ser Ala Asp Val Gly
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<213> prME, Zika MR766 strain

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Asp Arg Ser Asp Ala Gly Lys Ala Ile Ser Phe Ala Thr Thr Leu Gly
35 40 45

Val Asn Lys Cys His Val Gln Ile Met Asp Leu Gly His Met Cys Asp
50 55 60

Ala Thr Met Ser Tyr Glu Cys Pro Met Leu Asp Glu Gly Val Glu Pro

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Phe Thr Cys Ser Lys Lys Met Thr Gly Lys Ser Ile Gln Pro Glu Asn
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Leu Glu Tyr Arg Ile Met Leu Ser Val His Gly Ser Gln His Ser Gly
325 330 335

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

Ser Asp Leu Tyr Tyr Leu Thr Met Asn Asn Lys His Trp Leu Val His
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Lys Glu Trp Phe His Asp Ile Pro Leu Pro Trp His Ala Gly Ala Asp
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505

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<213> Zika MR766 strain

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 <211> 3423
 <212> PRT
 <213> Complete ORF, Zika MR766 strain

<400> 6

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			20					25					30		

Leu	Pro	Ala	Gly	Leu	Leu	Leu	Gly	His	Gly	Pro	Ile	Arg	Met	Val	Leu
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Ala	Ile	Leu	Ala	Phe	Leu	Arg	Phe	Thr	Ala	Ile	Lys	Pro	Ser	Leu	Gly
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Leu	Ile	Asn	Arg	Trp	Gly	Ser	Val	Gly	Lys	Lys	Glu	Ala	Met	Glu	Ile
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Ile	Lys	Lys	Phe	Lys	Lys	Asp	Leu	Ala	Ala	Met	Leu	Arg	Ile	Ile	Asn
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Ala Arg Lys Glu Arg Lys Arg Arg Gly Ala Asp Thr Ser Ile Gly Ile
100 105 110

Ile Gly Leu Leu Leu Thr Thr Ala Met Ala Ala Glu Ile Thr Arg Arg
115 120 125

Gly Ser Ala Tyr Tyr Met Tyr Leu Asp Arg Ser Asp Ala Gly Lys Ala
130 135 140

Ile Ser Phe Ala Thr Thr Leu Gly Val Asn Lys Cys His Val Gln Ile
145 150 155 160

Met Asp Leu Gly His Met Cys Asp Ala Thr Met Ser Tyr Glu Cys Pro
165 170 175

Met Leu Asp Glu Gly Val Glu Pro Asp Asp Val Asp Cys Trp Cys Asn
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Thr Thr Ser Thr Trp Val Val Tyr Gly Thr Cys His His Lys Lys Gly
195 200 205

Glu Ala Arg Arg Ser Arg Arg Ala Val Thr Leu Pro Ser His Ser Thr
210 215 220

Arg Lys Leu Gln Thr Arg Ser Gln Thr Trp Leu Glu Ser Arg Glu Tyr
225 230 235 240

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

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Glu Ala Tyr Leu Asp Lys Gln Ser Asp Thr Gln Tyr Val Cys Lys Arg						
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Gly Ser Leu Val Thr Cys Ala Lys Phe Thr Cys Ser Lys Lys Met Thr						
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Val His Gly Ser Gln His Ser Gly Met Ile Val Asn Asp Thr Gly Tyr						
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Glu Pro Arg Thr Gly Leu Asp Phe Ser Asp Leu Tyr Tyr Leu Thr Met						
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Asn Asn Lys His Trp Leu Val His Lys Glu Trp Phe His Asp Ile Pro						
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Leu Pro Trp His Ala Gly Ala Asp Thr Gly Thr Pro His Trp Asn Asn						
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Lys Glu Ala Leu Val Glu Phe Lys Asp Ala His Ala Lys Arg Gln Thr
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Val Val Val Leu Gly Ser Gln Glu Gly Ala Val His Thr Ala Leu Ala
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Gly Ala Leu Glu Ala Glu Met Asp Gly Ala Lys Gly Lys Leu Phe Ser
565 570 575

Gly His Leu Lys Cys Arg Leu Lys Met Asp Lys Leu Arg Leu Lys Gly
580 585 590

Val Ser Tyr Ser Leu Cys Thr Ala Ala Phe Thr Phe Thr Lys Val Pro
595 600 605

Ala Glu Thr Leu His Gly Thr Val Thr Val Glu Val Gln Tyr Ala Gly
610 615 620

Thr Asp Gly Pro Cys Lys Ile Pro Val Gln Met Ala Val Asp Met Gln
625 630 635 640

Thr Leu Thr Pro Val Gly Arg Leu Ile Thr Ala Asn Pro Val Ile Thr
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Glu Ser Thr Glu Asn Ser Lys Met Met Leu Glu Leu Asp Pro Pro Phe
660 665 670

Gly Asp Ser Tyr Ile Val Ile Gly Val Gly Asp Lys Lys Ile Thr His
675 680 685

His Trp His Arg Ser Gly Ser Thr Ile Gly Lys Ala Phe Glu Ala Thr
690 695 700

Val Arg Gly Ala Lys Arg Met Ala Val Leu Gly Asp Thr Ala Trp Asp
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Phe Gly Ser Val Gly Gly Val Phe Asn Ser Leu Gly Lys Gly Ile His
725 730 735

Gln Ile Phe Gly Ala Ala Phe Lys Ser Leu Phe Gly Gly Met Ser Trp

740

745

750

Phe Ser Gln Ile Leu Ile Gly Thr Leu Leu Val Trp Leu Gly Leu Asn
755 760 765

Thr Lys Asn Gly Ser Ile Ser Leu Thr Cys Leu Ala Leu Gly Gly Val
770 775 780

Met Ile Phe Leu Ser Thr Ala Val Ser Ala Asp Val Gly Cys Ser Val
785 790 795 800

Asp Phe Ser Lys Lys Glu Thr Arg Cys Gly Thr Gly Val Phe Ile Tyr
805 810 815

Asn Asp Val Glu Ala Trp Arg Asp Arg Tyr Lys Tyr His Pro Asp Ser
820 825 830

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

Cys Gly Ile Ser Ser Val Ser Arg Met Glu Asn Ile Met Trp Lys Ser
850 855 860

Val Glu Gly Glu Leu Asn Ala Ile Leu Glu Glu Asn Gly Val Gln Leu
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Thr Val Val Val Gly Ser Val Lys Asn Pro Met Trp Arg Gly Pro Gln
885 890 895

Arg Leu Pro Val Pro Val Asn Glu Leu Pro His Gly Trp Lys Ala Trp
900 905 910

Gly Lys Ser Tyr Phe Val Arg Ala Ala Lys Thr Asn Asn Ser Phe Val
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Val Asp Gly Asp Thr Leu Lys Glu Cys Pro Leu Glu His Arg Ala Trp
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Asn Ser Phe Leu Val Glu Asp His Gly Phe Gly Val Phe His Thr Ser
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Val Trp Leu Lys Val Arg Glu Asp Tyr Ser Leu Glu Cys Asp Pro Ala
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Val Ile Gly Thr Ala Val Lys Gly Arg Glu Ala Ala His Ser Asp Leu
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Gly Tyr Trp Ile Glu Ser Glu Lys Asn Asp Thr Trp Arg Leu Lys Arg
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Lys Ser Leu Ala Gly Pro Leu Ser His His Asn Thr Arg Glu Gly
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Ile Arg Phe Glu Glu Cys Pro Gly Thr Lys Val Tyr Val Glu Glu
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Gly Asp Ile Thr Trp Glu Lys Asp Ala Glu Val Thr Gly Asn Ser
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Val Glu Glu Asp Gly Pro Pro Met Arg Glu Ile Ile Leu Lys Val
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Gln Pro Ile Arg Val Pro Asn Tyr Asn Leu Tyr Ile Met Asp Glu
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Ala His Phe Thr Asp Pro Ser Ser Ile Ala Ala Arg Gly Tyr Ile
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Ser Thr Arg Val Glu Met Gly Glu Ala Ala Ala Ile Phe Met Thr
1805 1810 1815

Ala Thr Pro Pro Gly Thr Arg Asp Ala Phe Pro Asp Ser Asn Ser
1820 1825 1830

Pro Ile Met Asp Thr Glu Val Glu Val Pro Glu Arg Ala Trp Ser
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Ser Gly Phe Asp Trp Val Thr Asp His Ser Gly Lys Thr Val Trp
1850 1855 1860

Phe Val Pro Ser Val Arg Asn Gly Asn Glu Ile Ala Ala Cys Leu
1865 1870 1875

Thr Lys Ala Gly Lys Arg Val Ile Gln Leu Ser Arg Lys Thr Phe
1880 1885 1890

Glu Thr Glu Phe Gln Lys Thr Lys Asn Gln Glu Trp Asp Phe Val
1895 1900 1905

Ile Thr Thr Asp Ile Ser Glu Met Gly Ala Asn Phe Lys Ala Asp
1910 1915 1920

Arg Val Ile Asp Ser Arg Arg Cys Leu Lys Pro Val Ile Leu Asp
1925 1930 1935

Gly Glu Arg Val Ile Leu Ala Gly Pro Met Pro Val Thr His Ala
1940 1945 1950

Ser Ala Ala Gln Arg Arg Gly Arg Ile Gly Arg Asn Pro Asn Lys
1955 1960 1965

Pro Gly Asp Glu Tyr Met Tyr Gly Gly Gly Cys Ala Glu Thr Asp

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Asn Lys Gly Ile Gly Lys Met Gly Phe Gly Met Val Thr Leu Gly
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2380

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ggagtgccta	10269

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 <211> 3423
 <212> PRT
 <213> Complete ORF, Zika strain FSS13025
 <400> 8

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Leu Lys Arg Gly Val Ala Arg Val Ser Pro Phe Gly Gly Leu Lys Arg
20 25 30

Leu Pro Ala Gly Leu Leu Leu Gly His Gly Pro Ile Arg Met Val Leu
35 40 45

Ala Ile Leu Ala Phe Leu Arg Phe Thr Ala Ile Lys Pro Ser Leu Gly
50 55 60

Leu Ile Asn Arg Trp Gly Ser Val Gly Lys Lys Glu Ala Met Glu Ile
65 70 75 80

Ile Lys Lys Phe Lys Lys Asp Leu Ala Ala Met Leu Arg Ile Ile Asn
85 90 95

Ala Arg Lys Glu Lys Lys Arg Arg Gly Thr Asp Thr Ser Val Gly Ile
100 105 110

Val Gly Leu Leu Leu Thr Thr Ala Met Ala Val Glu Val Thr Arg Arg
115 120 125

Gly Asn Ala Tyr Tyr Met Tyr Leu Asp Arg Ser Asp Ala Gly Glu Ala
130 135 140

Ile Ser Phe Pro Thr Thr Met Gly Met Asn Lys Cys Tyr Ile Gln Ile
145 150 155 160

Met Asp Leu Gly His Met Cys Asp Ala Thr Met Ser Tyr Glu Cys Pro
165 170 175

Met Leu Asp Glu Gly Val Glu Pro Asp Asp Val Asp Cys Trp Cys Asn
180 185 190

Thr Thr Ser Thr Trp Val Val Tyr Gly Thr Cys His His Lys Lys Gly
195 200 205

Glu Ala Arg Arg Ser Arg Arg Ala Val Thr Leu Pro Ser His Ser Thr
210 215 220

Arg Lys Leu Gln Thr Arg Ser Gln Thr Trp Leu Glu Ser Arg Glu Tyr
225 230 235 240

Thr Lys His Leu Ile Arg Val Glu Asn Trp Ile Phe Arg Asn Pro Gly
245 250 255

Phe Ala Leu Ala Ala Ala Ala Ile Ala Trp Leu Leu Gly Ser Ser Thr
260 265 270

Ser Gln Lys Val Ile Tyr Leu Val Met Ile Leu Leu Ile Ala Pro Ala
275 280 285

Tyr Ser Ile Arg Cys Ile Gly Val Ser Asn Arg Asp Phe Val Glu Gly
290 295 300

Met Ser Gly Gly Thr Trp Val Asp Val Val Leu Glu His Gly Gly Cys
305 310 315 320

Val Thr Val Met Ala Gln Asp Lys Pro Thr Val Asp Ile Glu Leu Val
325 330 335

Thr Thr Thr Val Ser Asn Met Ala Glu Val Arg Ser Tyr Cys Tyr Glu
340 345 350

Ala Ser Ile Ser Asp Met Ala Ser Asp Ser Arg Cys Pro Thr Gln Gly
355 360 365

Glu Ala Tyr Leu Asp Lys Gln Ser Asp Thr Gln Tyr Val Cys Lys Arg
370 375 380

Thr Leu Val Asp Arg Gly Trp Gly Asn Gly Cys Gly Leu Phe Gly Lys
385 390 395 400

Gly Ser Leu Val Thr Cys Ala Lys Phe Ala Cys Ser Lys Lys Met Thr
405 410 415

Gly Lys Ser Ile Gln Pro Glu Asn Leu Glu Tyr Arg Ile Met Leu Ser
420 425 430

Val His Gly Ser Gln His Ser Gly Met Ile Val Asn Asp Thr Gly His
435 440 445

Glu Thr Asp Glu Asn Arg Ala Lys Val Glu Ile Thr Pro Asn Ser Pro
450 455 460

Arg Ala Glu Ala Thr Leu Gly Gly Phe Gly Ser Leu Gly Leu Asp Cys
465 470 475 480

Glu Pro Arg Thr Gly Leu Asp Phe Ser Asp Leu Tyr Tyr Leu Thr Met
485 490 495

Asn Asn Lys His Trp Leu Val His Lys Glu Trp Phe His Asp Ile Pro
500 505 510

Leu Pro Trp His Ala Gly Ala Asp Thr Gly Thr Pro His Trp Asn Asn
515 520 525

Lys Glu Ala Leu Val Glu Phe Lys Asp Ala His Ala Lys Arg Gln Thr
530 535 540

Val Val Val Leu Gly Ser Gln Glu Gly Ala Val His Thr Ala Leu Ala
545 550 555 560

Gly Ala Leu Glu Ala Glu Met Asp Gly Ala Lys Gly Arg Leu Ser Ser
565 570 575

Gly His Leu Lys Cys Arg Leu Lys Met Asp Lys Leu Arg Leu Lys Gly
580 585 590

Val Ser Tyr Ser Leu Cys Thr Ala Ala Phe Thr Phe Thr Lys Ile Pro
595 600 605

Ala Glu Thr Leu His Gly Thr Val Thr Val Glu Val Gln Tyr Ala Gly
610 615 620

Thr Asp Gly Pro Cys Lys Val Pro Ala Gln Met Ala Val Asp Met Gln
625 630 635 640

Thr Leu Thr Pro Val Gly Arg Leu Ile Thr Ala Asn Pro Val Ile Thr
645 650 655

Glu Ser Thr Glu Asn Ser Lys Met Met Leu Glu Leu Asp Pro Pro Phe
660 665 670

Gly Asp Ser Tyr Ile Val Ile Gly Val Gly Glu Lys Lys Ile Thr His
675 680 685

His Trp His Arg Ser Gly Ser Thr Ile Gly Lys Ala Phe Glu Ala Thr
690 695 700

Val Arg Gly Ala Lys Arg Met Ala Val Leu Gly Asp Thr Ala Trp Asp
705 710 715 720

Phe Gly Ser Val Gly Gly Ala Leu Asn Ser Leu Gly Lys Gly Ile His
725 730 735

Gln Ile Phe Gly Ala Ala Phe Lys Ser Leu Phe Gly Gly Met Ser Trp
740 745 750

Phe Ser Gln Ile Leu Ile Gly Thr Leu Leu Val Trp Leu Gly Leu Asn
755 760 765

Thr Lys Asn Gly Ser Ile Ser Leu Met Cys Leu Ala Leu Gly Gly Val
770 775 780

Leu Ile Phe Leu Ser Thr Ala Val Ser Ala Asp Val Gly Cys Ser Val
785 790 795 800

Asp Phe Ser Lys Lys Glu Thr Arg Cys Gly Thr Gly Val Phe Val Tyr
805 810 815

Asn Asp Val Glu Ala Trp Arg Asp Arg Tyr Lys Tyr His Pro Asp Ser
820 825 830

Pro Arg Arg Leu Ala Ala Ala Val Lys Gln Ala Trp Glu Asp Gly Ile
835 840 845

Cys Gly Ile Ser Ser Val Ser Arg Met Glu Asn Ile Met Trp Arg Ser
850 855 860

Val Glu Gly Glu Leu Asn Ala Ile Leu Glu Glu Asn Gly Val Gln Leu
865 870 875 880

Thr Val Val Val Gly Ser Val Lys Asn Pro Met Trp Arg Gly Pro Gln
885 890 895

Arg Leu Pro Val Pro Val Asn Glu Leu Pro His Gly Trp Lys Ala Trp
900 905 910

Gly Lys Ser Tyr Phe Val Arg Ala Ala Lys Thr Asn Asn Ser Phe Val
915 920 925

Val Asp Gly Asp Thr Leu Lys Glu Cys Pro Leu Lys His Arg Ala Trp
930 935 940

Asn Ser Phe Leu Val Glu Asp His Gly Phe Gly Val Phe His Thr Ser
945 950 955 960

Val Trp Leu Lys Val Arg Glu Asp Tyr Ser Leu Glu Cys Asp Pro Ala
965 970 975

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

Gly Tyr Trp Ile Glu Ser Glu Lys Asn Asp Thr Trp Arg Leu Lys Arg
995 1000 1005

Ala His Leu Ile Glu Met Lys Thr Cys Glu Trp Pro Lys Ser His
1010 1015 1020

Thr Leu Trp Thr Asp Gly Ile Glu Glu Ser Asp Leu Ile Ile Pro
1025 1030 1035

Lys Ser Leu Ala Gly Pro Leu Ser His His Asn Thr Arg Glu Gly
1040 1045 1050

Tyr Arg Thr Gln Met Lys Gly Pro Trp His Ser Glu Glu Leu Glu
1055 1060 1065

Ile Arg Phe Glu Glu Cys Pro Gly Thr Lys Val His Val Glu Glu
1070 1075 1080

Thr Cys Gly Thr Arg Gly Pro Ser Leu Arg Ser Thr Thr Ala Ser
1085 1090 1095

Gly Arg Val Ile Glu Glu Trp Cys Cys Arg Glu Cys Thr Met Pro
1100 1105 1110

Pro Leu Ser Phe Arg Ala Lys Asp Gly Cys Trp Tyr Gly Met Glu
1115 1120 1125

Ile Arg Pro Arg Lys Glu Pro Glu Ser Asn Leu Val Arg Ser Met
1130 1135 1140

Val Thr Ala Gly Ser Thr Asp His Met Asp His Phe Ser Leu Gly
1145 1150 1155

Val Leu Val Ile Leu Leu Met Val Gln Glu Gly Leu Lys Lys Arg
1160 1165 1170

Met Thr Thr Lys Ile Ile Ile Ser Thr Ser Met Ala Val Leu Val
1175 1180 1185

Ala Met Ile Leu Gly Gly Phe Ser Met Ser Asp Leu Ala Lys Leu
1190 1195 1200

Ala Ile Leu Met Gly Ala Thr Phe Ala Glu Met Asn Thr Gly Gly
1205 1210 1215

Asp Val Ala His Leu Ala Leu Ile Ala Ala Phe Lys Val Arg Pro
1220 1225 1230

Ala Leu Leu Val Ser Phe Ile Phe Arg Ala Asn Trp Thr Pro Arg
1235 1240 1245

Glu Ser Met Leu Leu Ala Leu Ala Ser Cys Leu Leu Gln Thr Ala
1250 1255 1260

Ile Ser Ala Leu Glu Gly Asp Leu Met Val Pro Ile Asn Gly Phe
1265 1270 1275

Ala Leu Ala Trp Leu Ala Ile Arg Ala Met Val Val Pro Arg Thr
1280 1285 1290

Asp Asn Ile Thr Leu Ala Ile Leu Ala Ala Leu Thr Pro Leu Ala
1295 1300 1305

Arg Gly Thr Leu Leu Val Ala Trp Arg Ala Gly Leu Ala Thr Cys
1310 1315 1320

Gly Gly Phe Met Leu Leu Ser Leu Lys Gly Lys Gly Ser Val Lys
1325 1330 1335

Lys Asn Leu Pro Phe Val Met Ala Leu Gly Leu Thr Ala Val Arg
1340 1345 1350

Leu Val Asp Pro Ile Asn Val Val Gly Leu Leu Leu Leu Thr Arg
1355 1360 1365

Ser Gly Lys Arg Ser Trp Pro Pro Ser Glu Val Leu Thr Ala Val
1370 1375 1380

Gly Leu Ile Cys Ala Leu Ala Gly Gly Phe Ala Lys Ala Asp Ile
1385 1390 1395

Glu Met Ala Gly Pro Met Ala Ala Val Gly Leu Leu Ile Val Ser
1400 1405 1410

Tyr Val Val Ser Gly Lys Ser Val Asp Met Tyr Ile Glu Arg Ala
1415 1420 1425

Gly Asp Ile Thr Trp Glu Lys Asp Ala Glu Val Thr Gly Asn Ser
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Pro Arg Leu Asp Val Ala Leu Asp Glu Ser Gly Asp Phe Ser Leu
1445 1450 1455

Val Glu Asp Asp Gly Pro Pro Met Arg Glu Ile Ile Leu Lys Val
1460 1465 1470

Val Leu Met Ala Ile Cys Gly Met Asn Pro Ile Ala Ile Pro Phe
1475 1480 1485

Ala Ala Gly Ala Trp Tyr Val Tyr Val Lys Thr Gly Lys Arg Ser
1490 1495 1500

Gly Ala Leu Trp Asp Val Pro Ala Pro Lys Glu Val Lys Lys Gly
1505 1510 1515

Glu Thr Thr Asp Gly Val Tyr Arg Val Met Thr Arg Arg Leu Leu
1520 1525 1530

Gly Ser Thr Gln Val Gly Val Gly Val Met Gln Glu Gly Val Phe
1535 1540 1545

His Thr Met Trp His Val Thr Lys Gly Ser Ala Leu Arg Ser Gly
1550 1555 1560

Glu Gly Arg Leu Asp Pro Tyr Trp Gly Asp Val Lys Gln Asp Leu
1565 1570 1575

Val Ser Tyr Cys Gly Pro Trp Lys Leu Asp Ala Ala Trp Asp Gly
1580 1585 1590

His Ser Glu Val Gln Leu Leu Ala Val Pro Pro Gly Glu Arg Ala
1595 1600 1605

Arg Asn Ile Gln Thr Leu Pro Gly Ile Phe Lys Thr Lys Asp Gly
1610 1615 1620

Asp Ile Gly Ala Val Ala Leu Asp Tyr Pro Ala Gly Thr Ser Gly
1625 1630 1635

Ser Pro Ile Leu Asp Lys Cys Gly Arg Val Ile Gly Leu Tyr Gly
1640 1645 1650

Asn Gly Val Val Ile Lys Asn Gly Ser Tyr Val Ser Ala Ile Thr
1655 1660 1665

Gln Gly Arg Arg Glu Glu Glu Thr Pro Val Glu Cys Phe Glu Pro
1670 1675 1680

Ser	Met	Leu	Lys	Lys	Lys	Gln	Leu	Thr	Val	Leu	Asp	Leu	His	Pro
	1685					1690					1695			
Gly	Ala	Gly	Lys	Thr	Arg	Arg	Val	Leu	Pro	Glu	Ile	Val	Arg	Glu
	1700					1705					1710			
Ala	Ile	Lys	Thr	Arg	Leu	Arg	Thr	Val	Ile	Leu	Ala	Pro	Thr	Arg
	1715					1720					1725			
Val	Val	Ala	Ala	Glu	Met	Glu	Glu	Ala	Leu	Arg	Gly	Leu	Pro	Val
	1730					1735					1740			
Arg	Tyr	Met	Thr	Thr	Ala	Val	Asn	Val	Thr	His	Ser	Gly	Thr	Glu
	1745					1750					1755			
Ile	Val	Asp	Leu	Met	Cys	His	Ala	Thr	Phe	Thr	Ser	Arg	Leu	Leu
	1760					1765					1770			
Gln	Pro	Ile	Arg	Val	Pro	Asn	Tyr	Asn	Leu	Tyr	Ile	Met	Asp	Glu
	1775					1780					1785			
Ala	His	Phe	Thr	Asp	Pro	Ser	Ser	Ile	Ala	Ala	Arg	Gly	Tyr	Ile
	1790					1795					1800			
Ser	Thr	Arg	Val	Glu	Met	Gly	Glu	Ala	Ala	Ala	Ile	Phe	Met	Thr
	1805					1810					1815			
Ala	Thr	Pro	Pro	Gly	Thr	Arg	Asp	Ala	Phe	Pro	Asp	Ser	Asn	Ser
	1820					1825					1830			
Pro	Ile	Met	Asp	Thr	Glu	Val	Glu	Val	Pro	Glu	Arg	Ala	Trp	Ser
	1835					1840					1845			
Ser	Gly	Phe	Asp	Trp	Val	Thr	Asp	His	Ser	Gly	Lys	Thr	Val	Trp
	1850					1855					1860			
Phe	Val	Pro	Ser	Val	Arg	Asn	Gly	Asn	Glu	Ile	Ala	Ala	Cys	Leu
	1865					1870					1875			
Thr	Lys	Ala	Gly	Lys	Arg	Val	Ile	Gln	Leu	Ser	Arg	Lys	Thr	Phe
	1880					1885					1890			

Glu Thr Glu Phe Gln Lys Thr Lys His Gln Glu Trp Asp Phe Val
1895 1900 1905

Val Thr Thr Asp Ile Ser Glu Met Gly Ala Asn Phe Lys Ala Asp
1910 1915 1920

Arg Val Ile Asp Ser Arg Arg Cys Leu Lys Pro Val Ile Leu Asp
1925 1930 1935

Gly Glu Arg Val Ile Leu Ala Gly Pro Met Pro Val Thr His Ala
1940 1945 1950

Ser Ala Ala Gln Arg Arg Gly Arg Ile Gly Arg Asn Pro Asn Lys
1955 1960 1965

Pro Gly Asp Glu Tyr Leu Tyr Gly Gly Gly Cys Ala Glu Thr Asp
1970 1975 1980

Glu Asp His Ala His Trp Leu Glu Ala Arg Met Leu Leu Asp Asn
1985 1990 1995

Ile Tyr Leu Gln Asp Gly Leu Ile Ala Ser Leu Tyr Arg Pro Glu
2000 2005 2010

Ala Asp Lys Val Ala Ala Ile Glu Gly Glu Phe Lys Leu Arg Thr
2015 2020 2025

Glu Gln Arg Lys Thr Phe Val Glu Leu Met Lys Arg Gly Asp Leu
2030 2035 2040

Pro Val Trp Leu Ala Tyr Gln Val Ala Ser Ala Gly Ile Thr Tyr
2045 2050 2055

Thr Asp Arg Arg Trp Cys Phe Asp Gly Thr Thr Asn Asn Thr Ile
2060 2065 2070

Met Glu Asp Ser Val Pro Ala Glu Val Trp Thr Arg Tyr Gly Glu
2075 2080 2085

Lys	Arg	Val	Leu	Lys	Pro	Arg	Trp	Met	Asp	Ala	Arg	Val	Cys	Ser
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Asp	His	Ala	Ala	Leu	Lys	Ser	Phe	Lys	Glu	Phe	Ala	Ala	Gly	Lys
2105						2110					2115			
Arg	Gly	Ala	Ala	Phe	Gly	Val	Met	Glu	Ala	Leu	Gly	Thr	Leu	Pro
2120						2125					2130			
Gly	His	Met	Thr	Glu	Arg	Phe	Gln	Glu	Ala	Ile	Asp	Asn	Leu	Ala
2135						2140					2145			
Val	Leu	Met	Arg	Ala	Glu	Thr	Gly	Ser	Arg	Pro	Tyr	Lys	Ala	Ala
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Ala	Ala	Gln	Leu	Pro	Glu	Thr	Leu	Glu	Thr	Ile	Met	Leu	Leu	Gly
2165						2170					2175			
Leu	Leu	Gly	Thr	Val	Ser	Leu	Gly	Ile	Phe	Phe	Val	Leu	Met	Arg
2180						2185					2190			
Asn	Lys	Gly	Ile	Gly	Lys	Met	Gly	Phe	Gly	Met	Val	Thr	Leu	Gly
2195						2200					2205			
Ala	Ser	Ala	Trp	Leu	Met	Trp	Leu	Ser	Glu	Ile	Glu	Pro	Ala	Arg
2210						2215					2220			
Ile	Ala	Cys	Val	Leu	Ile	Val	Val	Phe	Leu	Leu	Leu	Val	Val	Leu
2225						2230					2235			
Ile	Pro	Glu	Pro	Glu	Lys	Gln	Arg	Ser	Pro	Gln	Asp	Asn	Gln	Met
2240						2245					2250			
Ala	Ile	Ile	Ile	Met	Val	Ala	Val	Gly	Leu	Leu	Gly	Leu	Ile	Thr
2255						2260					2265			
Ala	Asn	Glu	Leu	Gly	Trp	Leu	Glu	Arg	Thr	Lys	Ser	Asp	Leu	Ser
2270						2275					2280			
His	Leu	Met	Gly	Arg	Arg	Glu	Glu	Gly	Ala	Thr	Ile	Gly	Phe	Ser
2285						2290					2295			

Met Asp Ile Asp Leu Arg Pro Ala Ser Ala Trp Ala Ile Tyr Ala
2300 2305 2310

Ala Leu Thr Thr Phe Ile Thr Pro Ala Val Gln His Ala Val Thr
2315 2320 2325

Thr Ser Tyr Asn Asn Tyr Ser Leu Met Ala Met Ala Thr Gln Ala
2330 2335 2340

Gly Val Leu Phe Gly Met Gly Lys Gly Met Pro Phe Tyr Ala Trp
2345 2350 2355

Asp Phe Gly Val Pro Leu Leu Met Ile Gly Cys Tyr Ser Gln Leu
2360 2365 2370

Thr Pro Leu Thr Leu Ile Val Ala Ile Ile Leu Leu Val Ala His
2375 2380 2385

Tyr Met Tyr Leu Ile Pro Gly Leu Gln Ala Ala Ala Ala Arg Ala
2390 2395 2400

Ala Gln Lys Arg Thr Ala Ala Gly Ile Met Lys Asn Pro Val Val
2405 2410 2415

Asp Gly Ile Val Val Thr Asp Ile Asp Thr Met Thr Ile Asp Pro
2420 2425 2430

Gln Val Glu Lys Lys Met Gly Gln Val Leu Leu Ile Ala Val Ala
2435 2440 2445

Val Ser Ser Ala Ile Leu Ser Arg Thr Ala Trp Gly Trp Gly Glu
2450 2455 2460

Ala Gly Ala Leu Ile Thr Ala Ala Thr Ser Thr Leu Trp Glu Gly
2465 2470 2475

Ser Pro Asn Lys Tyr Trp Asn Ser Ser Thr Ala Thr Ser Leu Cys
2480 2485 2490

Asn	Ile	Phe	Arg	Gly	Ser	Tyr	Leu	Ala	Gly	Ala	Ser	Leu	Ile	Tyr
2495						2500					2505			
Thr	Val	Thr	Arg	Asn	Ala	Gly	Leu	Val	Lys	Arg	Arg	Gly	Gly	Gly
2510						2515					2520			
Thr	Gly	Glu	Thr	Leu	Gly	Glu	Lys	Trp	Lys	Ala	Arg	Leu	Asn	Gln
2525						2530					2535			
Met	Ser	Ala	Leu	Glu	Phe	Tyr	Ser	Tyr	Lys	Lys	Ser	Gly	Ile	Thr
2540						2545					2550			
Glu	Val	Cys	Arg	Glu	Glu	Ala	Arg	Arg	Ala	Leu	Lys	Asp	Gly	Val
2555						2560					2565			
Ala	Thr	Gly	Gly	His	Ala	Val	Ser	Arg	Gly	Ser	Ala	Lys	Leu	Arg
2570						2575					2580			
Trp	Leu	Val	Glu	Arg	Gly	Tyr	Leu	Gln	Pro	Tyr	Gly	Lys	Val	Ile
2585						2590					2595			
Asp	Leu	Gly	Cys	Gly	Arg	Gly	Gly	Trp	Ser	Tyr	Tyr	Ala	Ala	Thr
2600						2605					2610			
Ile	Arg	Lys	Val	Gln	Glu	Val	Lys	Gly	Tyr	Thr	Lys	Gly	Gly	Pro
2615						2620					2625			
Gly	His	Glu	Glu	Pro	Met	Leu	Val	Gln	Ser	Tyr	Gly	Trp	Asn	Ile
2630						2635					2640			
Val	Arg	Leu	Lys	Ser	Gly	Val	Asp	Val	Phe	His	Met	Ala	Ala	Glu
2645						2650					2655			
Pro	Cys	Asp	Thr	Leu	Leu	Cys	Asp	Ile	Gly	Glu	Ser	Ser	Ser	Ser
2660						2665					2670			
Pro	Glu	Val	Glu	Glu	Ala	Arg	Thr	Leu	Arg	Val	Leu	Ser	Met	Val
2675						2680					2685			
Gly	Asp	Trp	Leu	Glu	Lys	Arg	Pro	Gly	Ala	Phe	Cys	Ile	Lys	Val
2690						2695					2700			

Leu Cys Pro Tyr Thr Ser Thr Met Met Glu Thr Leu Glu Arg Leu
2705 2710 2715

Gln Arg Arg Tyr Gly Gly Gly Leu Val Arg Val Pro Leu Ser Arg
2720 2725 2730

Asn Ser Thr His Glu Met Tyr Trp Val Ser Gly Ala Lys Ser Asn
2735 2740 2745

Thr Ile Lys Ser Val Ser Thr Thr Ser Gln Leu Leu Leu Gly Arg
2750 2755 2760

Met Asp Gly Pro Arg Arg Pro Val Lys Tyr Glu Glu Asp Val Asn
2765 2770 2775

Leu Gly Ser Gly Thr Arg Ala Val Val Ser Cys Ala Glu Ala Pro
2780 2785 2790

Asn Met Lys Ile Ile Gly Asn Arg Ile Glu Arg Ile Arg Ser Glu
2795 2800 2805

His Ala Glu Thr Trp Phe Phe Asp Glu Asn His Pro Tyr Arg Thr
2810 2815 2820

Trp Ala Tyr His Gly Ser Tyr Glu Ala Pro Thr Gln Gly Ser Ala
2825 2830 2835

Ser Ser Leu Ile Asn Gly Val Val Arg Leu Leu Ser Lys Pro Trp
2840 2845 2850

Asp Val Val Thr Gly Val Thr Gly Ile Ala Met Thr Asp Thr Thr
2855 2860 2865

Pro Tyr Gly Gln Gln Arg Val Phe Lys Glu Lys Val Asp Thr Arg
2870 2875 2880

Val Pro Asp Pro Gln Glu Gly Thr Arg Gln Val Met Ser Met Val
2885 2890 2895

Ser	Ser	Trp	Leu	Trp	Lys	Glu	Leu	Gly	Lys	His	Lys	Arg	Pro	Arg
2900						2905					2910			
Val	Cys	Thr	Lys	Glu	Glu	Phe	Ile	Asn	Lys	Val	Arg	Ser	Asn	Ala
2915						2920					2925			
Ala	Leu	Gly	Ala	Ile	Phe	Glu	Glu	Glu	Lys	Glu	Trp	Lys	Thr	Ala
2930						2935					2940			
Val	Glu	Ala	Val	Asn	Asp	Pro	Arg	Phe	Trp	Ala	Leu	Val	Asp	Lys
2945						2950					2955			
Glu	Arg	Glu	His	His	Leu	Arg	Gly	Glu	Cys	Gln	Ser	Cys	Val	Tyr
2960						2965					2970			
Asn	Met	Met	Gly	Lys	Arg	Glu	Lys	Lys	Gln	Gly	Glu	Phe	Gly	Lys
2975						2980					2985			
Ala	Lys	Gly	Ser	Arg	Ala	Ile	Trp	Tyr	Met	Trp	Leu	Gly	Ala	Arg
2990						2995					3000			
Phe	Leu	Glu	Phe	Glu	Ala	Leu	Gly	Phe	Leu	Asn	Glu	Asp	His	Trp
3005						3010					3015			
Met	Gly	Arg	Glu	Asn	Ser	Gly	Gly	Gly	Val	Glu	Gly	Leu	Gly	Leu
3020						3025					3030			
Gln	Arg	Leu	Gly	Tyr	Val	Leu	Glu	Glu	Met	Ser	Arg	Ile	Pro	Gly
3035						3040					3045			
Gly	Arg	Met	Tyr	Ala	Asp	Asp	Thr	Ala	Gly	Trp	Asp	Thr	Arg	Ile
3050						3055					3060			
Ser	Arg	Phe	Asp	Leu	Glu	Asn	Glu	Ala	Leu	Ile	Thr	Asn	Gln	Met
3065						3070					3075			
Glu	Lys	Gly	His	Arg	Ala	Leu	Ala	Leu	Ala	Ile	Ile	Lys	Tyr	Thr
3080						3085					3090			
Tyr	Gln	Asn	Lys	Val	Val	Lys	Val	Leu	Arg	Pro	Ala	Glu	Lys	Gly
3095						3100					3105			

Lys Thr Val Met Asp Ile Ile Ser Arg Gln Asp Gln Arg Gly Ser
3110 3115 3120

Gly Gln Val Val Thr Tyr Ala Leu Asn Thr Phe Thr Asn Leu Val
3125 3130 3135

Val Gln Leu Ile Arg Asn Met Glu Ala Glu Glu Val Leu Glu Met
3140 3145 3150

Gln Asp Leu Trp Leu Leu Arg Arg Ser Glu Lys Val Thr Asn Trp
3155 3160 3165

Leu Gln Ser Asn Gly Trp Asp Arg Leu Lys Arg Met Ala Val Ser
3170 3175 3180

Gly Asp Asp Cys Val Val Lys Pro Ile Asp Asp Arg Phe Ala His
3185 3190 3195

Ala Leu Arg Phe Leu Asn Asp Met Gly Lys Val Arg Lys Asp Thr
3200 3205 3210

Gln Glu Trp Lys Pro Ser Thr Gly Trp Asp Asn Trp Glu Glu Val
3215 3220 3225

Pro Phe Cys Ser His His Phe Asn Lys Leu His Leu Lys Asp Gly
3230 3235 3240

Arg Ser Ile Val Val Pro Cys Arg His Gln Asp Glu Leu Ile Gly
3245 3250 3255

Arg Ala Arg Val Ser Pro Gly Ala Gly Trp Ser Ile Arg Glu Thr
3260 3265 3270

Ala Cys Leu Ala Lys Ser Tyr Ala Gln Met Trp Gln Leu Leu Tyr
3275 3280 3285

Phe His Arg Arg Asp Leu Arg Leu Met Ala Asn Ala Ile Cys Ser
3290 3295 3300

Ser Val Pro Val Asp Trp Val Pro Thr Gly Arg Thr Thr Trp Ser
3305 3310 3315

Ile His Gly Lys Gly Glu Trp Met Thr Thr Glu Asp Met Leu Val
3320 3325 3330

Val Trp Asn Arg Val Trp Ile Glu Glu Asn Asp His Met Glu Asp
3335 3340 3345

Lys Thr Pro Val Thr Lys Trp Thr Asp Ile Pro Tyr Leu Gly Lys
3350 3355 3360

Arg Glu Asp Leu Trp Cys Gly Ser Leu Ile Gly His Arg Pro Arg
3365 3370 3375

Thr Thr Trp Ala Glu Asn Ile Lys Asn Thr Val Asn Met Met Arg
3380 3385 3390

Arg Ile Ile Gly Asp Glu Glu Lys Tyr Val Asp Tyr Leu Ser Thr
3395 3400 3405

Gln Val Arg Tyr Leu Gly Glu Glu Gly Ser Thr Pro Gly Val Leu
3410 3415 3420