

SEQUENCE LISTING

<110> CZ BIOHUB SF, LLC

THE BOARD OF TRUSTEES OF THE LELAND STANFORD JUNIOR UNIVERSITY

<120> IMMUNOGENIC CORONAVIRUS FUSION PROTEINS AND RELATED METHODS

<130> 079445-1256502-011510PC

<140> PCT/US2021/047885

<141> 2021-08-27

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<151> 2021-06-04

<160> 34

<170> PatentIn version 3.5

<210> 1

<211> 1273

<212> PRT

<213> SARS-CoV-2

<400> 1

Met Phe Val Phe Leu Val Leu Leu Pro Leu Val Ser Ser Gln Cys Val

1 5 10 15

Asn Leu Thr Thr Arg Thr Gln Leu Pro Pro Ala Tyr Thr Asn Ser Phe

20 25 30

Thr Arg Gly Val Tyr Tyr Pro Asp Lys Val Phe Arg Ser Ser Val Leu

35 40 45

His Ser Thr Gln Asp Leu Phe Leu Pro Phe Phe Ser Asn Val Thr Trp

50 55 60

Phe His Ala Ile His Val Ser Gly Thr Asn Gly Thr Lys Arg Phe Asp

65 70 75 80

Asn Pro Val Leu Pro Phe Asn Asp Gly Val Tyr Phe Ala Ser Thr Glu

85 90 95

Gly Thr His Trp Phe Val Thr	Gln Arg Asn Phe Tyr	Glu Pro Gln
1100	1105	1110
Ile Ile Thr Thr Asp Asn Thr	Phe Val Ser Gly Asn	Cys Asp Val
1115	1120	1125
Val Ile Gly Ile Val Asn Asn	Thr Val Tyr Asp Pro	Leu Gln Pro
1130	1135	1140
Glu Leu Asp Ser Gly Gly Asp	Ile Ile Lys Leu Leu	Asn Glu Gln
1145	1150	1155
Val Asn Lys Glu Met Gln Ser	Ser Asn Leu Tyr Met	Ser Met Ser
1160	1165	1170
Ser Trp Cys Tyr Thr His Ser	Leu Asp Gly Ala Gly	Leu Phe Leu
1175	1180	1185
Phe Asp His Ala Ala Glu Glu	Tyr Glu His Ala Lys	Lys Leu Ile
1190	1195	1200
Ile Phe Leu Asn Glu Asn Asn	Val Pro Val Gln Leu	Thr Ser Ile
1205	1210	1215
Ser Ala Pro Glu His Lys Phe	Glu Gly Leu Thr Gln	Ile Phe Gln
1220	1225	1230
Lys Ala Tyr Glu His Glu Gln	His Ile Ser Glu Ser	Ile Asn Asn
1235	1240	1245
Ile Val Asp His Ala Ile Lys	Ser Lys Asp His Ala	Thr Phe Asn
1250	1255	1260
Phe Leu Gln Trp Tyr Val Ala	Glu Gln His Glu Glu	Glu Val Leu
1265	1270	1275

Phe Lys Asp Ile Leu Asp Lys Ile Glu Leu Ile Gly Asn Glu Asn
 1280 1285 1290

His Gly Leu Tyr Leu Ala Asp Gln Tyr Val Lys Gly Ile Ala Lys
 1295 1300 1305

Ser Arg Lys Ser
 1310

<210> 31
 <211> 12
 <212> PRT
 <213> SARS-CoV-2

<400> 31

Met Phe Val Phe Leu Val Leu Leu Pro Leu Val Ser
 1 5 10

<210> 32
 <211> 13
 <212> PRT
 <213> SARS-CoV-2

<400> 32

Met Phe Val Phe Leu Val Leu Leu Pro Leu Val Ser Ser
 1 5 10

<210> 33
 <211> 1311
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Synthetic Construct

<400> 33

Met Phe Val Phe Leu Val Leu Leu Pro Leu Val Ser Gln Cys Val Asn
 1 5 10 15

Leu Thr Thr Arg Thr Gln Leu Pro Pro Ala Tyr Thr Asn Ser Phe Thr
20 25 30

Arg Gly Val Tyr Tyr Pro Asp Lys Val Phe Arg Ser Ser Val Leu His
35 40 45

Ser Thr Gln Asp Leu Phe Leu Pro Phe Phe Ser Asn Val Thr Trp Phe
50 55 60

His Ala Ile His Val Ser Gly Thr Asn Gly Thr Lys Arg Phe Asp Asn
65 70 75 80

Pro Val Leu Pro Phe Asn Asp Gly Val Tyr Phe Ala Ser Thr Glu Lys
85 90 95

Ser Asn Ile Ile Arg Gly Trp Ile Phe Gly Thr Thr Leu Asp Ser Lys
100 105 110

Thr Gln Ser Leu Leu Ile Val Asn Asn Ala Thr Asn Val Val Ile Lys
115 120 125

Val Cys Glu Phe Gln Phe Cys Asn Asp Pro Phe Leu Gly Val Tyr Tyr
130 135 140

His Lys Asn Asn Lys Ser Trp Met Glu Ser Glu Phe Arg Val Tyr Ser
145 150 155 160

Ser Ala Asn Asn Cys Thr Phe Glu Tyr Val Ser Gln Pro Phe Leu Met
165 170 175

Asp Leu Glu Gly Lys Gln Gly Asn Phe Lys Asn Leu Arg Glu Phe Val
180 185 190

Phe Lys Asn Ile Asp Gly Tyr Phe Lys Ile Tyr Ser Lys His Thr Pro
195 200 205

Ile Asn Leu Val Arg Asp Leu Pro Gln Gly Phe Ser Ala Leu Glu Pro
210 215 220

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

Leu Ala Leu His Arg Ser Tyr Leu Thr Pro Gly Asp Ser Ser Ser Gly
 245 250 255

Trp Thr Ala Gly Ala Ala Ala Tyr Tyr Val Gly Tyr Leu Gln Pro Arg
 260 265 270

Thr Phe Leu Leu Lys Tyr Asn Glu Asn Gly Thr Ile Thr Asp Ala Val
 275 280 285

Asp Cys Ala Leu Asp Pro Leu Ser Glu Thr Lys Cys Thr Leu Lys Ser
 290 295 300

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

Pro Thr Glu Ser Ile Val Arg Phe Pro Asn Ile Thr Asn Leu Cys Pro
 325 330 335

Phe Gly Glu Val Phe Asn Ala Thr Arg Phe Ala Ser Val Tyr Ala Trp
 340 345 350

Asn Arg Lys Arg Ile Ser Asn Cys Val Ala Asp Tyr Ser Val Leu Tyr
 355 360 365

Asn Ser Ala Ser Phe Ser Thr Phe Lys Cys Tyr Gly Val Ser Pro Thr
 370 375 380

Lys Leu Asn Asp Leu Cys Phe Thr Asn Val Tyr Ala Asp Ser Phe Val
 385 390 395 400

Ile Arg Gly Asp Glu Val Arg Gln Ile Ala Pro Gly Gln Thr Gly Lys
 405 410 415

Ile Ala Asp Tyr Asn Tyr Lys Leu Pro Asp Asp Phe Thr Gly Cys Val
420 425 430

Ile Ala Trp Asn Ser Asn Asn Leu Asp Ser Lys Val Gly Gly Asn Tyr
435 440 445

Asn Tyr Leu Tyr Arg Leu Phe Arg Lys Ser Asn Leu Lys Pro Phe Glu
450 455 460

Arg Asp Ile Ser Thr Glu Ile Tyr Gln Ala Gly Ser Thr Pro Cys Asn
465 470 475 480

Gly Val Glu Gly Phe Asn Cys Tyr Phe Pro Leu Gln Ser Tyr Gly Phe
485 490 495

Gln Pro Thr Asn Gly Val Gly Tyr Gln Pro Tyr Arg Val Val Val Leu
500 505 510

Ser Phe Glu Leu Leu His Ala Pro Ala Thr Val Cys Gly Pro Lys Lys
515 520 525

Ser Thr Asn Leu Val Lys Asn Lys Cys Val Asn Phe Asn Phe Asn Gly
530 535 540

Leu Thr Gly Thr Gly Val Leu Thr Glu Ser Asn Lys Lys Phe Leu Pro
545 550 555 560

Phe Gln Gln Phe Gly Arg Asp Ile Ala Asp Thr Thr Asp Ala Val Arg
565 570 575

Asp Pro Gln Thr Leu Glu Ile Leu Asp Ile Thr Pro Cys Ser Phe Gly
580 585 590

Gly Val Ser Val Ile Thr Pro Gly Thr Asn Thr Ser Asn Gln Val Ala
595 600 605

Val Leu Tyr Gln Asp Val Asn Cys Thr Glu Val Pro Val Ala Ile His
610 615 620

Ala Asp Gln Leu Thr Pro Thr Trp Arg Val Tyr Ser Thr Gly Ser Asn
625 630 635 640

Val Phe Gln Thr Arg Ala Gly Cys Leu Ile Gly Ala Glu His Val Asn
645 650 655

Asn Ser Tyr Glu Cys Asp Ile Pro Ile Gly Ala Gly Ile Cys Ala Ser
660 665 670

Tyr Gln Thr Gln Thr Asn Ser Pro Gly Ser Ala Ser Ser Val Ala Ser
675 680 685

Gln Ser Ile Ile Ala Tyr Thr Met Ser Leu Gly Ala Glu Asn Ser Val
690 695 700

Ala Tyr Ser Asn Asn Ser Ile Ala Ile Pro Thr Asn Phe Thr Ile Ser
705 710 715 720

Val Thr Thr Glu Ile Leu Pro Val Ser Met Thr Lys Thr Ser Val Asp
725 730 735

Cys Thr Met Tyr Ile Cys Gly Asp Ser Thr Glu Cys Ser Asn Leu Leu
740 745 750

Leu Gln Tyr Gly Ser Phe Cys Thr Gln Leu Asn Arg Ala Leu Thr Gly
755 760 765

Ile Ala Val Glu Gln Asp Lys Asn Thr Gln Glu Val Phe Ala Gln Val
770 775 780

Lys Gln Ile Tyr Lys Thr Pro Pro Ile Lys Asp Phe Gly Gly Phe Asn
785 790 795 800

Phe Ser Gln Ile Leu Pro Asp Pro Ser Lys Pro Ser Lys Arg Ser Pro
805 810 815

Ile Glu Asp Leu Leu Phe Asn Lys Val Thr Leu Ala Asp Ala Gly Phe
820 825 830

Ile Lys Gln Tyr Gly Asp Cys Leu Gly Asp Ile Ala Ala Arg Asp Leu
835 840 845

Ile Cys Ala Gln Lys Phe Asn Gly Leu Thr Val Leu Pro Pro Leu Leu
850 855 860

Thr Asp Glu Met Ile Ala Gln Tyr Thr Ser Ala Leu Leu Ala Gly Thr
865 870 875 880

Ile Thr Ser Gly Trp Thr Phe Gly Ala Gly Pro Ala Leu Gln Ile Pro
885 890 895

Phe Pro Met Gln Met Ala Tyr Arg Phe Asn Gly Ile Gly Val Thr Gln
900 905 910

Asn Val Leu Tyr Glu Asn Gln Lys Leu Ile Ala Asn Gln Phe Asn Ser
915 920 925

Ala Ile Gly Lys Ile Gln Asp Ser Leu Ser Ser Thr Pro Ser Ala Leu
930 935 940

Gly Lys Leu Gln Asp Val Val Asn Gln Asn Ala Gln Ala Leu Asn Thr
945 950 955 960

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

Asn Asp Ile Leu Ser Arg Leu Asp Pro Pro Glu Ala Glu Val Gln Ile
980 985 990

Asp Arg Leu Ile Thr Gly Arg Leu Gln Ser Leu Gln Thr Tyr Val Thr
995 1000 1005

Gln Gln Leu Ile Arg Ala Ala Glu Ile Arg Ala Ser Ala Asn Leu
1010 1015 1020

Ala	Ala	Thr	Lys	Met	Ser	Glu	Cys	Val	Leu	Gly	Gln	Ser	Lys	Arg
1025						1030					1035			
Val	Asp	Phe	Cys	Gly	Lys	Gly	Tyr	His	Leu	Met	Ser	Phe	Pro	Gln
1040						1045					1050			
Ser	Ala	Pro	His	Gly	Val	Val	Phe	Leu	His	Val	Thr	Tyr	Val	Pro
1055						1060					1065			
Ala	Gln	Glu	Lys	Asn	Phe	Thr	Thr	Ala	Pro	Ala	Ile	Cys	His	Asp
1070						1075					1080			
Gly	Lys	Ala	His	Phe	Pro	Arg	Glu	Gly	Val	Phe	Val	Ser	Asn	Gly
1085						1090					1095			
Thr	His	Trp	Phe	Val	Thr	Gln	Arg	Asn	Phe	Tyr	Glu	Pro	Gln	Ile
1100						1105					1110			
Ile	Thr	Thr	Asp	Asn	Thr	Phe	Val	Ser	Gly	Asn	Cys	Asp	Val	Val
1115						1120					1125			
Ile	Gly	Ile	Val	Asn	Asn	Thr	Val	Tyr	Asp	Pro	Leu	Gln	Pro	Glu
1130						1135					1140			
Leu	Asp	Ser	Gly	Gly	Asp	Ile	Ile	Lys	Leu	Leu	Asn	Glu	Gln	Val
1145						1150					1155			
Asn	Lys	Glu	Met	Gln	Ser	Ser	Asn	Leu	Tyr	Met	Ser	Met	Ser	Ser
1160						1165					1170			
Trp	Cys	Tyr	Thr	His	Ser	Leu	Asp	Gly	Ala	Gly	Leu	Phe	Leu	Phe
1175						1180					1185			
Asp	His	Ala	Ala	Glu	Glu	Tyr	Glu	His	Ala	Lys	Lys	Leu	Ile	Ile
1190						1195					1200			

Phe Leu Asn Glu Asn Asn Val Pro Val Gln Leu Thr Ser Ile Ser
 1205 1210 1215

Ala Pro Glu His Lys Phe Glu Gly Leu Thr Gln Ile Phe Gln Lys
 1220 1225 1230

Ala Tyr Glu His Glu Gln His Ile Ser Glu Ser Ile Asn Asn Ile
 1235 1240 1245

Val Asp His Ala Ile Lys Ser Lys Asp His Ala Thr Phe Asn Phe
 1250 1255 1260

Leu Gln Trp Tyr Val Ala Glu Gln His Glu Glu Glu Val Leu Phe
 1265 1270 1275

Asn Asp Ile Leu Asp Lys Ile Glu Leu Ile Gly Asn Glu Asn His
 1280 1285 1290

Gly Leu Tyr Leu Ala Asp Gln Tyr Val Lys Gly Ile Ala Lys Ser
 1295 1300 1305

Arg Lys Ser
 1310

<210> 34
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 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Synthetic Construct

<400> 34

Met Phe Val Phe Leu Val Leu Leu Pro Leu Val Ser Ser Ser Gln Cys
 1 5 10 15

Val Asn Leu Thr Thr Arg Thr Gln Leu Pro Pro Ala Tyr Thr Asn Ser
 20 25 30

Phe Thr Arg Gly Val Tyr Tyr Pro Asp Lys Val Phe Arg Ser Ser Val
35 40 45

Leu His Ser Thr Gln Asp Leu Phe Leu Pro Phe Phe Ser Asn Val Thr
50 55 60

Trp Phe His Ala Ile His Val Ser Gly Thr Asn Gly Thr Lys Arg Phe
65 70 75 80

Asp Asn Pro Val Leu Pro Phe Asn Asp Gly Val Tyr Phe Ala Ser Thr
85 90 95

Glu Lys Ser Asn Ile Ile Arg Gly Trp Ile Phe Gly Thr Thr Leu Asp
100 105 110

Ser Lys Thr Gln Ser Leu Leu Ile Val Asn Asn Ala Thr Asn Val Val
115 120 125

Ile Lys Val Cys Glu Phe Gln Phe Cys Asn Asp Pro Phe Leu Gly Val
130 135 140

Tyr Tyr His Lys Asn Asn Lys Ser Trp Met Glu Ser Glu Phe Arg Val
145 150 155 160

Tyr Ser Ser Ala Asn Asn Cys Thr Phe Glu Tyr Val Ser Gln Pro Phe
165 170 175

Leu Met Asp Leu Glu Gly Lys Gln Gly Asn Phe Lys Asn Leu Arg Glu
180 185 190

Phe Val Phe Lys Asn Ile Asp Gly Tyr Phe Lys Ile Tyr Ser Lys His
195 200 205

Thr Pro Ile Asn Leu Val Arg Asp Leu Pro Gln Gly Phe Ser Ala Leu
210 215 220

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

Thr Leu Leu Ala Leu His Arg Ser Tyr Leu Thr Pro Gly Asp Ser Ser
245 250 255

Ser Gly Trp Thr Ala Gly Ala Ala Ala Tyr Tyr Val Gly Tyr Leu Gln
260 265 270

Pro Arg Thr Phe Leu Leu Lys Tyr Asn Glu Asn Gly Thr Ile Thr Asp
275 280 285

Ala Val Asp Cys Ala Leu Asp Pro Leu Ser Glu Thr Lys Cys Thr Leu
290 295 300

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

Val Gln Pro Thr Glu Ser Ile Val Arg Phe Pro Asn Ile Thr Asn Leu
325 330 335

Cys Pro Phe Gly Glu Val Phe Asn Ala Thr Arg Phe Ala Ser Val Tyr
340 345 350

Ala Trp Asn Arg Lys Arg Ile Ser Asn Cys Val Ala Asp Tyr Ser Val
355 360 365

Leu Tyr Asn Ser Ala Ser Phe Ser Thr Phe Lys Cys Tyr Gly Val Ser
370 375 380

Pro Thr Lys Leu Asn Asp Leu Cys Phe Thr Asn Val Tyr Ala Asp Ser
385 390 395 400

Phe Val Ile Arg Gly Asp Glu Val Arg Gln Ile Ala Pro Gly Gln Thr
405 410 415

Gly Lys Ile Ala Asp Tyr Asn Tyr Lys Leu Pro Asp Asp Phe Thr Gly
420 425 430

Cys Val Ile Ala Trp Asn Ser Asn Asn Leu Asp Ser Lys Val Gly Gly
435 440 445

Asn Tyr Asn Tyr Leu Tyr Arg Leu Phe Arg Lys Ser Asn Leu Lys Pro
450 455 460

Phe Glu Arg Asp Ile Ser Thr Glu Ile Tyr Gln Ala Gly Ser Thr Pro
465 470 475 480

Cys Asn Gly Val Glu Gly Phe Asn Cys Tyr Phe Pro Leu Gln Ser Tyr
485 490 495

Gly Phe Gln Pro Thr Asn Gly Val Gly Tyr Gln Pro Tyr Arg Val Val
500 505 510

Val Leu Ser Phe Glu Leu Leu His Ala Pro Ala Thr Val Cys Gly Pro
515 520 525

Lys Lys Ser Thr Asn Leu Val Lys Asn Lys Cys Val Asn Phe Asn Phe
530 535 540

Asn Gly Leu Thr Gly Thr Gly Val Leu Thr Glu Ser Asn Lys Lys Phe
545 550 555 560

Leu Pro Phe Gln Gln Phe Gly Arg Asp Ile Ala Asp Thr Thr Asp Ala
565 570 575

Val Arg Asp Pro Gln Thr Leu Glu Ile Leu Asp Ile Thr Pro Cys Ser
580 585 590

Phe Gly Gly Val Ser Val Ile Thr Pro Gly Thr Asn Thr Ser Asn Gln
595 600 605

Val Ala Val Leu Tyr Gln Asp Val Asn Cys Thr Glu Val Pro Val Ala
610 615 620

Ile His Ala Asp Gln Leu Thr Pro Thr Trp Arg Val Tyr Ser Thr Gly
625 630 635 640

Ser Asn Val Phe Gln Thr Arg Ala Gly Cys Leu Ile Gly Ala Glu His
645 650 655

Val Asn Asn Ser Tyr Glu Cys Asp Ile Pro Ile Gly Ala Gly Ile Cys
660 665 670

Ala Ser Tyr Gln Thr Gln Thr Asn Ser Pro Gly Ser Ala Ser Ser Val
675 680 685

Ala Ser Gln Ser Ile Ile Ala Tyr Thr Met Ser Leu Gly Ala Glu Asn
690 695 700

Ser Val Ala Tyr Ser Asn Asn Ser Ile Ala Ile Pro Thr Asn Phe Thr
705 710 715 720

Ile Ser Val Thr Thr Glu Ile Leu Pro Val Ser Met Thr Lys Thr Ser
725 730 735

Val Asp Cys Thr Met Tyr Ile Cys Gly Asp Ser Thr Glu Cys Ser Asn
740 745 750

Leu Leu Leu Gln Tyr Gly Ser Phe Cys Thr Gln Leu Asn Arg Ala Leu
755 760 765

Thr Gly Ile Ala Val Glu Gln Asp Lys Asn Thr Gln Glu Val Phe Ala
770 775 780

Gln Val Lys Gln Ile Tyr Lys Thr Pro Pro Ile Lys Asp Phe Gly Gly
785 790 795 800

Phe Asn Phe Ser Gln Ile Leu Pro Asp Pro Ser Lys Pro Ser Lys Arg
805 810 815

Ser Pro Ile Glu Asp Leu Leu Phe Asn Lys Val Thr Leu Ala Asp Ala
820 825 830

Gly Phe Ile Lys Gln Tyr Gly Asp Cys Leu Gly Asp Ile Ala Ala Arg
835 840 845

Asp Leu Ile Cys Ala Gln Lys Phe Asn Gly Leu Thr Val Leu Pro Pro
850 855 860

Leu Leu Thr Asp Glu Met Ile Ala Gln Tyr Thr Ser Ala Leu Leu Ala
865 870 875 880

Gly Thr Ile Thr Ser Gly Trp Thr Phe Gly Ala Gly Pro Ala Leu Gln
885 890 895

Ile Pro Phe Pro Met Gln Met Ala Tyr Arg Phe Asn Gly Ile Gly Val
900 905 910

Thr Gln Asn Val Leu Tyr Glu Asn Gln Lys Leu Ile Ala Asn Gln Phe
915 920 925

Asn Ser Ala Ile Gly Lys Ile Gln Asp Ser Leu Ser Ser Thr Pro Ser
930 935 940

Ala Leu Gly Lys Leu Gln Asp Val Val Asn Gln Asn Ala Gln Ala Leu
945 950 955 960

Asn Thr Leu Val Lys Gln Leu Ser Ser Asn Phe Gly Ala Ile Ser Ser
965 970 975

Val Leu Asn Asp Ile Leu Ser Arg Leu Asp Pro Pro Glu Ala Glu Val
980 985 990

Gln Ile Asp Arg Leu Ile Thr Gly Arg Leu Gln Ser Leu Gln Thr Tyr
995 1000 1005

Val Thr Gln Gln Leu Ile Arg Ala Ala Glu Ile Arg Ala Ser Ala
1010 1015 1020

Asn Leu Ala Ala Thr Lys Met Ser Glu Cys Val Leu Gly Gln Ser
1025 1030 1035

Lys Arg Val Asp Phe Cys Gly Lys Gly Tyr His Leu Met Ser Phe
1040 1045 1050

Pro Gln Ser Ala Pro His Gly Val Val Phe Leu His Val Thr Tyr
1055 1060 1065

Val Pro Ala Gln Glu Lys Asn Phe Thr Thr Ala Pro Ala Ile Cys
1070 1075 1080

His Asp Gly Lys Ala His Phe Pro Arg Glu Gly Val Phe Val Ser
1085 1090 1095

Asn Gly Thr His Trp Phe Val Thr Gln Arg Asn Phe Tyr Glu Pro
1100 1105 1110

Gln Ile Ile Thr Thr Asp Asn Thr Phe Val Ser Gly Asn Cys Asp
1115 1120 1125

Val Val Ile Gly Ile Val Asn Asn Thr Val Tyr Asp Pro Leu Gln
1130 1135 1140

Pro Glu Leu Asp Ser Gly Gly Asp Ile Ile Lys Leu Leu Asn Glu
1145 1150 1155

Gln Val Asn Lys Glu Met Gln Ser Ser Asn Leu Tyr Met Ser Met
1160 1165 1170

Ser Ser Trp Cys Tyr Thr His Ser Leu Asp Gly Ala Gly Leu Phe
1175 1180 1185

Leu Phe Asp His Ala Ala Glu Glu Tyr Glu His Ala Lys Lys Leu
1190 1195 1200

Ile Ile Phe Leu Asn Glu Asn Asn Val Pro Val Gln Leu Thr Ser
1205 1210 1215

Ile Ser Ala Pro Glu His Lys Phe Glu Gly Leu Thr Gln Ile Phe
1220 1225 1230

Gln Lys Ala Tyr Glu His Glu Gln His Ile Ser Glu Ser Ile Asn
1235 1240 1245

Asn Ile Val Asp His Ala Ile Lys Ser Lys Asp His Ala Thr Phe
1250 1255 1260

Asn Phe Leu Gln Trp Tyr Val Ala Glu Gln His Glu Glu Glu Val
1265 1270 1275

Leu Phe Asn Asp Ile Leu Asp Lys Ile Glu Leu Ile Gly Asn Glu
1280 1285 1290

Asn His Gly Leu Tyr Leu Ala Asp Gln Tyr Val Lys Gly Ile Ala
1295 1300 1305

Lys Ser Arg Lys Ser
1310