

# SEQUENCE LISTING

<110> Intercell AG  
 <120> Peptides protective against S. pneumoniae and compositions,  
 methods and uses relating thereto  
 <130> ICP065-PCT  
 <150> EP08102655.1  
 <151> 2008-03-17  
 <160> 331  
 <170> PatentIn version 3.5  
 <210> 1  
 <211> 778  
 <212> PRT  
 <213> Artificial Sequence  
 <220>  
 <223> Construct 1: SP0498 aa  
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Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
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Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
 20 25 30

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
 35 40 45

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
 50 55 60

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
 65 70 75 80

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
 85 90 95

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
 100 105 110

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
 115 120 125

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala Pro  
 130 135 140

Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr Gln Leu  
145 150 155 160

Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val Pro Lys Asp  
165 170 175

Asp Arg Arg Ile Lys Ser Val Ser Leu Glu Thr Gly Pro Lys Lys Thr  
180 185 190

Ser Tyr Ala Glu Gly Glu Asp Leu Asp Leu Arg Gly Gly Val Leu Arg  
195 200 205

Val Gln Tyr Glu Gly Gly Thr Glu Asp Glu Leu Ile Arg Leu Thr His  
210 215 220

Ala Gly Val Ser Val Ser Gly Phe Asp Thr His His Lys Gly Glu Gln  
225 230 235 240

Asn Leu Thr Leu Gln Tyr Leu Gly Gln Pro Val Asn Ala Asn Leu Ser  
245 250 255

Val Thr Val Thr Gly Gln Asp Glu Ala Ser Pro Lys Thr Ile Leu Gly  
260 265 270

Ile Glu Val Ser Gln Glu Pro Lys Lys Asp Tyr Leu Val Gly Asp Ser  
275 280 285

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

Met Glu Glu His Ser Phe Thr Asp Glu Gly Val Glu Ile Ser Gly Tyr  
305 310 315 320

Asp Ala Gln Lys Thr Gly Arg Gln Thr Leu Thr Leu His Tyr Gln Gly  
325 330 335

His Glu Val Ser Phe Asp Val Leu Val Ser Pro Lys Ala Ala Leu Asn  
340 345 350

Asp Glu Tyr Leu Lys Gln Lys Leu Ala Glu Val Glu Ala Ala Lys Asn  
355 360 365

Lys Val Val Tyr Asn Phe Ala Ser Ser Glu Val Lys Glu Ala Phe Leu  
370 375 380

Lys Ala Ile Glu Ala Ala Glu Gln Val Leu Lys Asp His Glu Thr Ser  
385 390 395 400

Thr Gln Asp Gln Val Asn Asp Arg Leu Asn Lys Leu Thr Glu Ala His  
405 410 415

Lys Ala Leu Asn Gly Gln Glu Lys Phe Thr Glu Glu Lys Thr Glu Leu  
420 425 430

Asp Arg Leu Thr Gly Glu Val Gln Glu Leu Leu Ala Ala Lys Pro Asn  
435 440 445

His Pro Ser Gly Ser Ala Leu Ala Pro Leu Leu Glu Lys Asn Lys Ala  
450 455 460

Leu Val Glu Lys Val Asp Leu Ser Pro Glu Glu Leu Thr Thr Ala Lys  
465 470 475 480

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

Val Phe Ser Asp Ser Lys Thr Gly Val Glu Val His Phe Ser Asn Lys  
500 505 510

Glu Lys Thr Val Ile Lys Gly Leu Lys Val Glu Arg Val Gln Ala Ser  
515 520 525

Ala Glu Glu Lys Lys Tyr Phe Ala Gly Glu Asp Ala His Val Phe Glu  
530 535 540

Ile Glu Gly Leu Asp Glu Lys Gly Gln Asp Val Asp Leu Ser Tyr Ala  
545 550 555 560

Ser Ile Val Lys Ile Pro Ile Glu Lys Asp Lys Lys Val Lys Lys Val  
565 570 575

Phe Phe Leu Pro Glu Gly Lys Glu Ala Val Glu Leu Ala Phe Glu Gln  
580 585 590

Thr Asp Ser His Val Ile Phe Thr Ala Pro His Phe Thr His Tyr Ala  
595 600 605

Phe Val Tyr Glu Ser Ala Glu Lys Pro Gln Pro Ala Lys Pro Ala Pro  
610 615 620

Gln Asn Thr Val Leu Pro Lys Pro Thr Tyr Gln Pro Thr Ser Asp Gln

625                      630                      635                      640  
 Gln Lys Ala Pro Lys Leu Glu Val Gln Glu Glu Lys Val Ala Phe His  
                                 645                      650                      655  
 Arg Gln Glu His Glu Asn Thr Glu Met Leu Val Gly Glu Gln Arg Val  
                                 660                      665                      670  
 Ile Ile Gln Gly Arg Asp Gly Leu Leu Arg His Val Phe Glu Val Asp  
                                 675                      680                      685  
 Glu Asn Gly Gln Arg Arg Leu Arg Ser Thr Glu Val Ile Gln Glu Ala  
                                 690                      695                      700  
 Ile Pro Glu Ile Val Glu Ile Gly Thr Lys Val Lys Thr Val Pro Ala  
 705                                  710                      715                      720  
 Val Val Ala Thr Gln Glu Lys Pro Ala Gln Asn Thr Ala Val Lys Ser  
                                 725                      730                      735  
 Glu Glu Ala Ser Lys Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala Asn  
                                 740                      745                      750  
 Glu Ala Leu Ile Ala Gly Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala  
                                 755                      760                      765  
 Leu Thr Leu Arg Arg Lys Arg Glu Asp Lys  
                                 770                      775  
  
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 <211> 254  
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 <213> Artificial Sequence  
  
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 <223> Construct 2: SP0609 aa  
  
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 1                                  5                                  10                                  15  
  
 Thr Ser Ile Ala Asp Ile Gln Lys Arg Gly Glu Leu Val Val Gly Val  
                                 20                                  25                                  30  
  
 Lys Gln Asp Val Pro Asn Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr  
                                 35                                  40                                  45



Tyr Pro Gly Ile Glu Thr Asp Leu Ala Lys Met Val Ala Asp Glu Leu  
50 55 60

Lys Val Lys Ile Arg Tyr Val Pro Val Thr Ala Gln Thr Arg Gly Pro  
65 70 75 80

Leu Leu Asp Asn Glu Gln Val Asp Met Asp Ile Ala Thr Phe Thr Ile  
85 90 95

Thr Asp Glu Arg Lys Lys Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr  
100 105 110

Asp Ala Ser Gly Phe Leu Val Asn Lys Ser Ala Lys Ile Lys Lys Ile  
115 120 125

Glu Asp Leu Asn Gly Lys Thr Ile Gly Val Ala Gln Gly Ser Ile Thr  
130 135 140

Gln Arg Leu Ile Thr Glu Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys  
145 150 155 160

Phe Val Glu Leu Gly Ser Tyr Pro Glu Leu Ile Thr Ser Leu His Ala  
165 170 175

His Arg Ile Asp Thr Phe Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr  
180 185 190

Thr Ser Lys Arg Thr Ala Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp  
195 200 205

Tyr Gly Ile Val Thr Lys Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu  
210 215 220

Asp Asn Leu Val Thr Lys Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu  
225 230 235 240

Tyr Asp Arg Tyr Lys Leu Lys Pro Ser Ser His Thr Ala Asp  
245 250

<210> 3  
<211> 359  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Construct 3: SP0749 aa

<400> 3

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

Glu Phe Val Gln Gln Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe  
245 250 255

Ile Ser Gly Phe Ser Thr Thr Val Glu Val Ser Ala Lys Ala Lys Ala  
260 265 270

Phe Leu Asp Ala Tyr Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe  
275 280 285

Ala Ala Leu Ala Tyr Asp Ser Val His Leu Val Ala Asn Ala Ala Lys  
290 295 300

Gly Ala Lys Asn Ser Gly Glu Ile Lys Asn Asn Leu Ala Lys Thr Lys  
305 310 315 320

Asp Phe Glu Gly Val Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn  
325 330 335

Thr Val Lys Thr Ala Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu  
340 345 350

Ala Ala Glu Val Val Lys Pro  
355

<210> 4  
<211> 135  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Construct 4: SP2027 aa

<400> 4

Glu Asn Leu Thr Asn Phe Tyr Glu Lys Tyr Arg Val Tyr Leu Thr Arg  
1 5 10 15

Pro Arg Leu Glu Leu Leu Ala Val Val Thr Ile Val Phe Cys Ala Val  
20 25 30

Leu Val Phe Phe Leu Asn Ile Pro Gly Lys Gly Val Leu Lys Leu Asp  
35 40 45

Asn Gly Thr Ile Val Tyr Asp Gly Ser Leu Val Arg Gly Lys Met Asn  
50 55 60

Gly Gln Gly Thr Ile Thr Phe Gln Asn Gly Asp Gln Tyr Thr Gly Gly  
65 70 75 80

Phe Asn Asn Gly Ala Phe Asn Gly Lys Gly Thr Phe Gln Ser Lys Glu  
85 90 95

Gly Trp Thr Tyr Glu Gly Asp Phe Val Asn Gly Gln Ala Glu Gly Lys  
100 105 110

Gly Lys Leu Thr Thr Glu Gln Glu Val Val Tyr Glu Gly Thr Phe Lys  
115 120 125

Gln Gly Val Phe Gln Gln Lys  
130 135

<210> 5

<211> 809

<212> PRT

<213> Artificial Sequence

<220>

<223> Construct 5: SP2194 aa

<400> 5

Asn Tyr Ser Lys Ala Leu Asn Gly Cys Ile Glu Ser Ala Tyr Met Val  
1 5 10 15

Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu Ile  
20 25 30

Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn Asp  
35 40 45

Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu Thr  
50 55 60

Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe Ser  
65 70 75 80

Arg Arg Leu Gln Val Leu Phe Asp Glu Ala Glu Tyr Val Ala Ser Val  
85 90 95

Val His Ala Lys Val Leu Gly Thr Glu His Val Leu Tyr Ala Ile Leu  
100 105 110

His Asp Ser Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly Phe  
115 120 125

Ser Tyr Glu Asp Lys Lys Asp Gln Val Lys Ile Ala Ala Leu Arg Arg  
130 135 140

Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala Leu  
145 150 155 160

Arg Gln Arg His Arg Thr Val Ala Asp Lys Gln Asn Ser Met Ala Asn  
165 170 175

Met Met Gly Met Pro Gln Thr Pro Ser Gly Gly Leu Glu Asp Tyr Thr  
180 185 190

His Asp Leu Thr Glu Gln Ala Arg Ser Gly Lys Leu Glu Pro Val Ile  
195 200 205

Gly Arg Asp Lys Glu Ile Ser Arg Met Ile Gln Ile Leu Ser Arg Lys  
210 215 220

Thr Lys Asn Asn Pro Val Leu Val Gly Asp Ala Gly Val Gly Lys Thr  
225 230 235 240

Ala Leu Ala Leu Gly Leu Ala Gln Arg Ile Ala Ser Gly Asp Val Pro  
245 250 255

Ala Glu Met Ala Lys Met Arg Val Leu Glu Leu Asp Leu Met Asn Val  
260 265 270

Val Ala Gly Thr Arg Phe Arg Gly Asp Phe Glu Glu Arg Met Asn Asn  
275 280 285

Ile Ile Lys Asp Ile Glu Glu Asp Gly Gln Val Ile Leu Phe Ile Asp  
290 295 300

Glu Leu His Thr Ile Met Gly Ser Gly Ser Gly Ile Asp Ser Thr Leu  
305 310 315 320

Asp Ala Ala Asn Ile Leu Lys Pro Ala Leu Ala Arg Gly Thr Leu Arg  
325 330 335

Thr Val Gly Ala Thr Thr Gln Glu Glu Tyr Gln Lys His Ile Glu Lys  
340 345 350

Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu Pro  
355 360 365

Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr Tyr  
370 375 380

Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr Ala  
385 390 395 400

Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp Ser  
405 410 415

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

Lys His Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys Ala  
435 440 445

Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys Glu  
450 455 460

Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile Leu  
465 470 475 480

Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr Gln  
485 490 495

Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys Arg  
500 505 510

Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile Arg  
515 520 525

Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser Phe  
530 535 540

Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys Ala  
545 550 555 560

Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe Asp  
565 570 575

Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly Ala  
580 585 590

Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu Lys  
595 600 605

Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu Lys  
610 615 620

Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp Gly  
625 630 635 640

Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr Ile  
645 650 655

Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp Lys  
660 665 670

Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn Met  
675 680 685

Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu Phe  
690 695 700

Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser Asp  
705 710 715 720

His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala Ser  
725 730 735

Leu Thr Glu Lys Gly Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu Lys  
740 745 750

Leu Leu Ala Asn Gln Gly Tyr Asp Pro Glu Met Gly Ala Arg Pro Leu  
755 760 765

Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu Leu  
770 775 780

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

Ala Gly Gln Leu Lys Phe Asp Ile Ala  
805

<210> 6

<211> 251

<212> PRT

<213> Artificial Sequence

<220>

<223> Construct 6: SP2216-1 aa

<400> 6

Glu Thr Thr Asp Asp Lys Ile Ala Ala Gln Asp Asn Lys Ile Ser Asn  
1 5 10 15

Leu	Thr	Ala	Gln	Gln	Gln	Glu	Ala	Gln	Lys	Gln	Val	Asp	Gln	Ile	Gln	
			20					25					30			
Glu	Gln	Val	Ser	Ala	Ile	Gln	Ala	Glu	Gln	Ser	Asn	Leu	Gln	Ala	Glu	
		35					40					45				
Asn	Asp	Arg	Leu	Gln	Ala	Glu	Ser	Lys	Lys	Leu	Glu	Gly	Glu	Ile	Thr	
	50					55					60					
Glu	Leu	Ser	Lys	Asn	Ile	Val	Ser	Arg	Asn	Gln	Ser	Leu	Glu	Lys	Gln	
65					70					75					80	
Ala	Arg	Ser	Ala	Gln	Thr	Asn	Gly	Ala	Val	Thr	Ser	Tyr	Ile	Asn	Thr	
				85					90					95		
Ile	Val	Asn	Ser	Lys	Ser	Ile	Thr	Glu	Ala	Ile	Ser	Arg	Val	Ala	Ala	
			100					105					110			
Met	Ser	Glu	Ile	Val	Ser	Ala	Asn	Asn	Lys	Met	Leu	Glu	Gln	Gln	Lys	
		115					120					125				
Ala	Asp	Lys	Lys	Ala	Ile	Ser	Glu	Lys	Gln	Val	Ala	Asn	Asn	Asp	Ala	
	130					135					140					
Ile	Asn	Thr	Val	Ile	Ala	Asn	Gln	Gln	Lys	Leu	Ala	Asp	Asp	Ala	Gln	
145					150					155					160	
Ala	Leu	Thr	Thr	Lys	Gln	Ala	Glu	Leu	Lys	Ala	Ala	Glu	Leu	Ser	Leu	
				165					170					175		
Ala	Ala	Glu	Lys	Ala	Thr	Ala	Glu	Gly	Glu	Lys	Ala	Ser	Leu	Leu	Glu	
			180					185					190			
Gln	Lys	Ala	Ala	Ala	Glu	Ala	Glu	Ala	Arg	Ala	Ala	Ala	Val	Ala	Glu	
		195					200					205				
Ala	Ala	Tyr	Lys	Glu	Lys	Arg	Ala	Ser	Gln	Gln	Gln	Ser	Val	Leu	Ala	
	210					215					220					
Ser	Ala	Asn	Thr	Asn	Leu	Thr	Ala	Gln	Val	Gln	Ala	Val	Ser	Glu	Ser	
225					230					235					240	
Ala	Ala	Ala	Pro	Val	Arg	Ala	Lys	Val	Arg	Pro						
				245					250							



<210> 7  
<211> 315  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Construct 7: SP1732-3 aa

<400> 7

Tyr Leu Ile Leu Leu Ala Ser Leu Val Leu Val Ala Ala Ser Leu Ile  
1 5 10 15

Trp Ile Leu Ser Arg Thr Pro Ala Thr Ile Ala Ile Pro Asp Val Ala  
20 25 30

Gly Gln Thr Val Ala Glu Ala Lys Ala Thr Leu Lys Lys Ala Asn Phe  
35 40 45

Glu Ile Gly Glu Glu Lys Thr Glu Ala Ser Glu Lys Val Glu Glu Gly  
50 55 60

Arg Ile Ile Arg Thr Asp Pro Gly Ala Gly Thr Gly Arg Lys Glu Gly  
65 70 75 80

Thr Lys Ile Asn Leu Val Val Ser Ser Gly Lys Gln Ser Phe Gln Ile  
85 90 95

Ser Asn Tyr Val Gly Arg Lys Ser Ser Asp Val Ile Ala Glu Leu Lys  
100 105 110

Glu Lys Lys Val Pro Asp Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
115 120 125

Asn Glu Ser Glu Ala Gly Thr Val Leu Lys Gln Ser Leu Pro Glu Gly  
130 135 140

Thr Thr Tyr Asp Leu Ser Lys Ala Thr Gln Ile Val Leu Thr Val Ala  
145 150 155 160

Lys Lys Ala Thr Thr Ile Gln Leu Gly Asn Tyr Ile Gly Arg Asn Ser  
165 170 175

Thr Glu Val Ile Ser Glu Leu Lys Gln Lys Lys Val Pro Glu Asn Leu  
180 185 190

Ile Lys Ile Glu Glu Glu Glu Ser Ser Glu Ser Glu Pro Gly Thr Ile  
195 200 205

Met Lys Gln Ser Pro Gly Ala Gly Thr Thr Tyr Asp Val Ser Lys Pro  
210 215 220

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Val Thr Ser Val Ala Met  
225 230 235 240

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

Gln Ile Val Gly Ile Lys Glu Ala Asn Ile Glu Val Val Glu Val Thr  
260 265 270

Thr Ala Pro Ala Gly Ser Val Glu Gly Met Val Val Glu Gln Ser Pro  
275 280 285

Arg Ala Gly Glu Lys Val Asp Leu Asn Lys Thr Arg Val Lys Ile Ser  
290 295 300

Ile Tyr Lys Pro Lys Thr Thr Ser Ala Thr Pro  
305 310 315

<210> 8  
<211> 289  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Construct 8: SP1650 (PsaA) aa

<400> 8

Ala Ser Gly Lys Lys Asp Thr Thr Ser Gly Gln Lys Leu Lys Val Val  
1 5 10 15

Ala Thr Asn Ser Ile Ile Ala Asp Ile Thr Lys Asn Ile Ala Gly Asp  
20 25 30

Lys Ile Asp Leu His Ser Ile Val Pro Ile Gly Gln Asp Pro His Glu  
35 40 45

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

Ile Phe Tyr Asn Gly Ile Asn Leu Glu Thr Gly Gly Asn Ala Trp Phe  
65 70 75 80

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

Ala Val Ser Asp Gly Val Asp Val Ile Tyr Leu Glu Gly Gln Asn Glu  
100 105 110

Lys Gly Lys Glu Asp Pro His Ala Trp Leu Asn Leu Glu Asn Gly Ile  
115 120 125

Ile Phe Ala Lys Asn Ile Ala Lys Gln Leu Ser Ala Lys Asp Pro Asn  
130 135 140

Asn Lys Glu Phe Tyr Glu Lys Asn Leu Lys Glu Tyr Thr Asp Lys Leu  
145 150 155 160

Asp Lys Leu Asp Lys Glu Ser Lys Asp Lys Phe Asn Lys Ile Pro Ala  
165 170 175

Glu Lys Lys Leu Ile Val Thr Ser Glu Gly Ala Phe Lys Tyr Phe Ser  
180 185 190

Lys Ala Tyr Gly Val Pro Ser Ala Tyr Ile Trp Glu Ile Asn Thr Glu  
195 200 205

Glu Glu Gly Thr Pro Glu Gln Ile Lys Thr Leu Val Glu Lys Leu Arg  
210 215 220

Gln Thr Lys Val Pro Ser Leu Phe Val Glu Ser Ser Val Asp Asp Arg  
225 230 235 240

Pro Met Lys Thr Val Ser Gln Asp Thr Asn Ile Pro Ile Tyr Ala Gln  
245 250 255

Ile Phe Thr Asp Ser Ile Ala Glu Gln Gly Lys Glu Gly Asp Ser Tyr  
260 265 270

Tyr Ser Met Met Lys Tyr Asn Leu Asp Lys Ile Ala Glu Gly Leu Ala  
275 280 285

Lys

<210> 9  
<211> 2334  
<212> DNA  
<213> Artificial Sequence  
  
<220>  
<223> Construct 1: SP0498 nt

<400> 9

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tataaagatg cagatggtga gtggaagcta gctaaggaag tccgtggtaa caaagcacac	120
gtgacagata tcaactcttga taaaccaatc actgctcaag actggcgctt gaatgttgtc	180
acttctgaca atggaactcc atggaaggct attcgtatct ataactggaa aatgtatgaa	240
aagcttgata ctgagagtgt caatattccg atggccaagg ctgcagcccg ttctctaggc	300
aataacaagg tacaagttgg ctttgcagat gtaccggctg gagcaactat taccgtttat	360
gataatccaa attctcaaac tccgctcgca accttgaaga gcgaagttgg aggagaccta	420
gcaagtgcac cattggattt gacaaatcaa tctggtcttc tttattatcg taccagttg	480
ccaggcaagg aaattagtaa tgtcctagca gtttccgttc caaaagatga cagaagaatc	540
aagtcagtca gcctagaaac aggacctaa aaaacaagct acgccgaagg ggaggatttg	600
gaccttagag gtggtgttct tcgagttcag tatgaaggag gaactgagga cgaactcatt	660
cgcctaactc acgcaggtgt atcagtatca ggttttgata cgcatacataa gggagaaacag	720
aatcttactc tccaatatatt gggacaaccg gtaaatgcta atttgtcagt gactgtcact	780
ggccaagacg aagcaagtcc gaaaactatt ttgggaattg aagtaagtca ggaaccgaaa	840
aaagattacc tagttggtga tagcttagac ttgtctgaag gacgctttgc agtggcttat	900
agcaatgaca ccatggaaga acattccttt actgatgagg gagttgaaat ttctggttac	960
gatgctcaaa agactggtcg tcaaaccttg acgcttcatt accaaggcca tgaagttagc	1020
tttgatgttt tggtatctcc aaaagcagca ttgaacgatg agtacctcaa acaaaaatta	1080
gcagaagttg aagctgctaa gaacaaggtg gtctataact ttgcttcac agaatgaaaa	1140
gaagccttct tgaaagcaat tgaagcggcc gaacaagtgt tgaaagacca tgaaactagc	1200
accaagatc aagtcaatga ccgacttaat aaattgacag aagctcataa agctctgaat	1260
ggtcaagaga aatttacgga agaaaagaca gagcttgatc gcttaacagg tgaggttcaa	1320
gaactcttgg ctgccaaacc aaaccatcct tcaggttctg ccctagctcc gcttcttgag	1380
aaaaacaagg ccttggttga aaaagtagat ttgagtccag aagagcttac aacagcgaaa	1440
cagagtctaa aagatctggt tgctttattg aaagaagaca agccagcagt cttttctgat	1500
agtaaaacag gtgttgaagt acacttctca aataaagaga agactgtcat caagggtttg	1560
aaagtagagc gtgttcaagc aagtgctgaa gagaagaaat actttgctgg agaagatgct	1620
catgtctttg aaatagaagg tttggatgaa aaaggccaag atgttgatct ctcttatgct	1680
tctattgtga aaatcccaat tgaaaaagat aagaaagtta agaaagtatt tttcttacct	1740
gaaggcaaag aggcagtaga attggctttt gaacaaacgg atagtcatgt tatctttaca	1800

gcacctcact ttactcatta tgcctttgtt tatgaatctg ctgaaaaacc acaacctgct	1860
aaaccagcac caaaaaacac agtccttcca aaacctactt atcaaccgac ttctgatcaa	1920
caaaaggctc ctaaattgga agttcaagag gaaaagggtg cctttcatcg tcaagagcat	1980
gaaaatactg agatgctagt tggggaacaa cgagtcatca tacagggacg agatggactg	2040
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atccaagaag cgattccaga aattggtgaa attggaacaa aagtaaaaaac agtaccagca	2160
gtagtagcta cacaggaaaa accagctcaa aatacagcag ttaaatacaga agaagcaagc	2220
aaacaattgc caaatacagg aacagctgat gctaataagc ccctaatagc aggetttagcc	2280
agccttggtc ttgctagttt agccttgacc ttgagacgga aaagagaaga taaa	2334

<210> 10  
 <211> 762  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Construct 2: SP0609 nt

<400> 10	
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gacattcaaa aaagaggcga actggttgtc ggtgtcaaac aagacgttcc caattttggt	120
tacaaagatc ccaagaccgg tacttatacct ggtatcgaaa ccgacttggc caagatggta	180
gctgatgaac tcaaggtcaa gattcgctat gtgccggtta cagcacaaac ccgcggcccc	240
cttctagaca atgaacaggt cgatatggat atcgcgacct ttaccatcac ggacgaacgc	300
aaaaaactct acaactttac cagtcacctac tacacagacg cttctggatt tttggtcaat	360
aatctgcca aaatcaaaaa gattgaggac ctaaacggca aaaccatcgg agtcgcecaa	420
ggttctatca cccaacgcct gattactgaa ctgggtaaaa agaaaggctc gaagttttaa	480
ttcgtcgaac ttggttccta ccagaattg attacttccc tgcacgctca tcgtatcgat	540
accttttccg ttgaccgctc tattctatct ggctacacta gtaaacggac agcactacta	600
gatgatagtt tcaagccatc tgactacggg attgttacca agaaatcaaa tacagagctc	660
aacgactatc ttgataactt gggtactaaa tggagcaagg atggtagttt gcagaaactt	720
tatgaccgtt acaagctcaa accatctagc catactgcag at	762

<210> 11  
 <211> 1077  
 <212> DNA  
 <213> Artificial Sequence

<220>

<223> Construct 3: SP0749 nt

<400> 11

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gttgatgaaa tcaatgccgc aggtggtatc gatggaaaac aaatcgaagt agtcgataaa      180
gataataagt ctgaaacagc tgaggctgct tcagttacaa ctaaccttgt aacccaatct      240
aaagtatcag cagtcgtagg acctgcgaca tctggtgcga ctgcagctgc ggtagcgaac      300
gctacaaaag caggtgttcc attgatctca ccaagtgcga ctcaagatgg attgactaaa      360
gggtcaagatt acctctttat tggaactttc caagatagct tccaaggaaa aattatctca      420
aactatgttt ctgaaaaatt aaatgctaag aaagttgttc ttacactga caatgccagt      480
gactatgcta aagggattgc aaaatctttc cgcgagtcac acaaggggtga aatcgttgca      540
gatgaaactt tcgtagcagg tgacacagac ttccaagcag cccttacaaa aatgaaaggg      600
aaagactttg atgctatcgt tgttcctggt tactataatg aggctggtaa aattgtaaac      660
caagcgcgtg gcatgggaat tgacaaacca atcgttggtg gtgatggatt caacgggtgag      720
gagtttgtac aacaagcaac tgctgaaaaa gcatcaaaca tctactttat ctcaggcttc      780
tcaactactg tagaagtttc agctaaagct aaagccttcc ttgacgctta ccgtgctaag      840
tacaatgaag agccttcaac atttgcagcc ttggcttatg attcagttca ccttgtagca      900
aacgcagcaa aaggtgctaa aaattcaggt gaaatcaaga ataaccttgc taaaacaaaa      960
gattttgaag gtgtaactgg tcaaacaagc ttcgatgcag accacaacac agtcaaaact     1020
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<210> 12

<211> 405

<212> DNA

<213> Artificial Sequence

<220>

<223> Construct 4: SP2027 nt

<400> 12

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ggaaaagggtg tcttaaaact cgataatgga acgattgttt atgatggcag tcttgtccgc      180
ggtaaaatga atggccaagg taccattacc ttccaaaatg gagaccaata tacagggtggc      240
ttcaacaatg gagccttcaa cggaaaagggt acctttcaat ctaaagaagg ctggacctac      300
gaaggtgatt ttgtaaatgg tcaggctgaa ggaaaaggga aactaacaac agaacaagaa      360
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gtcgttttatg aaggaacttt taaacaaggc gtttttcaac aaaaa 405

<210> 13  
<211> 2427  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> Construct 5: SP2194 nt

<400> 13  
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gtagcagggg caactttaaa tgattatccg tatgagatgg accgtttaga agaggtggct 180  
ttggaactga ctgaaacgga ctatagccag gatgaaacct ttacggaatt gccgttctcc 240  
cgtcgtttgc aggttctttt tgatgaagca gagtatgtag cgtcagtggc ccatgctaag 300  
gtactaggga cagagcacgt cctctatgcg attttgc atagcaatgc cttggcgact 360  
cgtatcttgg agagggctgg tttttcttat gaagacaaga aagatcaggt caagattgct 420  
gctcttcgtc gaaatttaga agaacgggca ggctggactc gtgaagatct caaggcttta 480  
cgccaacgcc atcgtacagt agctgacaag caaaattcta tggccaatat gatgggcatg 540  
ccgcagactc ctagtgggtg tctcgaggat tatacgcatg atttgacaga gcaagcgcgt 600  
tctggcaagt tagaaccagt catcggtcgg gacaaggaaa tctcacgtat gattcaaate 660  
ttgagccgga agactaagaa caaccctgtc ttgggtgggg atgctgggtg cgggaaaaca 720  
gctctggcgc ttgggtcttc ccagcgtatt gctagtgggt acgtgcctgc ggaaatggct 780  
aagatgcgcg tgttagaact tgatttgatg aatgtcggtg cagggacacg cttccgtggg 840  
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gctaaagtga cgattgaaga accaagtgtg gcagatagta tgactatattt acaagggttg 1140  
aaggcgactt atgagaaaca tcaccgtgta caaatcacag atgaagcggg tgaaacagcg 1200  
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gatttgagtc cagctgacaa ggccctgatg gatggcaagt ggaaacaggc agcccagcta 1380  
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accaccttga gtcgcttgtc aggaatccca gttcaaaaac tgactcaaac ggatgctaag	1500
aagtatttaa atcttgaagc agaactccat aaacgggtta tcggtcaaga tcaagctggt	1560
tcaagcatta gccgtgccat tcgccgcaac cagtcaggga ttcgcagtca taagcgccg	1620
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gaagggtggg agttgacaga gaagggtcgc aataaacctt attccgttct cctctttgat	1860
gaggtagaga agggccaccc agatatcttt aatgttctct tgcaggttct ggatgacggt	1920
gtcttgacag atagcaaggg acgcaaggtc gattttttcaa ataccattat cattatgaca	1980
tcgaatctag gtgcgactgc ccttcgtgat gataagactg ttggtttttg ggctaaggat	2040
attcgttttg accaggaaaa tatggaaaaa cgcattgttg aagaactgaa aaaagcttat	2100
agaccggaat tcatcaaccg tattgatgag aagggtgtct tccatagcct atctagtgat	2160
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ggcattgact tgaaattaca agcttcagct ctgaaattgt tagcaaatca aggatatgac	2280
ccagagatgg gagctcgccc acttcgcaga accctgcaaa cagaagtgga ggacaagttg	2340
gcagaacttc ttctcaaggg agatttagtg gcaggcagca cacttaagat tgggtgtcaaa	2400
gcaggccagt taaaatttga tattgca	2427

<210> 14

<211> 753

<212> DNA

<213> Artificial Sequence

<220>

<223> Construct 6: SP2216-1 nt

<400> 14

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caacaagaag cccaaaaaca agttgaccaa attcaggagc aagtatcagc tattcaagct	120
gagcagtcta acttgcaagc tgaaaatgat agattacaag cagaatctaa gaaactcgag	180
ggtgagatta cagaactttc taaaaacatt gtttctcgta accaatcggt ggaaaaacaa	240
gctcgtagtg ctcaaacaaa tggagccgta actagctata tcaataccat tgtaaactca	300
aaatcaatta cagaagctat ttcacgtgtt gctgcaatga gtgaaatcgt atctgcaaac	360
aacaaaatgt tagaacaaca aaaggcagat aaaaaagcta tttctgaaaa acaagtagca	420
aataatgatg ctatcaatac tgtaattgct aatcaacaaa aattggctga tgatgctcaa	480
gcattgacta cgaaacaggc agaactaaaa gctgctgaat taagtcttgc tgctgagaaa	540



gcgacagctg aaggggaaaa agcaagtcta ttagagcaaa aagcagcagc tgaggcagag	600
gctcgtgcag ctgcggtagc agaagcagct tataaagaaa aacgagctag ccaacaacaa	660
tcagtacttg cttcagcaaa cactaactta acagctcaag tgcaagcagt atctgaatct	720
gcagcagcac ctgtccgtgc aaaagttcgt cca	753

<210> 15  
 <211> 945  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Construct 7: SP1732-3 nt

<400> 15	
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agaactcctg caaccattgc cattccagat gtggcaggtc agacagttgc agaggccaag	120
gcaacgctca aaaaagccaa ttttgagatt ggtgaggaga agacagaggc tagtgaaaag	180
gtggaagaag ggcggtattat ccgtacagat cctggcgctg gaactggtcg aaaagaagga	240
acgaaaatca atttggttgt ctcatcaggc aaacaatcct tccaaattag taattatgtc	300
ggccggaaat cttctgatgt tatcgcgga ttaaaagaga aaaaagttcc agataatttg	360
attaaaattg aggaagaaga gtcgaatgag agtgaggctg gaacggtcct gaagcaaagt	420
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aaaaaagcta cgacgattca attagggaac tatattggac ggaactctac agaagtaatc	540
tcagaactca agcagaagaa ggttcctgag aatttgatta agatagagga agaagagtcc	600
agcgaaagcg aaccaggaac gattatgaaa caaagtccag gtgccggaac gacttatgat	660
gtgagtaaac ctactcaaat tgtcttgaca gtagctaaaa aagttacaag tgttgccatg	720
ccgagttaca ttggttccag cttggagttt actaagaaca atttgattca aattgttggg	780
attaaggaag ctaatataga agttgtagaa gtgacgacag cgctgcagg tagtgtagaa	840
ggcatggttg ttgaacaaag tcctagagca ggtgaaaagg tagacctaaa taagactaga	900
gtcaagattt caatctacaa acctaaaaca acttcagcta ctct	945

<210> 16  
 <211> 867  
 <212> DNA  
 <213> Artificial Sequence

<220>  
 <223> Construct 8: SP1650 (PsaA) nt

<400> 16

gctagcggaa aaaaagatac aacttctggt caaaaactaa aagttgttgc tacaaactca	60
atcatcgctg atattactaa aaatattgct ggtgacaaaa ttgaccttca tagtatcggt	120
ccgattgggc aagaccacaca cgaatacgaa ccacttcctg aagacgttaa gaaaacttct	180
gaggctgatt tgattttcta taacggtatc aaccttgaaa caggtggcaa tgcttggttt	240
acaaaattgg tagaaaatgc caagaaaact gaaaacaaag actacttcgc agtcagcgac	300
ggcgttgatg ttatctacct tgaagggtcaa aatgaaaaag gaaaagaaga cccacacgct	360
tggcttaacc ttgaaaacgg tattatTTTT gctaaaaata tcgccaaaca attgagcgcc	420
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gacaaacttg ataaagaaag taaggataaa tttaataaga tccttgctga aaagaaactc	540
attgtaacca gcgaaggagc attcaaatac ttctctaaag cctatggtgt cccaagtgcc	600
tacatctggg aaatcaatac tgaagaagaa ggaactcctg aacaaatcaa gaccttggtt	660
gaaaaacttc gccaaacaaa agttccatca ctctttgtag aatcaagtgt ggatgaccgt	720
ccaatgaaaa ctgtttctca agacacaaac atcccaatct acgcacaaat ctttactgac	780
tctatcgag aacaaggtaa agaaggcgac agctactaca gcatgatgaa atacaacctt	840
gacaagattg ctgaaggatt ggcaaaa	867

<210> 17  
 <211> 254  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> Construct 2m: SP0609 aa

<400> 17

Leu	Ile	Ser	Leu	Phe	Gly	Leu	Ala	Ala	Ala	Lys	Pro	Val	Gln	Ala	Asp
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Thr	Ser	Ile	Ala	Asp	Ile	Gln	Lys	Arg	Gly	Glu	Leu	Val	Val	Gly	Val
			20					25					30		

Lys	Gln	Asp	Val	Pro	Asn	Phe	Gly	Tyr	Lys	Asp	Pro	Lys	Thr	Gly	Thr
		35					40					45			

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

Lys	Val	Lys	Ile	Arg	Tyr	Val	Pro	Val	Thr	Ala	Gln	Thr	Arg	Gly	Pro
65						70				75				80	

Leu Leu Asp Asn Glu Gln Val Asp Met Asp Ile Ala Thr Phe Thr Ile  
85 90 95

Thr Asp Glu Arg Lys Lys Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr  
100 105 110

Asp Ala Ser Gly Phe Leu Val Asn Lys Ser Ala Lys Ile Lys Lys Ile  
115 120 125

Glu Asp Leu Asn Gly Lys Thr Ile Gly Val Ala Gln Gly Ser Ile Thr  
130 135 140

Gln Arg Leu Ile Thr Glu Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys  
145 150 155 160

Phe Val Glu Leu Gly Ser Tyr Pro Glu Leu Ile Thr Ser Leu His Ala  
165 170 175

His Arg Ile Asp Thr Phe Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr  
180 185 190

Thr Ser Lys Arg Thr Ala Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp  
195 200 205

Tyr Gly Ile Val Thr Lys Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu  
210 215 220

Asp Asn Leu Val Thr Lys Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu  
225 230 235 240

Tyr Asp Arg Tyr Lys Leu Lys Pro Ser Ser His Thr Ala Asp  
245 250

<210> 18  
<211> 809  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Construct 5m: SP2194 aa

<400> 18

Asn Tyr Ser Lys Ala Leu Asn Glu Cys Ile Glu Ser Ala Tyr Met Val  
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Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu Ile  
20 25 30

Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn Asp  
35 40 45

Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu Thr  
50 55 60

Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe Ser  
65 70 75 80

Arg Arg Leu Gln Val Leu Phe Asp Glu Ala Glu Tyr Val Ala Ser Val  
85 90 95

Val His Ala Lys Val Leu Gly Thr Glu His Val Leu Tyr Ala Ile Leu  
100 105 110

His Asp Ser Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly Phe  
115 120 125

Ser Tyr Glu Asp Lys Lys Asp Gln Val Lys Ile Ala Ala Leu Arg Arg  
130 135 140

Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala Leu  
145 150 155 160

Arg Gln Arg His Arg Thr Val Ala Asp Lys Gln Asn Ser Met Ala Asn  
165 170 175

Met Met Gly Met Pro Gln Thr Pro Ser Gly Gly Leu Glu Asp Tyr Thr  
180 185 190

His Asp Leu Thr Glu Gln Ala Arg Ser Gly Lys Leu Glu Pro Val Ile  
195 200 205

Gly Arg Asp Lys Glu Ile Ser Arg Met Ile Gln Ile Leu Ser Arg Lys  
210 215 220

Thr Lys Asn Asn Pro Val Leu Val Gly Asp Ala Gly Val Gly Lys Thr  
225 230 235 240

Ala Leu Ala Leu Gly Leu Ala Gln Arg Ile Ala Ser Gly Asp Val Pro  
245 250 255

Ala Glu Met Ala Lys Met Arg Val Leu Glu Leu Asp Leu Met Asn Val  
260 265 270

Val Ala Gly Thr Arg Phe Arg Gly Asp Phe Glu Glu Arg Met Asn Asn  
275 280 285

Ile Ile Lys Asp Ile Glu Glu Asp Gly Gln Val Ile Leu Phe Ile Asp  
290 295 300

Glu Leu His Thr Ile Met Gly Ser Gly Ser Gly Ile Asp Ser Thr Leu  
305 310 315 320

Asp Ala Ala Asn Ile Leu Lys Pro Ala Leu Ala Arg Gly Thr Leu Arg  
325 330 335

Thr Val Gly Ala Thr Thr Gln Glu Glu Tyr Gln Lys His Ile Glu Lys  
340 345 350

Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu Pro  
355 360 365

Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr Tyr  
370 375 380

Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr Ala  
385 390 395 400

Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp Ser  
405 410 415

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

Lys His Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys Ala  
435 440 445

Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys Glu  
450 455 460

Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile Leu  
465 470 475 480

Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr Gln  
485 490 495

Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys Arg  
500 505 510

Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile Arg

515

520

525

Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser Phe  
 530 535 540

Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys Ala  
 545 550 555 560

Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe Asp  
 565 570 575

Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly Ala  
 580 585 590

Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu Lys  
 595 600 605

Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu Lys  
 610 615 620

Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp Gly  
 625 630 635 640

Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr Ile  
 645 650 655

Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp Lys  
 660 665 670

Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn Met  
 675 680 685

Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu Phe  
 690 695 700

Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser Asp  
 705 710 715 720

His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala Ser  
 725 730 735

Leu Thr Glu Lys Gly Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu Lys  
 740 745 750

Leu Leu Ala Asn Gln Gly Tyr Asp Pro Glu Met Gly Ala Arg Pro Leu  
 755 760 765

Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu Leu  
770 775 780

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

Ala Gly Gln Leu Lys Phe Asp Ile Ala  
805

<210> 19  
<211> 27  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> ICC5875 primer

<400> 19  
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27

<210> 20  
<211> 24  
<212> DNA  
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<220>  
<223> ICC6198 primer

<400> 20  
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24

<210> 21  
<211> 21  
<212> DNA  
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<220>  
<223> ICC5876 primer

<400> 21  
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21

<210> 22  
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<212> DNA  
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<220>  
<223> ICC5877 primer

<400> 22  
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21

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<223>	ICC5879 primer	
<400>	24	
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<212>	DNA	
<213>	Artificial Sequence	
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<223>	ICC5881 primer	
<400>	26	
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<210>	28	
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35 40 45

Asn Pro Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Glu Ala Ala Ser Ala  
85 90 95

Ala Lys Pro Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser  
100 105 110

Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu  
115 120 125

Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys

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

Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile  
405 410 415

Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly  
420 425 430

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

Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr  
450 455 460

Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe  
465 470 475 480

Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys  
485 490 495

Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val  
500 505 510

Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp  
515 520 525

Phe Val Asp Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser  
530 535 540

Val Ser Gly Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly  
545 550 555 560

Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly  
565 570 575

Asn Ser Leu Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp  
580 585 590

Val Arg Leu Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu  
595 600 605

Arg Val Ala His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe  
610 615 620

Ser Thr Thr Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu  
625 630 635 640

Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu Glu Phe Ala Leu Ser Ser  
645 650 655

Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu  
660 665 670

Gly Ala Val Lys Asp Tyr Gln Phe His Leu Gly Gln Leu Thr Ile Ser  
675 680 685

Asp Asn His Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys  
690 695 700

Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys  
705 710 715 720

Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp  
725 730 735

Ser Trp Lys Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro  
740 745 750

Lys Val Ser Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys  
755 760 765

Val Val Ala Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr  
770 775 780

Thr Phe Asp Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro  
785 790 795 800

Leu Ala Glu Asn Ile Val Pro Gly Ala Thr Val Ile Asp Ser Thr Phe  
805 810 815

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

Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser  
835 840 845

Val Asp Ile Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met  
850 855 860

Asp His Ala Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn  
865 870 875 880

Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys  
885 890 895

Leu Ala Lys Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr  
900 905 910

Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr  
915 920 925

Ser Asp Asn Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys  
930 935 940

Met Tyr Glu Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys  
945 950 955 960

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

Asp Val Pro Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser  
980 985 990

Gln Thr Pro Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala  
995 1000 1005

Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr  
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Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val  
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Ser Val Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu  
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Thr Gly Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp  
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Leu Arg Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu  
1070 1075 1080

Asp Glu Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly  
1085 1090 1095

Phe Asp Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr



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Leu Gly Gln Pro Val Asn	Ala Asn Leu Ser Val Thr	Val Thr Gly		
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Gln Asp Glu Ala Ser Pro	Lys Thr Ile Leu Gly Ile	Glu Val Ser		
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Gln Glu Pro Lys Lys Asp	Tyr Leu Val Gly Asp Asn	Leu Asp Leu		
1145	1150	1155		
Ser Glu Gly Arg Phe Ala	Val Ala Tyr Ser Asn Asp	Thr Met Glu		
1160	1165	1170		
Glu His Ser Phe Thr Asp	Glu Gly Val Glu Ile Ser	Gly Tyr Asp		
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Ala Gln Lys Thr Gly Arg	Gln Thr Leu Thr Leu Arg	Tyr Gln Gly		
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His Glu Val Asn Phe Asp	Val Leu Val Ser Pro Lys	Ala Ala Leu		
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Asn Asp Glu Tyr Leu Lys	Gln Lys Leu Ala Glu Val	Glu Ala Ala		
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Lys Asn Lys Val Val Tyr	Asn Phe Ala Ser Pro Glu	Val Lys Glu		
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Ala Phe Leu Lys Ala Ile	Glu Ala Ala Glu Gln Val	Leu Lys Asp		
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His Glu Thr Ser Thr Gln	Asp Gln Val Asn Asp Arg	Leu Asn Lys		
1265	1270	1275		
Leu Thr Glu Ala His Lys	Ala Leu Asn Gly Gln Glu	Lys Phe Thr		
1280	1285	1290		
Glu Glu Lys Thr Glu Leu	Asp Arg Leu Thr Gly Glu	Ala Gln Glu		
1295	1300	1305		
Leu Leu Ala Ala Lys Pro	Asn His Pro Ser Gly Ser	Ala Leu Ala		
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Pro Leu Leu Glu Lys Asn	Lys Ala Leu Val Glu Lys	Val Asp Leu		
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Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Ser	Ala	Val	Phe	Ser	Asp	Ser
1355						1360					1365			
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1370						1375					1380			
Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu
1385						1390					1395			
Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu
1400						1405					1410			
Gly	Leu	Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser
1415						1420					1425			
Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val
1430						1435					1440			
Phe	Phe	Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu
1445						1450					1455			
Gln	Thr	Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His
1460						1465					1470			
Tyr	Ala	Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys
1475						1480					1485			
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1490						1495					1500			
Ala	Ser	Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu
1505						1510					1515			
Lys	Val	Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Ala	Glu	Met	Leu
1520						1525					1530			
Val	Gly	Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	Arg	Asp	Gly	Leu	Leu
1535						1540					1545			
Arg	His	Val	Phe	Glu	Val	Asp	Glu	Asn	Gly	Gln	Arg	Arg	Leu	Arg
1550						1555					1560			

Ser Thr Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile  
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Gly Thr Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu  
1580 1585 1590

Lys Pro Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys  
1595 1600 1605

Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile  
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Arg Arg Lys Arg Glu Asp Lys Asp  
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Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
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Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
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Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala

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Glu	Val	Gln	Pro	Asp	Val	Pro	Lys	Asn	Thr	Glu	Lys	Thr	Leu	Lys	Pro
				165					170					175	
Lys	Glu	Ile	Lys	Phe	Asn	Ser	Trp	Glu	Glu	Leu	Leu	Lys	Trp	Glu	Pro
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Gly	Ala	Arg	Glu	Asp	Asp	Ala	Ile	Asn	Arg	Gly	Ser	Val	Val	Leu	Ala
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Ser	Arg	Arg	Thr	Gly	His	Leu	Val	Asn	Glu	Lys	Ala	Ser	Lys	Glu	Ala
210						215				220					
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Ser	Val	Gly	Gly	Glu	Glu	Phe	Lys	Ala	Tyr	Ala	Phe	Asp	Tyr	Trp	Gln
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Tyr	Leu	Asp	Ser	Met	Val	Phe	Trp	Glu	Gly	Leu	Val	Pro	Thr	Pro	Asp
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Val	Ile	Asp	Ala	Gly	His	Arg	Asn	Gly	Val	Pro	Val	Tyr	Gly	Thr	Leu
		275					280					285			
Phe	Phe	Asn	Trp	Ser	Asn	Ser	Ile	Ala	Asp	Gln	Glu	Arg	Phe	Ala	Glu
290						295				300					
Ala	Leu	Lys	Gln	Asp	Ala	Asp	Gly	Ser	Phe	Pro	Ile	Ala	Arg	Lys	Leu
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Val	Asp	Met	Ala	Lys	Tyr	Tyr	Gly	Tyr	Asp	Gly	Tyr	Phe	Ile	Asn	Gln
				325					330					335	
Glu	Thr	Thr	Gly	Asp	Leu	Val	Lys	Pro	Leu	Gly	Glu	Lys	Met	Arg	Gln
			340					345					350		
Phe	Met	Leu	Tyr	Ser	Lys	Glu	Tyr	Ala	Ala	Lys	Val	Asn	His	Pro	Ile
		355					360					365			

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

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
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His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Ser Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
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Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
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Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
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Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
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Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
 850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala  
 865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
 885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
 900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
 915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
 930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
 945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
 965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Gln  
 980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
 995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
 1010 1015 1020

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

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Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr	Leu	Gly	
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Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly	Gln	Asp	
1130						1135					1140				
Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser	Gln	Glu	
1145						1150					1155				
Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asn	Leu	Ser	Glu	
1160						1165					1170				
Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	Glu	His	
1175						1180					1185				
Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln	
1190						1195					1200				
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly	His	Glu	
1205						1210					1215				
Phe	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp	
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Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn	
1235						1240					1245				
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu	Ala	Phe	
1250						1255					1260				
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Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr	
1280						1285					1290				
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys	Glu	Glu	
1295						1300					1305				
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu	
1310						1315					1320				



Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
1325						1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
1340						1345					1350			
Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
1355						1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
1370						1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys
1385						1390					1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
1400						1405					1410			
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
1415						1420					1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val
1430						1435					1440			
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe
1445						1450					1455			
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Thr	Phe	Glu	Gln	Thr
1460						1465					1470			
Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	Tyr	Ala
1475						1480					1485			
Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	Pro	Ala
1490						1495					1500			
Pro	Gln	Asn	Lys	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro	Ala	Ser
1505						1510					1515			
Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu	Lys	Val
1520						1525					1530			
Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Ala	Glu	Met	Leu	Val	Gly
1535						1540					1545			

Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu Arg His  
1550 1555 1560

Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg Ser Thr  
1565 1570 1575

Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile Gly Thr  
1580 1585 1590

Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu Lys Pro  
1595 1600 1605

Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys Gln Leu  
1610 1615 1620

Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile Ala Gly  
1625 1630 1635

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1640 1645 1650

Lys Arg Glu Asp Lys Asp  
1655

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<212> PRT  
<213> Streptococcus pneumoniae Pj-102-70

<400> 47

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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
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Gly Pro Ala Leu Ala Glu Glu Thr Ala Val Pro Glu Asn Ser Gly Ala  
35 40 45

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn

85

90

95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
 100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
 115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
 130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys Thr Glu Lys  
 145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
 165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
 180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
 195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
 210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
 225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
 245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
 260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
 275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
 290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
 305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
 325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Ser Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala  
865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Gln  
980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
1010 1015 1020

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

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Pro	Lys	Lys	Thr	Ser	Tyr	Ala	Glu	Gly	Glu	Asp	Leu	Asp	Leu	Arg
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Gly	Gly	Val	Leu	Arg	Val	Gln	Tyr	Glu	Gly	Gly	Thr	Glu	Asp	Glu
1085						1090					1095			
Leu	Ile	Arg	Leu	Thr	His	Ala	Gly	Val	Ser	Val	Ser	Gly	Phe	Asp
1100						1105					1110			
Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr	Leu	Gly
1115						1120					1125			
Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly	Gln	Asp
1130						1135					1140			
Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser	Gln	Glu
1145						1150					1155			
Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asn	Leu	Ser	Glu
1160						1165					1170			
Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	Glu	His
1175						1180					1185			
Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln
1190						1195					1200			
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly	His	Glu
1205						1210					1215			
Phe	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
1220						1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
1235						1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu	Ala	Phe
1250						1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
1265						1270					1275			
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
1280						1285					1290			

Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys	Glu	Glu
1295						1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu
1310						1315					1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
1325						1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
1340						1345					1350			
Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
1355						1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
1370						1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys
1385						1390					1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
1400						1405					1410			
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
1415						1420					1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val
1430						1435					1440			
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe
1445						1450					1455			
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Thr	Phe	Glu	Gln	Thr
1460						1465					1470			
Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	Tyr	Ala
1475						1480					1485			
Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	Pro	Ala
1490						1495					1500			
Pro	Gln	Asn	Lys	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro	Ala	Ser
1505						1510					1515			



Asp Gln Gln Lys Ala Pro Lys Leu Glu Val Gln Glu Glu Lys Val  
1520 1525 1530

Ala Phe His Arg Gln Glu His Glu Asn Ala Glu Met Leu Val Gly  
1535 1540 1545

Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu Arg His  
1550 1555 1560

Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg Ser Thr  
1565 1570 1575

Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile Gly Thr  
1580 1585 1590

Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu Lys Pro  
1595 1600 1605

Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys Gln Leu  
1610 1615 1620

Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile Ala Gly  
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Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu Arg Arg  
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Lys Arg Glu Asp Lys Asp  
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<400> 48

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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
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Gly Pro Ala Leu Ala Glu Glu Thr Ala Val Pro Glu Asn Ser Gly Ala  
35 40 45

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Ile Asn Glu Ala

50

55

60

Asp Lys Gln Asn Glu Gly Glu His Thr Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Glu Ala Ala Ser Ala  
85 90 95

Ala Lys Pro Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser  
100 105 110

Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu  
115 120 125

Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys  
130 135 140

Thr Glu Lys Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr  
145 150 155 160

Leu Lys Pro Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys  
165 170 175

Trp Glu Pro Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val  
180 185 190

Val Leu Ala Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser  
195 200 205

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

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

Tyr Trp Gln Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro  
245 250 255

Thr Pro Asp Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr  
260 265 270

Gly Thr Leu Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg  
275 280 285

Phe Ala Glu Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala  
290 295 300

Arg Lys Leu Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe  
305 310 315 320

Ile Asn Gln Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys  
325 330 335

Met Arg Gln Phe Met Leu Tyr Ser Lys Ala Tyr Ala Ala Lys Val Asn  
340 345 350

His Pro Ile Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly  
355 360 365

Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln  
370 375 380

Pro Glu Gly Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn  
385 390 395 400

Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile  
405 410 415

Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly  
420 425 430

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

Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr  
450 455 460

Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe  
465 470 475 480

Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys  
485 490 495

Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val  
500 505 510

Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp  
515 520 525

Phe Val Asp Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser  
530 535 540

Val Ser Gly Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly  
545 550 555 560

Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly  
565 570 575

Asn Ser Leu Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp  
580 585 590

Val Arg Leu Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu  
595 600 605

Arg Val Ala His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe  
610 615 620

Ser Thr Thr Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu  
625 630 635 640

Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser  
645 650 655

Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu  
660 665 670

Gly Ala Val Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser  
675 680 685

Asp Asn His Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys  
690 695 700

Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys  
705 710 715 720

Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp  
725 730 735

Ser Trp Lys Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro  
740 745 750

Lys Val Ser Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys  
755 760 765

Val Val Ala Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr  
770 775 780

Thr Phe Asp Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro  
785 790 795 800

Leu Ala Glu Asn Ile Val Pro Gly Ala Thr Val Ile Asp Ser Thr Phe  
805 810 815

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

Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser  
835 840 845

Val Asp Ile Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met  
850 855 860

Asp His Ala Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn  
865 870 875 880

Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys  
885 890 895

Leu Ala Lys Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr  
900 905 910

Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr  
915 920 925

Ser Asp Asn Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys  
930 935 940

Met Tyr Glu Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys  
945 950 955 960

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

Asp Val Pro Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser  
980 985 990

Gln Thr Pro Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala  
995 1000 1005

Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr  
1010 1015 1020

Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val

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Ser	Val	Pro	Lys	Asp	Asp	Arg	Arg	Ile	Lys	Ser	Val	Ser	Leu	Glu	
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Thr	Gly	Pro	Lys	Lys	Thr	Ser	Tyr	Ala	Glu	Gly	Glu	Asp	Leu	Asp	
	1055					1060					1065				
Leu	Arg	Gly	Gly	Val	Leu	Arg	Val	Gln	Tyr	Glu	Gly	Gly	Thr	Glu	
	1070					1075					1080				
Asp	Glu	Leu	Ile	Arg	Leu	Thr	His	Ala	Gly	Val	Ser	Val	Ser	Gly	
	1085					1090					1095				
Phe	Asp	Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr	
	1100					1105					1110				
Leu	Gly	Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly	
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Gln	Asp	Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser	
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Gln	Glu	Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu	
	1145					1150					1155				
Ser	Glu	Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	
	1160					1165					1170				
Glu	His	Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	
	1175					1180					1185				
Ala	Gln	Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly	
	1190					1195					1200				
His	Glu	Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	
	1205					1210					1215				
Asn	Asp	Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	
	1220					1225					1230				
Lys	Asn	Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu	
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Ala	Phe	Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	
	1250					1255					1260				

His	Glu	Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys
1265						1270					1275			
Leu	Thr	Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr
1280						1285					1290			
Glu	Glu	Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Ala	Gln	Glu
1295						1300					1305			
Leu	Leu	Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala
1310						1315					1320			
Pro	Leu	Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu
1325						1330					1335			
Ser	Pro	Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu
1340						1345					1350			
Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Ser	Ala	Val	Phe	Ser	Asp	Ser
1355						1360					1365			
Lys	Thr	Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val
1370						1375					1380			
Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu
1385						1390					1395			
Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu
1400						1405					1410			
Gly	Leu	Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser
1415						1420					1425			
Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val
1430						1435					1440			
Phe	Phe	Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu
1445						1450					1455			
Gln	Thr	Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His
1460						1465					1470			
Tyr	Ala	Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys
1475						1480					1485			

Pro Ala Pro Gln Asn Lys Val Leu Pro Lys Pro Thr Tyr Gln Pro  
1490 1495 1500

Ala Ser Asp Gln Gln Lys Ala Pro Lys Leu Glu Val Gln Glu Glu  
1505 1510 1515

Lys Val Ala Phe His Arg Gln Glu His Glu Asn Ala Glu Met Leu  
1520 1525 1530

Val Gly Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu  
1535 1540 1545

Arg His Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg  
1550 1555 1560

Ser Thr Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile  
1565 1570 1575

Gly Thr Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu  
1580 1585 1590

Lys Pro Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys  
1595 1600 1605

Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile  
1610 1615 1620

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1625 1630 1635

Arg Arg Lys Arg Glu Asp Lys Asp  
1640 1645

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<213> Streptococcus pneumoniae Pj-102-93

<400> 49

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Gly Pro Ala Leu Ala Glu Glu Thr Ala Val Pro Glu Asn Ser Gly Ala



35

40

45

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Thr Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Glu Ala Ala Ser Ala  
85 90 95

Ala Lys Pro Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser  
100 105 110

Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu  
115 120 125

Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys  
130 135 140

Thr Glu Lys Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr  
145 150 155 160

Leu Lys Pro Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys  
165 170 175

Trp Glu Pro Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val  
180 185 190

Val Leu Ala Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser  
195 200 205

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

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

Tyr Trp Gln Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro  
245 250 255

Thr Pro Asp Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr  
260 265 270

Gly Thr Leu Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg  
275 280 285

Phe Ala Glu Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala  
290 295 300

Arg Lys Leu Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe  
305 310 315 320

Ile Asn Gln Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys  
325 330 335

Met Arg Gln Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn  
340 345 350

His Pro Ile Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly  
355 360 365

Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln  
370 375 380

Pro Glu Gly Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn  
385 390 395 400

Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile  
405 410 415

Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly  
420 425 430

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

Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr  
450 455 460

Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe  
465 470 475 480

Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys  
485 490 495

Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val  
500 505 510

Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp  
515 520 525

Phe Val Asp Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser  
530 535 540

Val Ser Gly Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly  
545 550 555 560

Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly  
565 570 575

Asn Ser Leu Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp  
580 585 590

Val Arg Leu Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu  
595 600 605

Arg Val Ala His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe  
610 615 620

Ser Thr Thr Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu  
625 630 635 640

Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser  
645 650 655

Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu  
660 665 670

Gly Ala Val Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser  
675 680 685

Asp Asn His Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys  
690 695 700

Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys  
705 710 715 720

Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp  
725 730 735

Ser Trp Lys Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro  
740 745 750

Lys Val Ser Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys  
755 760 765

Val Val Ala Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr  
770 775 780

Thr Phe Asp Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro  
785 790 795 800

Leu Ala Glu Asn Ile Val Pro Gly Ala Thr Val Ile Asp Ser Thr Phe  
805 810 815

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

Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser  
835 840 845

Val Asp Ile Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met  
850 855 860

Asp His Ala Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn  
865 870 875 880

Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys  
885 890 895

Leu Ala Lys Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr  
900 905 910

Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr  
915 920 925

Ser Asp Asn Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys  
930 935 940

Met Tyr Glu Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys  
945 950 955 960

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

Asp Val Pro Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser  
980 985 990

Gln Thr Pro Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala  
995 1000 1005

Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr

1010		1015		1020
Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val				
1025		1030		1035
Ser Val Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu				
1040		1045		1050
Thr Gly Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp				
1055		1060		1065
Leu Arg Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu				
1070		1075		1080
Asp Glu Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly				
1085		1090		1095
Phe Asp Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr				
1100		1105		1110
Leu Gly Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly				
1115		1120		1125
Gln Asp Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile Glu Val Ser				
1130		1135		1140
Gln Glu Pro Lys Lys Asp Tyr Leu Val Gly Asp Ser Leu Asp Leu				
1145		1150		1155
Ser Glu Gly Arg Phe Ala Val Ala Tyr Ser Asn Asp Thr Met Glu				
1160		1165		1170
Glu His Ser Phe Thr Asp Glu Gly Val Glu Ile Ser Gly Tyr Asp				
1175		1180		1185
Ala Gln Lys Thr Gly Arg Gln Thr Leu Thr Leu Arg Tyr Gln Gly				
1190		1195		1200
His Glu Val Asn Phe Asp Val Leu Val Ser Pro Lys Ala Ala Leu				
1205		1210		1215
Asn Asp Glu Tyr Leu Lys Gln Lys Leu Ala Glu Val Glu Ala Ala				
1220		1225		1230
Lys Asn Lys Val Val Tyr Asn Phe Ala Ser Pro Glu Val Lys Glu				
1235		1240		1245

Ala	Phe	Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp
1250						1255					1260			
His	Glu	Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys
1265						1270					1275			
Leu	Thr	Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr
1280						1285					1290			
Glu	Glu	Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu
1295						1300					1305			
Leu	Leu	Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala
1310						1315					1320			
Pro	Leu	Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu
1325						1330					1335			
Ser	Pro	Glu	Glu	Leu	Thr	Thr	Thr	Lys	Gln	Ser	Leu	Lys	Asp	Leu
1340						1345					1350			
Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser
1355						1360					1365			
Lys	Thr	Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val
1370						1375					1380			
Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu
1385						1390					1395			
Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu
1400						1405					1410			
Gly	Leu	Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser
1415						1420					1425			
Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val
1430						1435					1440			
Phe	Phe	Leu	Pro	Glu	Gly	Lys	Gly	Ala	Val	Glu	Leu	Ala	Phe	Glu
1445						1450					1455			
Gln	Thr	Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His
1460						1465					1470			

Tyr Ala Phe Val Tyr Glu Ser Ala Glu Lys Pro Gln Pro Ala Lys  
1475 1480 1485

Pro Ala Pro Gln Asn Lys Val Leu Pro Lys Pro Thr Tyr Gln Pro  
1490 1495 1500

Ala Ser Asp Gln Gln Lys Ala Pro Lys Leu Glu Val Gln Glu Glu  
1505 1510 1515

Lys Val Ala Phe His Arg Gln Glu His Glu Asn Thr Glu Met Leu  
1520 1525 1530

Val Gly Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu  
1535 1540 1545

Arg His Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg  
1550 1555 1560

Ser Thr Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile  
1565 1570 1575

Gly Thr Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu  
1580 1585 1590

Lys Pro Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys  
1595 1600 1605

Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile  
1610 1615 1620

Ala Gly Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu  
1625 1630 1635

Arg Arg Lys Arg Glu Asp Lys Asp  
1640 1645

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<212> PRT  
<213> Streptococcus pneumoniae Pj-102-94

<400> 50

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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala

20

25

30

Gly Pro Ala Leu Ala Glu Glu Thr Ala Val Pro Glu Asn Ser Arg Ala  
 35 40 45

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
 50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
 65 70 75 80

Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
 85 90 95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
 100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
 115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
 130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Glu Glu Ala Asn Lys Thr Glu Lys  
 145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
 165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
 180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
 195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
 210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
 225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
 245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
 260 265 270



Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
 755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
 770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
 785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
 805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
 835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
 850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala  
 865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
 885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
 900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
 915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
 930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
 945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
 965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
 980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro

995					1000					1005				
Leu	Ala	Thr	Leu	Lys	Ser	Glu	Val	Gly	Gly	Asp	Leu	Ala	Ser	Ala
1010						1015					1020			
Pro	Leu	Asp	Leu	Thr	Asn	Gln	Ser	Gly	Leu	Leu	Tyr	Tyr	Arg	Thr
1025						1030					1035			
Gln	Leu	Pro	Gly	Lys	Glu	Ile	Ser	Asn	Val	Leu	Ala	Val	Ser	Val
1040						1045					1050			
Pro	Lys	Asp	Asp	Arg	Arg	Ile	Lys	Ser	Val	Ser	Leu	Glu	Thr	Gly
1055						1060					1065			
Pro	Lys	Lys	Thr	Ser	Tyr	Ala	Glu	Gly	Glu	Asp	Leu	Asp	Leu	Arg
1070						1075					1080			
Gly	Gly	Val	Leu	Arg	Val	Gln	Tyr	Glu	Gly	Gly	Thr	Glu	Asp	Glu
1085						1090					1095			
Leu	Ile	Arg	Leu	Thr	His	Ala	Gly	Val	Ser	Val	Ser	Gly	Phe	Asp
1100						1105					1110			
Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr	Leu	Gly
1115						1120					1125			
Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly	Gln	Asp
1130						1135					1140			
Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser	Gln	Glu
1145						1150					1155			
Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu	Ser	Glu
1160						1165					1170			
Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	Glu	His
1175						1180					1185			
Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln
1190						1195					1200			
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly	His	Glu
1205						1210					1215			
Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
1220						1225					1230			

Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
1235						1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu	Ala	Phe
1250						1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
1265						1270					1275			
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
1280						1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys	Glu	Glu
1295						1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu
1310						1315					1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
1325						1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
1340						1345					1350			
Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
1355						1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Ser	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
1370						1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys
1385						1390					1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
1400						1405					1410			
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
1415						1420					1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val
1430						1435					1440			
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe
1445						1450					1455			

Leu Pro Glu Gly Lys Glu Ala Val Glu Leu Ala Phe Glu Gln Thr  
1460 1465 1470

Asp Ser His Val Ile Phe Thr Ala Pro His Phe Thr His Tyr Ala  
1475 1480 1485

Phe Val Tyr Glu Ser Ala Glu Lys Pro Gln Pro Ala Lys Pro Ala  
1490 1495 1500

Pro Gln Asn Thr Val Leu Pro Lys Pro Thr Tyr Gln Pro Ala Ser  
1505 1510 1515

Asp Gln Gln Lys Ala Pro Lys Leu Glu Val Gln Glu Glu Lys Val  
1520 1525 1530

Ala Phe His Arg Gln Glu His Glu Asn Ala Glu Met Leu Val Gly  
1535 1540 1545

Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu Arg His  
1550 1555 1560

Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg Ser Thr  
1565 1570 1575

Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile Gly Thr  
1580 1585 1590

Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu Lys Pro  
1595 1600 1605

Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys Gln Leu  
1610 1615 1620

Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile Ala Gly  
1625 1630 1635

Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu Arg Arg  
1640 1645 1650

Lys Arg Glu Asp Lys Asp  
1655

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<213> Streptococcus pneumoniae Pj-102-98

<400> 51

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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
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Gly Pro Ala Leu Ala Glu Glu Thr Ala Val Pro Glu Asn Ser Gly Ala  
35 40 45

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
85 90 95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys Thr Glu Lys  
145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480



Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Lys Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala  
865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala

965

970

975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
 980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
 995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
 1010 1015 1020

Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr  
 1025 1030 1035

Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val  
 1040 1045 1050

Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu Thr Gly  
 1055 1060 1065

Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp Leu Arg  
 1070 1075 1080

Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu Asp Glu  
 1085 1090 1095

Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly Phe Asp  
 1100 1105 1110

Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr Leu Gly  
 1115 1120 1125

Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly Gln Asp  
 1130 1135 1140

Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile Glu Val Ser Gln Glu  
 1145 1150 1155

Pro Lys Lys Asp Tyr Leu Val Gly Asp Ser Leu Asp Leu Ser Glu  
 1160 1165 1170

Gly Arg Phe Ala Val Ala Tyr Ser Asn Asp Thr Met Glu Glu His  
 1175 1180 1185

Ser Phe Thr Asp Glu Gly Val Glu Ile Ser Gly Tyr Asp Ala Gln  
 1190 1195 1200

Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	His	Tyr	Gln	Gly	His	Glu
1205						1210					1215			
Val	Ser	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
1220						1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
1235						1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Ser	Glu	Val	Lys	Glu	Ala	Phe
1250						1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
1265						1270					1275			
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
1280						1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys	Glu	Glu
1295						1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu
1310						1315					1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
1325						1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
1340						1345					1350			
Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
1355						1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
1370						1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys
1385						1390					1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
1400						1405					1410			
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
1415						1420					1425			

Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val
1430						1435					1440			
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe
1445						1450					1455			
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu	Gln	Thr
1460						1465					1470			
Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	Tyr	Ala
1475						1480					1485			
Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	Pro	Ala
1490						1495					1500			
Pro	Gln	Asn	Lys	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro	Ala	Ser
1505						1510					1515			
Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu	Lys	Val
1520						1525					1530			
Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Ala	Glu	Met	Leu	Val	Gly
1535						1540					1545			
Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	Arg	Asp	Gly	Leu	Leu	Arg	His
1550						1555					1560			
Val	Phe	Glu	Val	Asp	Glu	Asn	Gly	Gln	Arg	Arg	Leu	Arg	Ser	Thr
1565						1570					1575			
Glu	Val	Ile	Gln	Glu	Ala	Ile	Pro	Glu	Ile	Val	Glu	Ile	Gly	Thr
1580						1585					1590			
Lys	Val	Lys	Thr	Val	Pro	Ala	Val	Val	Ala	Thr	Gln	Glu	Lys	Pro
1595						1600					1605			
Ala	Gln	Asn	Thr	Ala	Val	Lys	Ser	Glu	Glu	Ala	Ser	Lys	Gln	Leu
1610						1615					1620			
Pro	Asn	Thr	Gly	Thr	Ala	Asp	Ala	Asn	Glu	Ala	Leu	Ile	Ala	Gly
1625						1630					1635			
Leu	Ala	Ser	Leu	Gly	Leu	Ala	Ser	Leu	Ala	Leu	Thr	Leu	Arg	Arg
1640						1645					1650			

Lys Arg Glu Asp Lys Asp  
1655

<210> 52  
<211> 1659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-148

<400> 52

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
85 90 95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Glu Glu Ala Asn Lys Thr Glu Lys  
145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
180 185 190

Gly Val Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
210 215 220

Lys Val Gln Thr Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val  
675 680 685



Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala  
865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn

930

935

940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
 945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
 965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
 980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Ile Pro  
 995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
 1010 1015 1020

Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr  
 1025 1030 1035

Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val  
 1040 1045 1050

Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu Thr Gly  
 1055 1060 1065

Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp Leu Arg  
 1070 1075 1080

Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu Asp Glu  
 1085 1090 1095

Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly Phe Asp  
 1100 1105 1110

Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr Leu Gly  
 1115 1120 1125

Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly Gln Asp  
 1130 1135 1140

Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile Glu Val Ser Gln Glu  
 1145 1150 1155

Pro Lys Lys Asn Tyr Leu Val Gly Asp Ser Leu Asp Leu Ser Glu  
 1160 1165 1170

Gly	Cys	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	Glu	His
1175						1180					1185			
Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln
1190						1195					1200			
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly	His	Glu
1205						1210					1215			
Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
1220						1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
1235						1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu	Ala	Phe
1250						1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
1265						1270					1275			
Ile	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
1280						1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys	Glu	Glu
1295						1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu
1310						1315					1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
1325						1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
1340						1345					1350			
Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
1355						1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
1370						1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys
1385						1390					1395			

Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
1400						1405					1410			
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
1415						1420					1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val
1430						1435					1440			
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe
1445						1450					1455			
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu	Gln	Thr
1460						1465					1470			
Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	Tyr	Ala
1475						1480					1485			
Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	Pro	Ala
1490						1495					1500			
Pro	Gln	Asn	Thr	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro	Ala	Ser
1505						1510					1515			
Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu	Lys	Val
1520						1525					1530			
Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Ala	Glu	Met	Leu	Val	Gly
1535						1540					1545			
Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	Arg	Asp	Gly	Leu	Leu	Arg	His
1550						1555					1560			
Val	Phe	Glu	Val	Asp	Glu	Asn	Gly	Gln	Arg	Arg	Leu	Arg	Ser	Thr
1565						1570					1575			
Glu	Val	Ile	Gln	Glu	Ala	Ile	Pro	Glu	Ile	Val	Glu	Ile	Gly	Thr
1580						1585					1590			
Lys	Val	Lys	Thr	Val	Pro	Ala	Val	Val	Ala	Ile	Gln	Glu	Lys	Pro
1595						1600					1605			
Ala	Gln	Asn	Thr	Ala	Val	Lys	Ser	Glu	Glu	Ala	Ser	Lys	Gln	Leu
1610						1615					1620			

Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile Ala Gly  
1625 1630 1635

Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu Arg Arg  
1640 1645 1650

Lys Arg Glu Asp Lys Asp  
1655

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<211> 1634  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-160

<400> 53

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Thr Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Glu Ala Ala Ser Ala  
85 90 95

Ala Lys Pro Glu Glu Lys Ala Ser Glu Ala Val Ala Glu Thr Pro Ser  
100 105 110

Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu  
115 120 125

Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys  
130 135 140

Thr Glu Lys Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr  
145 150 155 160

Leu Lys Pro Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys  
165 170 175

Trp Glu Pro Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val  
180 185 190

Val Leu Ala Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser  
195 200 205

Lys Glu Ala Lys Asp His Ala Ser Val Gly Gly Glu Glu Phe Lys Ala  
210 215 220

Tyr Ala Phe Asp Tyr Trp Gln Tyr Leu Asp Ser Met Val Phe Trp Glu  
225 230 235 240

Gly Leu Val Pro Thr Pro Asp Val Ile Asp Ala Gly His Arg Asn Gly  
245 250 255

Val Pro Val Tyr Gly Thr Leu Phe Phe Asn Trp Ser Asn Ser Ile Ala  
260 265 270

Asp Gln Glu Arg Phe Ala Glu Ala Leu Lys Gln Asp Ala Asp Gly Ser  
275 280 285

Phe Pro Ile Ala Arg Lys Leu Val Asp Met Ala Lys Tyr Tyr Gly Tyr  
290 295 300

Asp Gly Tyr Phe Ile Asn Gln Glu Thr Thr Gly Asp Leu Val Lys Pro  
305 310 315 320

Leu Gly Glu Lys Met Arg Gln Phe Met Leu Tyr Ser Lys Glu Tyr Ala  
325 330 335

Ala Lys Val Asn His Pro Ile Lys Tyr Ser Trp Tyr Asp Ala Met Thr  
340 345 350

Tyr Asn Tyr Gly Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr Asn Tyr  
355 360 365

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

Ala Asn Phe Asn Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile Ala Thr  
385 390 395 400

Ala Asn Trp Ile Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly Leu Glu  
405 410 415

Leu Gln Gln Gly Gly Ser Tyr Lys Thr Lys Val Lys Trp Asn Asp Ile  
420 425 430

Leu Asp Glu Asn Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro  
435 440 445

Asp Thr Ile Thr Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn  
450 455 460

Glu Asp Ile Phe Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys  
465 470 475 480

Pro Gly Asp Lys Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg  
485 490 495

Thr Pro Ala Val Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His  
500 505 510

Gly Lys Lys Trp Phe Val Asp Gly Lys Val Ser Lys Asp Ser Glu Trp  
515 520 525

Asn Tyr Arg Ser Val Ser Gly Val Leu Pro Thr Trp Arg Trp Trp Gln  
530 535 540

Thr Ser Thr Gly Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr Asp Ala  
545 550 555 560

Tyr Asn Gly Gly Asn Ser Leu Lys Phe Ser Gly Asp Val Ala Gly Lys  
565 570 575

Thr Val Gln Asp Val Arg Leu Tyr Ser Thr Lys Leu Glu Val Thr Glu  
580 585 590

Lys Thr Lys Leu Arg Val Ala His Lys Gly Gly Lys Gly Ser Lys Val  
595 600 605

Tyr Met Ala Phe Ser Thr Thr Ser Asp Tyr Lys Phe Asp Asp Ala Asp  
610 615 620

Ala Trp Lys Glu Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu Glu Phe  
625 630 635 640

Asp Leu Ser Ser Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys Leu Phe  
645 650 655

Phe Glu His Glu Gly Ala Val Lys Asp Tyr Gln Phe Asn Leu Gly Gln  
660 665 670

Leu Thr Ile Ser Asp Asn His Gln Glu Pro Gln Ser Pro Thr Ser Phe  
675 680 685

Ser Val Val Lys Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu Ala Val  
690 695 700

Val Gln Phe Lys Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val Tyr Glu  
705 710 715 720

Lys Asp Gly Asp Ser Trp Lys Leu Leu Thr Gly Ser Ser Ser Thr Thr  
725 730 735

Ile Tyr Leu Pro Lys Val Ser Arg Ser Ala Ser Ala Gln Gly Thr Thr  
740 745 750

Gln Glu Leu Lys Val Val Ala Val Gly Lys Asn Gly Val Arg Ser Glu  
755 760 765

Ala Ala Thr Thr Thr Phe Asp Trp Gly Met Thr Val Lys Asp Thr Ser  
770 775 780

Leu Pro Lys Pro Leu Ala Glu Asn Ile Val Pro Gly Ala Thr Val Ile  
785 790 795 800

Asp Ser Thr Phe Pro Lys Thr Glu Gly Gly Glu Gly Ile Glu Gly Met  
805 810 815

Leu Asn Gly Thr Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser Ala Gln  
820 825 830

Leu Ser Gly Ser Val Asp Ile Arg Leu Thr Lys Pro Arg Thr Val Val  
835 840 845

Arg Trp Val Met Asp His Ala Gly Ala Gly Gly Glu Ser Val Asn Asp  
850 855 860

Gly Leu Met Asn Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp Ala Asp  
865 870 875 880

Gly Glu Trp Lys Leu Ala Lys Glu Val Arg Gly Asn Lys Ala His Val  
885 890 895

Thr Asp Ile Thr Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp Arg Leu



900

905

910

Asn Val Val Thr Ser Asp Asn Gly Thr Pro Trp Lys Ala Ile Arg Ile  
 915 920 925

Tyr Asn Trp Lys Met Tyr Glu Lys Leu Asp Thr Glu Ser Val Asn Ile  
 930 935 940

Pro Met Ala Lys Ala Ala Ala Arg Ser Leu Gly Asn Asn Lys Val Gln  
 945 950 955 960

Val Gly Phe Ser Asp Val Pro Ala Gly Ala Thr Ile Thr Val Tyr Asp  
 965 970 975

Asn Pro Asn Ser Gln Thr Pro Leu Ala Thr Leu Lys Ser Glu Val Gly  
 980 985 990

Gly Asp Leu Ala Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu  
 995 1000 1005

Leu Tyr Tyr Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser Asn Val  
 1010 1015 1020

Leu Ala Val Ser Val Pro Lys Asp Asp Arg Arg Ile Lys Ser Val  
 1025 1030 1035

Ser Leu Glu Thr Gly Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu  
 1040 1045 1050

Asp Leu Asp Leu Arg Gly Gly Val Leu Arg Val Gln Tyr Glu Gly  
 1055 1060 1065

Gly Thr Glu Asp Glu Leu Ile Arg Leu Thr His Ala Gly Val Ser  
 1070 1075 1080

Val Ser Gly Phe Asp Thr His His Lys Gly Glu Gln Asn Leu Thr  
 1085 1090 1095

Leu Gln Tyr Leu Gly Gln Pro Val Asn Ala Asn Leu Ser Val Thr  
 1100 1105 1110

Val Thr Gly Lys Asp Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile  
 1115 1120 1125

Glu Val Ser Gln Glu Pro Lys Lys Asp Tyr Leu Val Gly Asp Ser  
 1130 1135 1140

Leu	Asp	Leu	Ser	Glu	Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp
1145						1150					1155			
Thr	Met	Glu	Glu	His	Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser
1160						1165					1170			
Gly	Tyr	Asp	Ala	Gln	Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	His
1175						1180					1185			
Tyr	Gln	Gly	His	Glu	Val	Ser	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys
1190						1195					1200			
Ala	Ala	Leu	Asn	Asp	Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val
1205						1210					1215			
Glu	Ala	Ala	Lys	Asn	Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu
1220						1225					1230			
Val	Lys	Glu	Ala	Phe	Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val
1235						1240					1245			
Leu	Lys	Asp	His	Glu	Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg
1250						1255					1260			
Leu	Asn	Lys	Leu	Thr	Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu
1265						1270					1275			
Lys	Phe	Lys	Glu	Glu	Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu
1280						1285					1290			
Val	Gln	Glu	Leu	Leu	Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser
1295						1300					1305			
Ala	Leu	Ala	Pro	Leu	Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys
1310						1315					1320			
Val	Asp	Leu	Ser	Pro	Glu	Glu	Leu	Thr	Thr	Ala	Lys	Gln	Ser	Leu
1325						1330					1335			
Lys	Asp	Leu	Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe
1340						1345					1350			
Ser	Asp	Ser	Lys	Thr	Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu
1355						1360					1365			

Lys	Thr	Val	Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser
1370						1375					1380			
Ala	Glu	Glu	Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe
1385						1390					1395			
Glu	Ile	Glu	Gly	Leu	Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser
1400						1405					1410			
Tyr	Ala	Ser	Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val
1415						1420					1425			
Lys	Lys	Val	Phe	Phe	Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu
1430						1435					1440			
Ala	Phe	Glu	Gln	Thr	Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His
1445						1450					1455			
Phe	Thr	His	Tyr	Ala	Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln
1460						1465					1470			
Pro	Ala	Lys	Pro	Ala	Pro	Gln	Asn	Thr	Val	Leu	Pro	Lys	Pro	Thr
1475						1480					1485			
Tyr	Gln	Pro	Ala	Ser	Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val
1490						1495					1500			
Gln	Glu	Glu	Lys	Val	Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Ala
1505						1510					1515			
Glu	Met	Leu	Val	Gly	Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	Arg	Asp
1520						1525					1530			
Gly	Leu	Leu	Arg	His	Val	Phe	Glu	Val	Asp	Glu	Asn	Gly	Gln	Arg
1535						1540					1545			
Arg	Leu	Arg	Ser	Thr	Glu	Val	Ile	Gln	Glu	Ala	Ile	Pro	Glu	Ile
1550						1555					1560			
Val	Glu	Ile	Gly	Thr	Lys	Val	Lys	Thr	Val	Pro	Ala	Val	Val	Ala
1565						1570					1575			
Thr	Gln	Glu	Lys	Pro	Ala	Gln	Asn	Thr	Ala	Val	Lys	Ser	Glu	Glu
1580						1585					1590			

Ala Ser Lys Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu  
1595 1600 1605

Ala Leu Ile Ala Gly Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala  
1610 1615 1620

Leu Thr Leu Arg Arg Lys Arg Glu Asp Lys Asp  
1625 1630

<210> 54  
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<212> PRT  
<213> Streptococcus pneumoniae Pj-102-161

<400> 54

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
1 5 10 15

Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Lys Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
85 90 95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys Thr Glu Lys  
145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala  
865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys

900

905

910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
 915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
 930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
 945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
 965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
 980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
 995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
 1010 1015 1020

Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr  
 1025 1030 1035

Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val  
 1040 1045 1050

Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu Thr Gly  
 1055 1060 1065

Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp Leu Arg  
 1070 1075 1080

Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu Asp Glu  
 1085 1090 1095

Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly Phe Asp  
 1100 1105 1110

Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr Leu Gly  
 1115 1120 1125

Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly Gln Asp  
 1130 1135 1140



Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser	Gln	Glu
1145						1150					1155			
Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu	Ser	Glu
1160						1165					1170			
Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	Glu	His
1175						1180					1185			
Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln
1190						1195					1200			
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	His	Tyr	Gln	Gly	His	Glu
1205						1210					1215			
Val	Ser	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
1220						1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
1235						1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Ser	Glu	Val	Lys	Glu	Ala	Phe
1250						1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
1265						1270					1275			
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
1280						1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys	Glu	Glu
1295						1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu
1310						1315					1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
1325						1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
1340						1345					1350			
Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
1355						1360					1365			

Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
1370						1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys
1385						1390					1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
1400						1405					1410			
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
1415						1420					1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val
1430						1435					1440			
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe
1445						1450					1455			
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Thr	Phe	Glu	Gln	Thr
1460						1465					1470			
Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	Tyr	Ala
1475						1480					1485			
Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	Pro	Ala
1490						1495					1500			
Pro	Gln	Asn	Lys	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro	Ala	Ser
1505						1510					1515			
Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu	Lys	Val
1520						1525					1530			
Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Ala	Glu	Met	Leu	Val	Gly
1535						1540					1545			
Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	Arg	Asp	Gly	Leu	Leu	Arg	His
1550						1555					1560			
Val	Phe	Glu	Val	Asp	Glu	Asn	Gly	Gln	Arg	Arg	Leu	Arg	Ser	Thr
1565						1570					1575			
Glu	Val	Ile	Gln	Glu	Ala	Ile	Pro	Glu	Ile	Val	Glu	Ile	Gly	Thr
1580						1585					1590			

Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu Lys Pro  
1595 1600 1605

Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys Gln Leu  
1610 1615 1620

Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile Ala Gly  
1625 1630 1635

Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu Arg Arg  
1640 1645 1650

Lys Arg Glu Asp Lys Asp  
1655

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<212> PRT  
<213> Streptococcus pneumoniae Pj-102-163

<400> 55

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

Gly Pro Ala Leu Ala Glu Glu Thr Ala Val Pro Glu Asn Ser Arg Ala  
35 40 45

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
85 90 95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Glu Glu Ala Asn Lys Thr Glu Lys  
145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala

865		870		875		880									
Gly	Ala	Gly	Gly	Glu	Ser	Val	Asn	Asp	Gly	Leu	Met	Asn	Thr	Lys	Asp
				885					890					895	
Phe	Asp	Leu	Tyr	Tyr	Lys	Asp	Ala	Asp	Gly	Glu	Trp	Lys	Leu	Ala	Lys
			900					905					910		
Glu	Val	Arg	Gly	Asn	Lys	Ala	His	Val	Thr	Asp	Ile	Thr	Leu	Asp	Lys
		915					920					925			
Pro	Ile	Thr	Ala	Gln	Asp	Trp	Arg	Leu	Asn	Val	Val	Thr	Ser	Asp	Asn
	930					935					940				
Gly	Thr	Pro	Trp	Lys	Ala	Ile	Arg	Ile	Tyr	Asn	Trp	Lys	Met	Tyr	Glu
945					950					955					960
Lys	Leu	Asp	Thr	Glu	Ser	Val	Asn	Ile	Pro	Met	Ala	Lys	Ala	Ala	Ala
				965					970					975	
Arg	Ser	Leu	Gly	Asn	Asn	Lys	Val	Gln	Val	Gly	Phe	Ala	Asp	Val	Pro
			980					985					990		
Ala	Gly	Ala	Thr	Ile	Thr	Val	Tyr	Asp	Asn	Pro	Asn	Ser	Gln	Thr	Pro
		995					1000					1005			
Leu	Ala	Thr	Leu	Lys	Ser	Glu	Val	Gly	Gly	Asp	Leu	Ala	Ser	Ala	
	1010					1015					1020				
Pro	Leu	Asp	Leu	Thr	Asn	Gln	Ser	Gly	Leu	Leu	Tyr	Tyr	Arg	Thr	
	1025					1030					1035				
Gln	Leu	Pro	Gly	Lys	Glu	Ile	Ser	Asn	Val	Leu	Ala	Val	Ser	Val	
	1040					1045					1050				
Pro	Lys	Asp	Asp	Arg	Arg	Ile	Lys	Ser	Val	Ser	Leu	Glu	Thr	Gly	
	1055					1060					1065				
Pro	Lys	Lys	Thr	Ser	Tyr	Ala	Glu	Gly	Glu	Asp	Leu	Asp	Leu	Arg	
	1070					1075					1080				
Gly	Gly	Val	Leu	Arg	Val	Gln	Tyr	Glu	Gly	Gly	Thr	Glu	Asp	Glu	
	1085					1090					1095				
Leu	Ile	Arg	Leu	Thr	His	Ala	Gly	Val	Ser	Val	Ser	Gly	Phe	Asp	
	1100					1105					1110				

Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr	Leu	Gly
1115						1120					1125			
Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly	Gln	Asp
1130						1135					1140			
Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser	Gln	Glu
1145						1150					1155			
Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu	Ser	Glu
1160						1165					1170			
Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	Glu	His
1175						1180					1185			
Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln
1190						1195					1200			
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly	His	Glu
1205						1210					1215			
Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
1220						1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
1235						1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu	Ala	Phe
1250						1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
1265						1270					1275			
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
1280						1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys	Glu	Glu
1295						1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu
1310						1315					1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
1325						1330					1335			



Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
1340						1345					1350			
Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
1355						1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Ser	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
1370						1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Ser	Val	Ile	Lys
1385						1390					1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
1400						1405					1410			
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
1415						1420					1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val
1430						1435					1440			
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe
1445						1450					1455			
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu	Gln	Thr
1460						1465					1470			
Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	Tyr	Ala
1475						1480					1485			
Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	Pro	Ala
1490						1495					1500			
Pro	Gln	Asn	Thr	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro	Ala	Ser
1505						1510					1515			
Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu	Lys	Val
1520						1525					1530			
Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Ala	Glu	Met	Leu	Val	Gly
1535						1540					1545			
Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	Arg	Asp	Gly	Leu	Leu	Arg	His
1550						1555					1560			

Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg Ser Thr  
1565 1570 1575

Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile Gly Thr  
1580 1585 1590

Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu Lys Pro  
1595 1600 1605

Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys Gln Leu  
1610 1615 1620

Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile Ala Gly  
1625 1630 1635

Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu Arg Arg  
1640 1645 1650

Lys Arg Glu Asp Lys Asp  
1655

<210> 56  
<211> 1659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-174

<400> 56

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
85 90 95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys Thr Glu Lys  
145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser

835

840

845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
 850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala  
 865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
 885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
 900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
 915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
 930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
 945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
 965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
 980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
 995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
 1010 1015 1020

Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr  
 1025 1030 1035

Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val  
 1040 1045 1050

Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu Thr Gly  
 1055 1060 1065

Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp Leu Arg  
 1070 1075 1080

Gly	Gly	Val	Leu	Arg	Val	Gln	Tyr	Glu	Gly	Gly	Thr	Glu	Asp	Glu
1085						1090					1095			
Leu	Ile	Arg	Leu	Thr	His	Ala	Gly	Val	Ser	Val	Ser	Gly	Phe	Asp
1100						1105					1110			
Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr	Leu	Gly
1115						1120					1125			
Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly	Gln	Asp
1130						1135					1140			
Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser	Gln	Glu
1145						1150					1155			
Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu	Ser	Glu
1160						1165					1170			
Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	Glu	His
1175						1180					1185			
Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln
1190						1195					1200			
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	His	Tyr	Gln	Gly	His	Glu
1205						1210					1215			
Val	Ser	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
1220						1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
1235						1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Ser	Glu	Val	Lys	Glu	Ala	Phe
1250						1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
1265						1270					1275			
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
1280						1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr	Glu	Glu
1295						1300					1305			

Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu
1310						1315					1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
1325						1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
1340						1345					1350			
Glu	Glu	Leu	Thr	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
1355						1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
1370						1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Ser	Val	Ile	Lys
1385						1390					1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
1400						1405					1410			
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
1415						1420					1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val
1430						1435					1440			
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe
1445						1450					1455			
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu	Gln	Thr
1460						1465					1470			
Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	Tyr	Ala
1475						1480					1485			
Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	Pro	Ala
1490						1495					1500			
Pro	Gln	Asn	Thr	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro	Thr	Ser
1505						1510					1515			
Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu	Lys	Val
1520						1525					1530			



Ala Phe His Arg Gln Glu His Glu Asn Thr Glu Met Leu Val Gly  
1535 1540 1545

Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu Arg His  
1550 1555 1560

Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg Ser Thr  
1565 1570 1575

Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile Gly Thr  
1580 1585 1590

Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu Lys Pro  
1595 1600 1605

Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys Gln Leu  
1610 1615 1620

Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile Ala Gly  
1625 1630 1635

Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu Arg Arg  
1640 1645 1650

Lys Arg Glu Asp Lys Asp  
1655

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<400> 57

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
85 90 95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys Thr Glu Lys  
145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu

805

810

815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
 835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
 850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala  
 865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
 885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
 900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
 915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
 930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
 945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
 965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
 980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
 995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
 1010 1015 1020

Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr  
 1025 1030 1035

Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val  
 1040 1045 1050

Pro	Lys	Asp	Asp	Arg	Arg	Ile	Lys	Ser	Val	Ser	Leu	Glu	Thr	Gly
	1055					1060					1065			
Pro	Lys	Lys	Thr	Ser	Tyr	Ala	Glu	Gly	Glu	Asp	Leu	Asp	Leu	Arg
	1070					1075					1080			
Gly	Gly	Val	Leu	Arg	Val	Gln	Tyr	Glu	Gly	Gly	Thr	Glu	Asp	Glu
	1085					1090					1095			
Leu	Ile	Arg	Leu	Thr	His	Ala	Gly	Val	Ser	Val	Ser	Gly	Phe	Asp
	1100					1105					1110			
Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr	Leu	Gly
	1115					1120					1125			
Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly	Gln	Asp
	1130					1135					1140			
Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser	Gln	Glu
	1145					1150					1155			
Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu	Ser	Glu
	1160					1165					1170			
Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	Glu	His
	1175					1180					1185			
Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln
	1190					1195					1200			
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly	His	Glu
	1205					1210					1215			
Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
	1220					1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
	1235					1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu	Ala	Phe
	1250					1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
	1265					1270					1275			

Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
	1280					1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr	Glu	Glu
	1295					1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu
	1310					1315					1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
	1325					1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
	1340					1345					1350			
Glu	Glu	Leu	Thr	Thr	Thr	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
	1355					1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
	1370					1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys
	1385					1390					1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
	1400					1405					1410			
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
	1415					1420					1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val
	1430					1435					1440			
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe
	1445					1450					1455			
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu	Gln	Thr
	1460					1465					1470			
Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	Tyr	Ala
	1475					1480					1485			
Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	Pro	Ala
	1490					1495					1500			

Pro Gln Asn Thr Val Leu Pro Lys Pro Thr Tyr Gln Pro Ala Ser  
1505 1510 1515

Asp Gln Gln Lys Ala Pro Lys Leu Glu Val Gln Glu Glu Lys Val  
1520 1525 1530

Ala Phe His Arg Gln Glu His Glu Asn Thr Glu Met Leu Val Gly  
1535 1540 1545

Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu Arg His  
1550 1555 1560

Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg Ser Thr  
1565 1570 1575

Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile Gly Thr  
1580 1585 1590

Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu Lys Pro  
1595 1600 1605

Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys Gln Leu  
1610 1615 1620

Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile Ala Gly  
1625 1630 1635

Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu Arg Arg  
1640 1645 1650

Lys Arg Glu Asp Lys Asp  
1655

<210> 58  
<211> 1659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-386

<400> 58

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
1 5 10 15

Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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



Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
85 90 95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys Thr Glu Lys  
145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Lys Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala

770

775

780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
 785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
 805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
 835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
 850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala  
 865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
 885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
 900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
 915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
 930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
 945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
 965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
 980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
 995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
 1010 1015 1020

Pro	Leu	Asp	Leu	Thr	Asn	Gln	Ser	Gly	Leu	Leu	Tyr	Tyr	Arg	Thr
1025						1030					1035			
Gln	Leu	Pro	Gly	Lys	Glu	Ile	Ser	Asn	Val	Leu	Ala	Val	Ser	Val
1040						1045					1050			
Pro	Lys	Asp	Asp	Arg	Arg	Ile	Lys	Ser	Val	Ser	Leu	Glu	Thr	Gly
1055						1060					1065			
Pro	Lys	Lys	Thr	Ser	Tyr	Ala	Glu	Gly	Glu	Asp	Leu	Asp	Leu	Arg
1070						1075					1080			
Gly	Gly	Val	Leu	Arg	Val	Gln	Tyr	Glu	Gly	Gly	Thr	Glu	Asp	Glu
1085						1090					1095			
Leu	Ile	Arg	Leu	Thr	His	Ala	Gly	Val	Ser	Val	Ser	Gly	Phe	Asp
1100						1105					1110			
Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr	Leu	Gly
1115						1120					1125			
Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly	Gln	Asp
1130						1135					1140			
Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser	Gln	Glu
1145						1150					1155			
Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu	Ser	Glu
1160						1165					1170			
Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	Glu	His
1175						1180					1185			
Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln
1190						1195					1200			
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	His	Tyr	Gln	Gly	His	Glu
1205						1210					1215			
Val	Ser	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
1220						1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
1235						1240					1245			

Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Ser	Glu	Val	Lys	Glu	Ala	Phe
1250						1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
1265						1270					1275			
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
1280						1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys	Glu	Glu
1295						1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu
1310						1315					1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
1325						1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
1340						1345					1350			
Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
1355						1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
1370						1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys
1385						1390					1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
1400						1405					1410			
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
1415						1420					1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val
1430						1435					1440			
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe
1445						1450					1455			
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu	Gln	Thr
1460						1465					1470			

Asp Ser His Val Ile Phe Thr Ala Pro His Phe Thr His Tyr Ala  
1475 1480 1485

Phe Val Tyr Glu Ser Ala Glu Lys Pro Gln Pro Ala Lys Pro Ala  
1490 1495 1500

Pro Gln Asn Lys Val Leu Pro Lys Pro Thr Tyr Gln Pro Ala Ser  
1505 1510 1515

Asp Gln Gln Lys Ala Pro Lys Leu Glu Val Gln Glu Glu Lys Val  
1520 1525 1530

Ala Phe His Arg Gln Glu His Glu Asn Ala Glu Met Leu Val Gly  
1535 1540 1545

Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu Arg His  
1550 1555 1560

Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg Ser Thr  
1565 1570 1575

Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile Gly Thr  
1580 1585 1590

Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu Lys Pro  
1595 1600 1605

Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys Gln Leu  
1610 1615 1620

Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile Ala Gly  
1625 1630 1635

Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu Arg Arg  
1640 1645 1650

Lys Arg Glu Asp Lys Asp  
1655

<210> 59  
<211> 1659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-468

<400> 59

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
1 5 10 15

Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
85 90 95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Glu Glu Ala Asn Lys Thr Glu Lys  
145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
245 250 255



Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys

740

745

750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
850 855 860

Arg Leu Thr Lys Ser Arg Thr Val Val Arg Trp Val Met Asp His Ala  
865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
1010 1015 1020

Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr  
1025 1030 1035

Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val  
1040 1045 1050

Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu Thr Gly  
1055 1060 1065

Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp Leu Arg  
1070 1075 1080

Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu Asp Glu  
1085 1090 1095

Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly Phe Asp  
1100 1105 1110

Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr Leu Gly  
1115 1120 1125

Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly Gln Asp  
1130 1135 1140

Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile Glu Val Ser Gln Glu  
1145 1150 1155

Pro Lys Lys Asp Tyr Leu Val Gly Asp Ser Leu Asp Leu Ser Glu  
1160 1165 1170

Gly Arg Phe Ala Val Ala Tyr Ser Asn Asp Thr Met Glu Glu His  
1175 1180 1185

Ser Phe Thr Asp Glu Gly Val Glu Ile Ser Gly Tyr Asp Ala Gln  
1190 1195 1200

Lys Thr Gly Arg Gln Thr Leu Thr Leu Arg Tyr Gln Gly His Glu  
1205 1210 1215

Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
1220						1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
1235						1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu	Ala	Phe
1250						1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
1265						1270					1275			
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
1280						1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr	Glu	Glu
1295						1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Ala	Gln	Glu	Leu	Leu
1310						1315					1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
1325						1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
1340						1345					1350			
Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
1355						1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Ser	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
1370						1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys
1385						1390					1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
1400						1405					1410			
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
1415						1420					1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val
1430						1435					1440			

Lys Ile Pro Ile Glu Lys Asp Lys Lys Val Lys Lys Val Phe Phe  
 1445 1450 1455  
 Leu Pro Glu Gly Lys Glu Ala Val Glu Leu Ala Phe Glu Gln Thr  
 1460 1465 1470  
 Asp Ser His Val Ile Phe Thr Ala Pro His Phe Thr His Tyr Ala  
 1475 1480 1485  
 Phe Val Tyr Glu Ser Ala Glu Lys Pro Gln Pro Ala Lys Pro Ala  
 1490 1495 1500  
 Pro Gln Asn Thr Val Leu Pro Lys Pro Thr Tyr Gln Pro Ala Ser  
 1505 1510 1515  
 Asp Gln Gln Lys Ala Pro Lys Leu Glu Val Gln Glu Glu Lys Val  
 1520 1525 1530  
 Ala Phe His Arg Gln Glu His Glu Asn Ala Glu Met Leu Val Gly  
 1535 1540 1545  
 Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu Arg His  
 1550 1555 1560  
 Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg Ser Thr  
 1565 1570 1575  
 Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile Gly Thr  
 1580 1585 1590  
 Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu Lys Pro  
 1595 1600 1605  
 Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys Gln Leu  
 1610 1615 1620  
 Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile Ala Gly  
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 Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu Arg Arg  
 1640 1645 1650  
 Lys Arg Glu Asp Lys Asp  
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<211> 1659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1344

<400> 60

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
1 5 10 15

Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
85 90 95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys Thr Glu Lys  
145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460



Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu

705					710					715					720
Lys	Asn	Ala	Gln	Glu	Ala	Glu	Ala	Val	Val	Gln	Phe	Lys	Gly	Asn	Lys
				725					730					735	
Asp	Ala	Asp	Phe	Tyr	Glu	Val	Tyr	Glu	Lys	Asp	Gly	Asp	Ser	Trp	Lys
			740					745					750		
Leu	Leu	Thr	Gly	Ser	Ser	Ser	Thr	Thr	Ile	Tyr	Leu	Pro	Lys	Val	Ser
		755					760					765			
Arg	Ser	Ala	Ser	Ala	Gln	Gly	Thr	Thr	Gln	Glu	Leu	Lys	Val	Val	Ala
	770					775					780				
Val	Gly	Lys	Asn	Gly	Val	Arg	Ser	Glu	Ala	Ala	Thr	Thr	Thr	Phe	Asp
785					790					795					800
Trp	Gly	Met	Thr	Val	Lys	Asp	Thr	Ser	Leu	Pro	Lys	Pro	Leu	Ala	Glu
				805					810					815	
Asn	Ile	Val	Pro	Gly	Ala	Thr	Val	Ile	Asp	Ser	Thr	Phe	Pro	Lys	Thr
			820					825					830		
Glu	Gly	Gly	Glu	Gly	Ile	Glu	Gly	Met	Leu	Asn	Gly	Thr	Ile	Thr	Ser
		835					840					845			
Leu	Ser	Asp	Lys	Trp	Ser	Ser	Ala	Gln	Leu	Ser	Gly	Ser	Val	Asp	Ile
	850					855					860				
Arg	Leu	Thr	Lys	Pro	Arg	Thr	Val	Val	Arg	Trp	Val	Met	Asp	His	Ala
865					870					875					880
Gly	Ala	Gly	Gly	Glu	Ser	Val	Asn	Asp	Gly	Leu	Met	Asn	Thr	Lys	Asp
				885					890					895	
Phe	Asp	Leu	Tyr	Tyr	Lys	Asp	Ala	Asp	Gly	Glu	Trp	Lys	Leu	Ala	Lys
			900					905					910		
Glu	Val	Arg	Gly	Asn	Lys	Ala	His	Val	Thr	Asp	Ile	Thr	Leu	Asp	Lys
		915					920					925			
Pro	Ile	Thr	Ala	Gln	Asp	Trp	Arg	Leu	Asn	Val	Val	Thr	Ser	Asp	Asn
	930					935					940				
Gly	Thr	Pro	Trp	Lys	Ala	Ile	Arg	Ile	Tyr	Asn	Trp	Lys	Met	Tyr	Glu
945					950					955					960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
1010 1015 1020

Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr  
1025 1030 1035

Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val  
1040 1045 1050

Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu Thr Gly  
1055 1060 1065

Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp Leu Arg  
1070 1075 1080

Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu Asp Glu  
1085 1090 1095

Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly Phe Asp  
1100 1105 1110

Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr Leu Gly  
1115 1120 1125

Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly Gln Asp  
1130 1135 1140

Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile Glu Val Ser Gln Glu  
1145 1150 1155

Pro Lys Lys Asp Tyr Leu Val Gly Asp Ser Leu Asp Leu Ser Glu  
1160 1165 1170

Gly Arg Phe Ala Val Ala Tyr Ser Asn Asp Thr Met Glu Glu His  
1175 1180 1185

Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln
1190						1195					1200			
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly	His	Glu
1205						1210					1215			
Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
1220						1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
1235						1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu	Ala	Phe
1250						1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
1265						1270					1275			
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
1280						1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys	Glu	Glu
1295						1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu
1310						1315					1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
1325						1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
1340						1345					1350			
Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
1355						1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
1370						1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys
1385						1390					1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
1400						1405					1410			

Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
1415						1420					1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val
1430						1435					1440			
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe
1445						1450					1455			
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu	Gln	Thr
1460						1465					1470			
Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	Tyr	Ala
1475						1480					1485			
Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	Pro	Ala
1490						1495					1500			
Pro	Gln	Asn	Lys	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro	Ala	Ser
1505						1510					1515			
Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu	Lys	Val
1520						1525					1530			
Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Ala	Glu	Met	Leu	Val	Gly
1535						1540					1545			
Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	Arg	Asp	Gly	Leu	Leu	Arg	His
1550						1555					1560			
Val	Phe	Glu	Val	Asp	Glu	Asn	Gly	Gln	Arg	Arg	Leu	Arg	Ser	Thr
1565						1570					1575			
Glu	Val	Ile	Gln	Glu	Ala	Ile	Pro	Glu	Ile	Val	Glu	Ile	Gly	Thr
1580						1585					1590			
Lys	Val	Lys	Thr	Val	Pro	Ala	Val	Val	Ala	Thr	Gln	Glu	Lys	Pro
1595						1600					1605			
Ala	Gln	Asn	Thr	Ala	Val	Lys	Ser	Glu	Glu	Ala	Ser	Lys	Gln	Leu
1610						1615					1620			
Pro	Asn	Thr	Gly	Thr	Ala	Asp	Ala	Asn	Glu	Ala	Leu	Ile	Ala	Val
1625						1630					1635			
Leu	Ala	Ser	Leu	Gly	Leu	Ala	Ser	Leu	Ala	Leu	Thr	Leu	Arg	Arg

1640

1645

1650

Lys Arg Glu Asp Lys Asp  
1655

&lt;210&gt; 61

&lt;211&gt; 1646

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae Pj-1364

&lt;400&gt; 61

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Val  
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Gly Pro Ala Leu Ala Glu Glu Thr Ala Val Pro Glu Asn Ser Gly Ala  
35 40 45

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Thr Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Glu Ala Ala Ser Ala  
85 90 95

Ala Lys Pro Glu Glu Lys Ala Gly Glu Val Val Ala Glu Thr Pro Ser  
100 105 110

Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu  
115 120 125

Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys  
130 135 140

Thr Glu Lys Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr  
145 150 155 160

Leu Lys Pro Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys  
165 170 175

Trp Glu Pro Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val  
180 185 190

Val Leu Ala Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser  
195 200 205

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

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

Tyr Trp Gln Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro  
245 250 255

Thr Pro Asp Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr  
260 265 270

Gly Thr Leu Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg  
275 280 285

Phe Ala Glu Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala  
290 295 300

Arg Lys Leu Val Asp Met Val Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe  
305 310 315 320

Ile Asn Gln Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys  
325 330 335

Met Arg Gln Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn  
340 345 350

His Pro Ile Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly  
355 360 365

Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln  
370 375 380

Pro Glu Gly Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn  
385 390 395 400

Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile  
405 410 415

Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly  
420 425 430

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

Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr  
450 455 460

Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe  
465 470 475 480

Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys  
485 490 495

Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val  
500 505 510

Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp  
515 520 525

Phe Val Asp Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser  
530 535 540

Val Ser Gly Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly  
545 550 555 560

Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly  
565 570 575

Asn Ser Leu Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp  
580 585 590

Val Arg Leu Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu  
595 600 605

Arg Val Ala His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe  
610 615 620

Ser Thr Thr Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu  
625 630 635 640

Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu Glu Phe Ala Leu Ser Ser  
645 650 655

Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu  
660 665 670

Gly Ala Val Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser



675								680								685
Asp	Asn	His	Gln	Glu	Pro	Gln	Ser	Pro	Thr	Ser	Phe	Ser	Val	Val	Lys	
690						695					700					
Gln	Ser	Leu	Lys	Asn	Ala	Gln	Glu	Ala	Glu	Ala	Val	Val	Gln	Phe	Lys	
705					710					715					720	
Gly	Asn	Lys	Asp	Ala	Asp	Phe	Tyr	Glu	Val	Tyr	Glu	Lys	Asp	Gly	Asp	
				725					730					735		
Ser	Trp	Lys	Leu	Leu	Thr	Gly	Ser	Ser	Ser	Thr	Thr	Ile	Tyr	Leu	Pro	
			740					745					750			
Lys	Val	Ser	Arg	Ser	Ala	Ser	Ala	Gln	Gly	Thr	Thr	Gln	Glu	Leu	Lys	
		755					760					765				
Val	Val	Ala	Val	Gly	Lys	Asn	Gly	Val	Arg	Ser	Glu	Ala	Ala	Thr	Thr	
	770					775					780					
Thr	Phe	Asp	Trp	Gly	Met	Thr	Val	Lys	Asp	Thr	Ser	Leu	Pro	Lys	Pro	
785					790					795					800	
Leu	Ala	Glu	Asn	Ile	Val	Pro	Gly	Ala	Thr	Val	Ile	Asp	Ser	Thr	Phe	
			805						810					815		
Pro	Lys	Thr	Glu	Gly	Gly	Glu	Gly	Ile	Glu	Gly	Met	Leu	Asn	Gly	Thr	
			820					825					830			
Ile	Thr	Ser	Leu	Ser	Asp	Lys	Trp	Ser	Ser	Ala	Gln	Leu	Ser	Gly	Ser	
		835					840					845				
Val	Asp	Ile	Arg	Leu	Thr	Lys	Pro	Arg	Thr	Val	Val	Arg	Trp	Val	Met	
	850					855					860					
Asp	His	Ala	Gly	Ala	Gly	Gly	Glu	Ser	Val	Asn	Asp	Gly	Leu	Met	Asn	
865					870					875					880	
Thr	Lys	Asp	Phe	Asp	Leu	Tyr	Tyr	Lys	Asp	Ala	Asp	Gly	Glu	Trp	Lys	
				885					890					895		
Leu	Ala	Lys	Glu	Val	Arg	Gly	Asn	Lys	Ala	His	Val	Thr	Asp	Val	Thr	
			900					905					910			
Leu	Asp	Lys	Pro	Ile	Thr	Ala	Gln	Asp	Trp	Arg	Leu	Asn	Val	Val	Thr	
		915					920					925				

Ser Asp Asn Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys  
930 935 940

Met Tyr Glu Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys  
945 950 955 960

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

Asp Val Pro Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser  
980 985 990

Pro Thr Pro Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala  
995 1000 1005

Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr  
1010 1015 1020

Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val  
1025 1030 1035

Ser Val Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu  
1040 1045 1050

Thr Gly Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp  
1055 1060 1065

Leu Arg Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu  
1070 1075 1080

Asp Glu Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly  
1085 1090 1095

Phe Asp Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr  
1100 1105 1110

Leu Gly Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly  
1115 1120 1125

Gln Asp Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile Glu Val Ser  
1130 1135 1140

Gln Glu Pro Lys Lys Asp Tyr Leu Val Gly Asp Ser Leu Asp Leu  
1145 1150 1155

Ser	Glu	Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu
1160						1165					1170			
Glu	His	Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp
1175						1180					1185			
Ala	Gln	Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly
1190						1195					1200			
His	Glu	Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu
1205						1210					1215			
Asn	Asp	Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala
1220						1225					1230			
Lys	Asn	Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu
1235						1240					1245			
Ala	Phe	Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp
1250						1255					1260			
His	Glu	Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys
1265						1270					1275			
Leu	Thr	Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr
1280						1285					1290			
Glu	Glu	Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Ala	Gln	Glu
1295						1300					1305			
Leu	Leu	Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala
1310						1315					1320			
Pro	Leu	Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu
1325						1330					1335			
Ser	Pro	Glu	Glu	Leu	Thr	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu
1340						1345					1350			
Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser
1355						1360					1365			
Lys	Thr	Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val
1370						1375					1380			

Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu
1385						1390					1395			
Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu
1400						1405					1410			
Gly	Leu	Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser
1415						1420					1425			
Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val
1430						1435					1440			
Phe	Phe	Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu
1445						1450					1455			
Gln	Thr	Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His
1460						1465					1470			
Tyr	Ala	Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys
1475						1480					1485			
Pro	Ala	Pro	Gln	Asn	Lys	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro
1490						1495					1500			
Ala	Ser	Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu
1505						1510					1515			
Lys	Val	Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Ala	Glu	Met	Leu
1520						1525					1530			
Val	Gly	Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	Arg	Asp	Gly	Leu	Leu
1535						1540					1545			
Arg	His	Val	Phe	Glu	Val	Asp	Glu	Asn	Gly	Gln	Arg	Arg	Leu	Arg
1550						1555					1560			
Ser	Thr	Glu	Val	Ile	Gln	Glu	Ala	Ile	Pro	Glu	Ile	Val	Glu	Ile
1565						1570					1575			
Gly	Thr	Lys	Val	Lys	Thr	Val	Pro	Ala	Val	Val	Ala	Thr	Gln	Glu
1580						1585					1590			
Lys	Pro	Ala	Gln	Asn	Thr	Ala	Val	Lys	Ser	Glu	Glu	Ala	Ser	Lys
1595						1600					1605			
Gln	Leu	Pro	Asn	Thr	Gly	Thr	Ala	Asp	Ala	Asn	Glu	Ala	Leu	Ile

1610

1615

1620

Ala Gly Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Ile Leu  
 1625 1630 1635

Arg Arg Lys Arg Glu Asp Glu Asp  
 1640 1645

&lt;210&gt; 62

&lt;211&gt; 1646

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae Pj-1484

&lt;400&gt; 62

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
 1 5 10 15

Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
 20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
 50 55 60

Asp Lys Gln Asn Glu Gly Glu His Thr Arg Glu Asn Lys Leu Glu Lys  
 65 70 75 80

Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Glu Ala Ala Ser Ala  
 85 90 95

Ala Lys Pro Glu Glu Lys Ala Gly Glu Val Val Ala Glu Thr Pro Ser  
 100 105 110

Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu  
 115 120 125

Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys  
 130 135 140

Thr Glu Lys Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr  
 145 150 155 160

Leu Lys Pro Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys  
 165 170 175

Trp Glu Pro Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val  
180 185 190

Val Leu Ala Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser  
195 200 205

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

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

Tyr Trp Gln Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro  
245 250 255

Thr Pro Asp Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr  
260 265 270

Gly Thr Leu Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg  
275 280 285

Phe Ala Glu Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala  
290 295 300

Arg Lys Leu Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe  
305 310 315 320

Ile Asn Gln Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys  
325 330 335

Met Arg Gln Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn  
340 345 350

His Pro Ile Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly  
355 360 365

Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln  
370 375 380

Pro Glu Gly Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn  
385 390 395 400

Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile  
405 410 415

Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly  
420 425 430

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

Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr  
450 455 460

Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe  
465 470 475 480

Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys  
485 490 495

Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val  
500 505 510

Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp  
515 520 525

Phe Val Asp Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser  
530 535 540

Val Ser Gly Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly  
545 550 555 560

Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly  
565 570 575

Asn Ser Leu Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp  
580 585 590

Val Arg Leu Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu  
595 600 605

Arg Val Ala His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe  
610 615 620

Ser Thr Thr Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu  
625 630 635 640

Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu Glu Phe Ala Leu Ser Ser  
645 650 655

Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu

660

665

670

Gly Ala Val Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser  
675 680 685

Asp Asn His Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys  
690 695 700

Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys  
705 710 715 720

Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp  
725 730 735

Ser Trp Lys Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro  
740 745 750

Lys Val Ser Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys  
755 760 765

Val Val Ala Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr  
770 775 780

Thr Phe Asp Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro  
785 790 795 800

Leu Ala Glu Asn Ile Val Pro Gly Ala Thr Val Ile Asp Ser Thr Phe  
805 810 815

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

Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser  
835 840 845

Val Asp Ile Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met  
850 855 860

Asp His Ala Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn  
865 870 875 880

Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys  
885 890 895

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



Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr  
915 920 925

Ser Asp Asn Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys  
930 935 940

Met Tyr Glu Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys  
945 950 955 960

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

Asp Val Pro Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser  
980 985 990

Pro Thr Pro Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala  
995 1000 1005

Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr  
1010 1015 1020

Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val  
1025 1030 1035

Ser Val Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu  
1040 1045 1050

Thr Gly Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp  
1055 1060 1065

Leu Arg Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu  
1070 1075 1080

Asp Glu Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly  
1085 1090 1095

Phe Asp Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr  
1100 1105 1110

Leu Gly Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly  
1115 1120 1125

Gln Asp Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile Glu Val Ser  
1130 1135 1140

Gln	Glu	Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu
1145						1150					1155			
Ser	Glu	Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu
1160						1165					1170			
Glu	His	Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp
1175						1180					1185			
Ala	Gln	Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly
1190						1195					1200			
His	Glu	Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu
1205						1210					1215			
Asn	Asp	Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala
1220						1225					1230			
Lys	Asn	Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu
1235						1240					1245			
Ala	Phe	Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp
1250						1255					1260			
His	Glu	Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys
1265						1270					1275			
Leu	Thr	Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr
1280						1285					1290			
Glu	Glu	Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Ala	Gln	Glu
1295						1300					1305			
Leu	Leu	Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala
1310						1315					1320			
Pro	Leu	Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu
1325						1330					1335			
Ser	Pro	Glu	Glu	Leu	Thr	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu
1340						1345					1350			
Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser
1355						1360					1365			

Lys	Thr	Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val
1370						1375					1380			
Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu
1385						1390					1395			
Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu
1400						1405					1410			
Gly	Leu	Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser
1415						1420					1425			
Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val
1430						1435					1440			
Phe	Phe	Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu
1445						1450					1455			
Gln	Thr	Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His
1460						1465					1470			
Tyr	Ala	Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys
1475						1480					1485			
Pro	Ala	Pro	Gln	Asn	Lys	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro
1490						1495					1500			
Ala	Ser	Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu
1505						1510					1515			
Lys	Val	Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Ala	Glu	Met	Leu
1520						1525					1530			
Val	Gly	Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	Arg	Asp	Gly	Leu	Leu
1535						1540					1545			
Arg	His	Val	Phe	Glu	Val	Asp	Glu	Asn	Gly	Gln	Arg	Arg	Leu	Arg
1550						1555					1560			
Ser	Thr	Glu	Val	Ile	Gln	Glu	Ala	Ile	Pro	Glu	Ile	Val	Glu	Ile
1565						1570					1575			
Gly	Thr	Lys	Val	Lys	Thr	Val	Pro	Ala	Val	Val	Ala	Thr	Gln	Glu
1580						1585					1590			
Lys	Pro	Ala	Gln	Asn	Thr	Ala	Val	Lys	Ser	Glu	Glu	Ala	Ser	Lys

1595

1600

1605

Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile  
 1610 1615 1620

Ala Gly Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Ile Leu  
 1625 1630 1635

Arg Arg Lys Arg Glu Asp Glu Asp  
 1640 1645

&lt;210&gt; 63

&lt;211&gt; 1659

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae Pj-1490

&lt;400&gt; 63

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
 1 5 10 15

Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
 20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
 50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
 65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
 85 90 95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
 100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
 115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
 130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys Thr Glu Lys  
 145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Arg Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu

				645				650				655			
Ser	Asp	Asn	Trp 660	Thr	Asn	Glu	Glu	Phe 665	Asp	Leu	Ser	Ser	Leu 670	Ala	Gly
Lys	Thr	Ile 675	Tyr	Ala	Val	Lys	Leu 680	Phe	Phe	Glu	His	Glu 685	Gly	Ala	Val
Lys	Asp 690	Tyr	Gln	Phe	Asn	Leu 695	Gly	Gln	Leu	Thr	Ile 700	Ser	Asp	Asn	His
Gln 705	Glu	Pro	Gln	Ser	Pro 710	Thr	Ser	Phe	Ser	Val 715	Val	Lys	Gln	Ser	Leu 720
Lys	Asn	Ala	Gln 725	Glu	Ala	Glu	Ala	Val 730	Val	Gln	Phe	Lys	Gly	Asn 735	Lys
Asp	Ala	Asp 740	Phe	Tyr	Glu	Val	Tyr	Glu 745	Lys	Asp	Gly	Asp	Ser 750	Trp	Lys
Leu	Leu	Thr 755	Gly	Ser	Ser	Ser	Thr	Thr 760	Ile	Tyr	Leu	Pro 765	Lys	Val	Ser
Arg 770	Ser	Ala	Ser	Ala	Gln	Gly 775	Thr	Thr	Gln	Glu	Leu 780	Lys	Val	Val	Ala
Val 785	Gly	Lys	Asn	Gly 790	Val	Arg	Ser	Glu	Ala	Ala 795	Thr	Thr	Thr	Phe	Asp 800
Trp	Gly	Met	Thr 805	Val	Lys	Asp	Thr	Ser	Leu 810	Pro	Lys	Pro	Leu 815	Ala	Glu
Asn	Ile	Val 820	Pro	Gly	Ala	Thr	Val	Ile 825	Asp	Ser	Thr	Phe	Pro 830	Lys	Thr
Glu	Gly	Gly 835	Glu	Gly	Ile	Glu	Gly	Met	Leu	Asn	Gly	Thr 845	Ile	Thr	Ser
Leu 850	Ser	Asp	Lys	Trp	Ser	Ser 855	Ala	Gln	Leu	Ser	Gly 860	Ser	Val	Asp	Ile
Arg 865	Leu	Thr	Lys	Pro	Arg 870	Thr	Val	Val	Arg	Trp 875	Val	Met	Asp	His	Ala 880
Gly	Ala	Gly	Gly 885	Glu	Ser	Val	Asn	Asp	Gly 890	Leu	Met	Asn	Thr	Lys 895	Asp

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
1010 1015 1020

Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr  
1025 1030 1035

Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val  
1040 1045 1050

Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu Thr Gly  
1055 1060 1065

Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp Leu Arg  
1070 1075 1080

Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu Asp Glu  
1085 1090 1095

Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly Phe Asp  
1100 1105 1110

Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr Leu Gly  
1115 1120 1125



Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly	Gln	Asp
	1130					1135					1140			
Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser	Gln	Glu
	1145					1150					1155			
Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu	Ser	Glu
	1160					1165					1170			
Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	Glu	His
	1175					1180					1185			
Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln
	1190					1195					1200			
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly	His	Glu
	1205					1210					1215			
Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
	1220					1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
	1235					1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu	Ala	Phe
	1250					1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
	1265					1270					1275			
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
	1280					1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys	Glu	Glu
	1295					1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu
	1310					1315					1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
	1325					1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
	1340					1345					1350			

Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
1355						1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
1370						1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys
1385						1390					1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
1400						1405					1410			
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
1415						1420					1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val
1430						1435					1440			
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe
1445						1450					1455			
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu	Gln	Thr
1460						1465					1470			
Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	Tyr	Ala
1475						1480					1485			
Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	Pro	Ala
1490						1495					1500			
Pro	Gln	Asn	Lys	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro	Ala	Ser
1505						1510					1515			
Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu	Lys	Val
1520						1525					1530			
Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Ala	Glu	Met	Leu	Val	Gly
1535						1540					1545			
Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	Arg	Asp	Gly	Leu	Leu	Arg	His
1550						1555					1560			
Val	Phe	Glu	Val	Asp	Glu	Asn	Gly	Gln	Arg	Arg	Leu	Arg	Ser	Thr
1565						1570					1575			
Glu	Val	Ile	Gln	Glu	Ala	Ile	Pro	Glu	Ile	Val	Glu	Ile	Gly	Thr

1580		1585		1590
Lys Val	Lys Thr Val Pro	Ala Val Val Ala Thr	Gln Glu Lys Pro	
1595		1600	1605	
Ala Gln	Asn Thr Ala Val	Lys Ser Glu Glu Ala	Ser Lys Gln Leu	
1610		1615	1620	
Pro Asn	Thr Gly Thr Ala	Asp Ala Asn Glu Ala	Leu Ile Ala Val	
1625		1630	1635	
Leu Ala	Ser Leu Gly Leu	Ala Ser Leu Ala Leu	Thr Leu Arg Arg	
1640		1645	1650	
Lys Arg	Glu Asp Lys Asp			
1655				
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<400> 64				
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1	5	10	15	
Leu Ser	Val Gly Ala Cys	Ser Leu Met Ile	Gly Ala Val Leu	Phe Ala
	20	25	30	
Gly Pro	Ala Leu Ala Glu	Glu Thr Ala Val	Pro Glu Asn Ser	Gly Ala
	35	40	45	
Asn Thr	Glu Leu Val Ser	Gly Glu Ser Glu	His Ser Thr Asn	Glu Ala
	50	55	60	
Asp Lys	Gln Asn Glu Gly	Glu His Ala Arg	Glu Asn Lys Leu	Glu Lys
65	70	75	80	
Ala Glu	Gly Val Ala Ile	Ala Ser Glu Thr	Ala Ser Pro Ala	Ser Asn
	85	90	95	
Glu Ala	Ala Thr Thr Glu	Thr Ala Glu Ala	Ala Ser Ala Ala	Lys Pro
	100	105	110	
Glu Glu	Lys Ala Ser Glu	Val Val Ala Glu	Thr Pro Ser Ala	Glu Ala
	115	120	125	

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys Thr Glu Lys  
145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

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

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

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala  
865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
1010 1015 1020

Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr  
1025 1030 1035

Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val  
1040 1045 1050

Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu Thr Gly  
1055 1060 1065

Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp Leu Arg  
1070 1075 1080

Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu Asp Glu  
1085 1090 1095

Leu	Ile	Arg	Leu	Thr	His	Ala	Gly	Val	Ser	Val	Ser	Gly	Phe	Asp
1100						1105					1110			
Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr	Leu	Gly
1115						1120					1125			
Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly	Gln	Asp
1130						1135					1140			
Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser	Gln	Glu
1145						1150					1155			
Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu	Ser	Glu
1160						1165					1170			
Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	Glu	His
1175						1180					1185			
Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln
1190						1195					1200			
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	His	Tyr	Gln	Gly	His	Glu
1205						1210					1215			
Val	Ser	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
1220						1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
1235						1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Ser	Glu	Val	Lys	Glu	Ala	Phe
1250						1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
1265						1270					1275			
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
1280						1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr	Glu	Glu
1295						1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu
1310						1315					1320			



Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
1325						1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
1340						1345					1350			
Glu	Glu	Leu	Thr	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
1355						1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
1370						1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys
1385						1390					1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
1400						1405					1410			
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
1415						1420					1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val
1430						1435					1440			
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe
1445						1450					1455			
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu	Gln	Thr
1460						1465					1470			
Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	Tyr	Ala
1475						1480					1485			
Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	Pro	Ala
1490						1495					1500			
Pro	Gln	Asn	Thr	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro	Thr	Ser
1505						1510					1515			
Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu	Lys	Val
1520						1525					1530			
Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Ala	Glu	Met	Leu	Val	Gly
1535						1540					1545			
Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	Arg	Asp	Gly	Leu	Leu	Arg	His

1550                                      1555                                      1560  
 Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg Ser Thr  
 1565                                      1570                                      1575  
 Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile Gly Thr  
 1580                                      1585                                      1590  
 Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu Lys Pro  
 1595                                      1600                                      1605  
 Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys Gln Leu  
 1610                                      1615                                      1620  
 Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile Ala Gly  
 1625                                      1630                                      1635  
 Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu Arg Arg  
 1640                                      1645                                      1650  
 Lys Arg Glu Asp Lys Asp  
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 <211> 1646  
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 <213> Streptococcus pneumoniae Pj-1229  
 <400> 65  
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 Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
 20                                      25                                      30  
 Gly Pro Ala Leu Ala Glu Glu Thr Ala Val Pro Glu Asn Ser Gly Ala  
 35                                      40                                      45  
 Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
 50                                      55                                      60  
 Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
 65                                      70                                      75                                      80  
 Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Glu Ala Ala Ser Ala  
 85                                      90                                      95

Ala Lys Pro Glu Glu Lys Val Gly Glu Val Val Ala Glu Thr Pro Ser  
100 105 110

Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu  
115 120 125

Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro Ala Glu Glu Ala Asn Lys  
130 135 140

Thr Glu Lys Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr  
145 150 155 160

Leu Lys Pro Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys  
165 170 175

Trp Glu Pro Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val  
180 185 190

Val Leu Ala Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser  
195 200 205

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

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

Tyr Trp Gln Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro  
245 250 255

Thr Pro Asp Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr  
260 265 270

Gly Thr Leu Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg  
275 280 285

Phe Ala Glu Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala  
290 295 300

Arg Lys Leu Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe  
305 310 315 320

Ile Asn Gln Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys  
325 330 335

Met Arg Gln Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn  
340 345 350

His Pro Ile Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly  
355 360 365

Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln  
370 375 380

Pro Glu Gly Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn  
385 390 395 400

Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile  
405 410 415

Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly  
420 425 430

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

Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr  
450 455 460

Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe  
465 470 475 480

Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys  
485 490 495

Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val  
500 505 510

Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp  
515 520 525

Phe Val Asp Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser  
530 535 540

Val Ser Gly Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly  
545 550 555 560

Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly  
565 570 575

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

580

585

590

Val Arg Leu Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu  
595 600 605

Arg Val Ala His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe  
610 615 620

Ser Thr Thr Ser Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu  
625 630 635 640

Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser  
645 650 655

Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu  
660 665 670

Gly Ala Val Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser  
675 680 685

Asp Asn His Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys  
690 695 700

Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys  
705 710 715 720

Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp  
725 730 735

Ser Trp Lys Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro  
740 745 750

Lys Val Ser Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys  
755 760 765

Val Val Ala Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr  
770 775 780

Thr Phe Asp Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro  
785 790 795 800

Leu Ala Glu Asn Ile Val Pro Gly Ala Thr Val Ile Asp Ser Thr Phe  
805 810 815

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

Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser  
835 840 845

Val Asp Ile Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met  
850 855 860

Asp His Ala Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn  
865 870 875 880

Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys  
885 890 895

Leu Ala Lys Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr  
900 905 910

Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr  
915 920 925

Ser Asp Asn Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys  
930 935 940

Met Tyr Glu Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys  
945 950 955 960

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

Asp Val Pro Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser  
980 985 990

Gln Thr Pro Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala  
995 1000 1005

Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr  
1010 1015 1020

Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val  
1025 1030 1035

Ser Val Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu  
1040 1045 1050

Thr Gly Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp  
1055 1060 1065

Leu	Arg	Gly	Gly	Val	Leu	Arg	Val	Gln	Tyr	Glu	Gly	Gly	Thr	Glu
1070						1075					1080			
Asp	Glu	Leu	Ile	Arg	Leu	Thr	His	Ala	Gly	Val	Ser	Val	Ser	Gly
1085						1090					1095			
Phe	Asp	Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr
1100						1105					1110			
Leu	Gly	Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly
1115						1120					1125			
Gln	Asp	Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser
1130						1135					1140			
Gln	Glu	Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu
1145						1150					1155			
Ser	Glu	Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu
1160						1165					1170			
Glu	His	Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp
1175						1180					1185			
Ala	Gln	Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	His	Tyr	Gln	Gly
1190						1195					1200			
His	Glu	Val	Ser	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu
1205						1210					1215			
Asn	Asp	Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala
1220						1225					1230			
Lys	Asn	Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Ser	Glu	Val	Lys	Glu
1235						1240					1245			
Ala	Phe	Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp
1250						1255					1260			
His	Glu	Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys
1265						1270					1275			
Leu	Thr	Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr
1280						1285					1290			

Glu	Glu	Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu
1295						1300					1305			
Leu	Leu	Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala
1310						1315					1320			
Pro	Leu	Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu
1325						1330					1335			
Ser	Pro	Glu	Glu	Leu	Thr	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu
1340						1345					1350			
Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser
1355						1360					1365			
Lys	Thr	Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val
1370						1375					1380			
Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu
1385						1390					1395			
Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu
1400						1405					1410			
Gly	Leu	Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser
1415						1420					1425			
Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val
1430						1435					1440			
Phe	Phe	Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu
1445						1450					1455			
Gln	Thr	Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His
1460						1465					1470			
Tyr	Ala	Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys
1475						1480					1485			
Pro	Ala	Pro	Gln	Asn	Thr	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro
1490						1495					1500			
Ala	Ser	Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu
1505						1510					1515			
Lys	Val	Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Ala	Glu	Met	Leu



1520		1525		1530
Val Gly Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu				
1535		1540		1545
Arg His Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg				
1550		1555		1560
Ser Thr Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile				
1565		1570		1575
Gly Thr Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu				
1580		1585		1590
Lys Pro Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys				
1595		1600		1605
Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile				
1610		1615		1620
Ala Gly Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu				
1625		1630		1635
Arg Arg Lys Arg Glu Asp Lys Asp				
1640		1645		
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<211> 1659				
<212> PRT				
<213> Streptococcus pneumoniae Pj-1230				
<400> 66				
Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys				
1	5	10	15	
Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala				
20	25	30		
Gly Pro Ala Leu Ala Glu Glu Thr Ala Val Pro Glu Asn Ser Gly Ala				
35	40	45		
Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala				
50	55	60		
Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys				
65	70	75	80	

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

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu

565

570

575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Glu  
785 790 795 800

Trp Gly Met Thr Val Gln Asp Thr Ser Leu Pro Arg Pro Leu Ala Glu  
805 810 815

Asn Ile Val Pro Gly Ala Thr Val Ile Gly Ser Thr Phe Pro Asp Thr  
820 825 830

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala  
865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
1010 1015 1020

Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr  
1025 1030 1035

Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val  
1040 1045 1050

Pro	Lys	Asp	Asp	Arg	Arg	Ile	Lys	Ser	Val	Ser	Leu	Glu	Thr	Gly
	1055					1060					1065			
Pro	Lys	Lys	Thr	Ser	Tyr	Ala	Glu	Gly	Glu	Asp	Leu	Asp	Leu	Arg
	1070					1075					1080			
Gly	Gly	Val	Leu	Arg	Val	Gln	Tyr	Glu	Gly	Gly	Thr	Glu	Asp	Glu
	1085					1090					1095			
Leu	Ile	Arg	Leu	Thr	His	Ala	Gly	Val	Ser	Val	Ser	Gly	Phe	Asp
	1100					1105					1110			
Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr	Leu	Gly
	1115					1120					1125			
Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly	Gln	Asp
	1130					1135					1140			
Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser	Gln	Glu
	1145					1150					1155			
Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu	Ser	Glu
	1160					1165					1170			
Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	Glu	His
	1175					1180					1185			
Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln
	1190					1195					1200			
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly	His	Glu
	1205					1210					1215			
Phe	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
	1220					1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
	1235					1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu	Ala	Phe
	1250					1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	Arg	Glu
	1265					1270					1275			

Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
1280						1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys	Glu	Glu
1295						1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu
1310						1315					1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
1325						1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
1340						1345					1350			
Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
1355						1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
1370						1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys
1385						1390					1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
1400						1405					1410			
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
1415						1420					1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Ala	Leu	Ser	Tyr	Ala	Ser	Ile	Val
1430						1435					1440			
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe
1445						1450					1455			
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu	Gln	Thr
1460						1465					1470			
Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	Tyr	Ala
1475						1480					1485			
Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	Pro	Ala
1490						1495					1500			
Pro	Gln	Asn	Lys	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro	Ala	Ser

1505		1510		1515
Asp Gln Gln Lys Ala Pro Lys Leu Glu Val Gln Glu Glu Lys Val				
1520		1525		1530
Ala Phe His Arg Gln Asp His Glu Asn Ala Glu Met Leu Val Gly				
1535		1540		1545
Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu Arg His				
1550		1555		1560
Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg Ser Thr				
1565		1570		1575
Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile Gly Thr				
1580		1585		1590
Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu Lys Pro				
1595		1600		1605
Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys Gln Leu				
1610		1615		1620
Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile Ala Gly				
1625		1630		1635
Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu Arg Arg				
1640		1645		1650
Lys Arg Glu Asp Lys Asp				
1655				
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<211> 1646				
<212> PRT				
<213> Streptococcus pneumoniae Pj-1231				
<400> 67				
Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys				
1		5	10	15
Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala				
	20		25	30
Gly Pro Ala Leu Ala Glu Glu Thr Ala Val Pro Glu Asn Ser Gly Ala				
	35		40	45



Asn Pro Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Glu Ala Ala Ser Ala  
85 90 95

Ala Lys Pro Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser  
100 105 110

Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu  
115 120 125

Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys  
130 135 140

Thr Glu Lys Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr  
145 150 155 160

Leu Lys Pro Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys  
165 170 175

Trp Glu Pro Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val  
180 185 190

Val Leu Ala Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser  
195 200 205

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

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

Tyr Trp Gln Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro  
245 250 255

Thr Pro Asp Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr  
260 265 270

Gly Thr Leu Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg  
275 280 285

Phe Ala Glu Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala  
290 295 300

Arg Lys Leu Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe  
305 310 315 320

Ile Asn Gln Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys  
325 330 335

Met Arg Gln Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn  
340 345 350

His Pro Ile Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly  
355 360 365

Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln  
370 375 380

Pro Glu Gly Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn  
385 390 395 400

Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile  
405 410 415

Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly  
420 425 430

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

Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr  
450 455 460

Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe  
465 470 475 480

Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys  
485 490 495

Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val  
500 505 510

Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp  
515 520 525

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

530					535					540					
Val 545	Ser	Gly	Val	Leu	Pro 550	Thr	Trp	Arg	Trp	Trp 555	Gln	Thr	Ser	Thr	Gly 560
Glu	Lys	Leu	Arg	Ala 565	Glu	Tyr	Asp	Phe	Thr 570	Asp	Ala	Tyr	Asn	Gly 575	Gly
Asn	Ser	Leu	Lys 580	Phe	Ser	Gly	Asp	Val 585	Ala	Gly	Lys	Thr	Asp 590	Gln	Asp
Val	Arg	Leu 595	Tyr	Ser	Thr	Lys	Leu	Glu 600	Val	Thr	Glu	Lys 605	Thr	Lys	Leu
Arg 610	Val	Ala	His	Lys	Gly	Gly 615	Lys	Gly	Ser	Lys	Val 620	Tyr	Met	Ala	Phe
Ser 625	Thr	Thr	Pro	Asp	Tyr 630	Lys	Phe	Asp	Asp	Ala 635	Asp	Ala	Trp	Lys	Glu 640
Leu	Thr	Leu	Ser	Asp 645	Asn	Trp	Thr	Asn	Glu 650	Glu	Phe	Ala	Leu	Ser 655	Ser
Leu	Ala	Gly	Lys 660	Thr	Ile	Tyr	Ala	Val 665	Lys	Leu	Phe	Phe	Glu 670	His	Glu
Gly	Ala	Val 675	Lys	Asp	Tyr	Gln	Phe 680	Asn	Leu	Gly	Gln	Leu 685	Thr	Ile	Ser
Asp 690	Asn	His	Gln	Glu	Pro	Gln 695	Ser	Pro	Thr	Ser	Phe 700	Ser	Val	Val	Lys
Gln 705	Ser	Leu	Lys	Asn	Ala 710	Gln	Glu	Ala	Glu	Ala 715	Val	Val	Gln	Phe	Lys 720
Gly	Asn	Lys	Asp	Ala 725	Asp	Phe	Tyr	Glu	Val 730	Tyr	Glu	Lys	Asp	Gly 735	Asp
Ser	Trp	Lys	Leu 740	Leu	Thr	Gly	Ser	Ser	Ser 745	Thr	Thr	Ile	Tyr 750	Leu	Pro
Lys	Val	Ser 755	Arg	Ser	Ala	Ser	Ala 760	Gln	Gly	Thr	Thr	Gln 765	Glu	Leu	Lys
Val 770	Val	Ala	Val	Gly	Lys	Asn 775	Gly	Val	Arg	Ser	Glu 780	Ala	Ala	Thr	Thr

Thr Phe Asp Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro  
785 790 795 800

Leu Ala Glu Asn Ile Val Pro Gly Ala Thr Val Ile Asp Ser Thr Phe  
805 810 815

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

Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser  
835 840 845

Val Asp Ile Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met  
850 855 860

Asp His Ala Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn  
865 870 875 880

Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys  
885 890 895

Leu Ala Lys Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr  
900 905 910

Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr  
915 920 925

Ser Asp Asn Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys  
930 935 940

Met Tyr Glu Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys  
945 950 955 960

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

Asp Val Pro Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser  
980 985 990

Gln Thr Pro Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala  
995 1000 1005

Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr  
1010 1015 1020

Arg	Thr	Gln	Leu	Pro	Gly	Lys	Glu	Ile	Ser	Asn	Val	Leu	Ala	Val
1025						1030					1035			
Ser	Val	Pro	Lys	Asp	Asp	Arg	Arg	Ile	Lys	Ser	Val	Ser	Leu	Glu
1040						1045					1050			
Thr	Gly	Pro	Lys	Lys	Thr	Ser	Tyr	Ala	Glu	Gly	Glu	Asp	Leu	Asp
1055						1060					1065			
Leu	Arg	Gly	Gly	Val	Leu	Arg	Val	Gln	Tyr	Glu	Gly	Gly	Thr	Glu
1070						1075					1080			
Asp	Glu	Leu	Ile	Arg	Leu	Thr	His	Ala	Gly	Val	Ser	Val	Ser	Gly
1085						1090					1095			
Phe	Asp	Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr
1100						1105					1110			
Leu	Gly	Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly
1115						1120					1125			
Gln	Asp	Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser
1130						1135					1140			
Gln	Glu	Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Asn	Leu	Asp	Leu
1145						1150					1155			
Ser	Glu	Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu
1160						1165					1170			
Glu	His	Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp
1175						1180					1185			
Ala	Gln	Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly
1190						1195					1200			
His	Glu	Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu
1205						1210					1215			
Asn	Asp	Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala
1220						1225					1230			
Lys	Asn	Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu
1235						1240					1245			

Ala	Phe	Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp
1250						1255					1260			
His	Glu	Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys
1265						1270					1275			
Leu	Thr	Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr
1280						1285					1290			
Glu	Glu	Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Ala	Gln	Glu
1295						1300					1305			
Leu	Leu	Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala
1310						1315					1320			
Pro	Leu	Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu
1325						1330					1335			
Ser	Pro	Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu
1340						1345					1350			
Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Ser	Ala	Val	Phe	Ser	Asp	Ser
1355						1360					1365			
Lys	Thr	Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val
1370						1375					1380			
Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu
1385						1390					1395			
Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu
1400						1405					1410			
Gly	Leu	Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser
1415						1420					1425			
Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val
1430						1435					1440			
Phe	Phe	Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu
1445						1450					1455			
Gln	Thr	Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His
1460						1465					1470			
Tyr	Ala	Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys

1475

1480

1485

Pro Ala Pro Gln Asn Lys Val Leu Pro Lys Pro Thr Tyr Gln Pro  
1490 1495 1500

Ala Ser Asp Gln Gln Lys Ala Pro Lys Leu Glu Val Gln Glu Glu  
1505 1510 1515

Lys Val Ala Phe His Arg Gln Glu His Glu Asn Ala Glu Met Leu  
1520 1525 1530

Val Gly Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu  
1535 1540 1545

Arg His Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg  
1550 1555 1560

Ser Thr Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile  
1565 1570 1575

Gly Thr Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu  
1580 1585 1590

Lys Pro Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys  
1595 1600 1605

Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile  
1610 1615 1620

Ala Gly Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu  
1625 1630 1635

Arg Arg Lys Arg Glu Asp Lys Asp  
1640 1645

&lt;210&gt; 68

&lt;211&gt; 1659

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae Pj-1232

&lt;400&gt; 68

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
1 5 10 15

Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
85 90 95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Glu Glu Ala Asn Lys Thr Glu Lys  
145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
260 265 270



Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr

515					520					525					
Phe	Thr	Thr	Ser	Phe	Asn	Thr	Gly	His	Gly	Lys	Lys	Trp	Phe	Val	Asp
530						535					540				
Gly	Lys	Val	Ser	Lys	Asp	Ser	Glu	Trp	Asn	Tyr	Arg	Ser	Val	Ser	Gly
545					550					555					560
Val	Leu	Pro	Thr	Trp	Arg	Trp	Trp	Gln	Thr	Ser	Thr	Gly	Glu	Lys	Leu
				565					570					575	
Arg	Ala	Glu	Tyr	Asp	Phe	Thr	Asp	Ala	Tyr	Asn	Gly	Gly	Asn	Ser	Leu
			580					585					590		
Lys	Phe	Ser	Gly	Asp	Val	Ala	Gly	Lys	Thr	Asp	Gln	Asp	Val	Arg	Leu
		595					600					605			
Tyr	Ser	Thr	Lys	Leu	Glu	Val	Thr	Glu	Lys	Thr	Lys	Leu	Arg	Val	Ala
	610					615					620				
His	Lys	Gly	Gly	Lys	Gly	Ser	Lys	Val	Tyr	Met	Ala	Phe	Ser	Thr	Thr
625					630					635					640
Pro	Asp	Tyr	Lys	Phe	Asp	Asp	Ala	Asp	Ala	Trp	Lys	Glu	Leu	Thr	Leu
				645					650					655	
Ser	Asp	Asn	Trp	Thr	Asn	Glu	Glu	Phe	Asp	Leu	Ser	Ser	Leu	Ala	Gly
			660					665					670		
Lys	Thr	Ile	Tyr	Ala	Val	Lys	Leu	Phe	Phe	Glu	His	Glu	Gly	Ala	Val
		675					680					685			
Lys	Asp	Tyr	Gln	Phe	Asn	Leu	Gly	Gln	Leu	Thr	Ile	Ser	Asp	Asn	His
	690					695					700				
Gln	Glu	Pro	Gln	Ser	Pro	Thr	Ser	Phe	Ser	Val	Val	Lys	Gln	Ser	Leu
705					710					715					720
Lys	Asn	Ala	Gln	Glu	Ala	Glu	Ala	Val	Val	Gln	Phe	Lys	Gly	Asn	Lys
				725					730					735	
Asp	Ala	Asp	Phe	Tyr	Glu	Val	Tyr	Glu	Lys	Asp	Gly	Asp	Ser	Trp	Lys
			740					745					750		
Leu	Leu	Thr	Gly	Ser	Ser	Ser	Thr	Thr	Ile	Tyr	Leu	Pro	Lys	Val	Ser
		755					760					765			

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala  
865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
995 1000 1005

Leu	Ala	Thr	Leu	Lys	Ser	Glu	Val	Gly	Gly	Asp	Leu	Ala	Ser	Ala
1010						1015					1020			
Pro	Leu	Asp	Leu	Thr	Asn	Gln	Ser	Gly	Leu	Leu	Tyr	Tyr	Arg	Thr
1025						1030					1035			
Gln	Leu	Pro	Gly	Lys	Glu	Ile	Ser	Asn	Val	Leu	Ala	Val	Ser	Val
1040						1045					1050			
Pro	Lys	Asp	Asp	Arg	Arg	Ile	Lys	Ser	Val	Ser	Leu	Glu	Thr	Gly
1055						1060					1065			
Pro	Lys	Lys	Thr	Ser	Tyr	Ala	Glu	Gly	Glu	Asp	Leu	Asp	Leu	Arg
1070						1075					1080			
Gly	Gly	Val	Leu	Arg	Val	Gln	Tyr	Glu	Gly	Gly	Thr	Glu	Asp	Glu
1085						1090					1095			
Leu	Ile	Arg	Leu	Thr	His	Ala	Gly	Val	Ser	Val	Ser	Gly	Phe	Asp
1100						1105					1110			
Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr	Leu	Gly
1115						1120					1125			
Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly	Gln	Asp
1130						1135					1140			
Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser	Gln	Glu
1145						1150					1155			
Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu	Ser	Glu
1160						1165					1170			
Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	Glu	His
1175						1180					1185			
Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln
1190						1195					1200			
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly	His	Glu
1205						1210					1215			
Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
1220						1225					1230			

Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
1235						1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu	Ala	Phe
1250						1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
1265						1270					1275			
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
1280						1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr	Glu	Glu
1295						1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Ala	Gln	Glu	Leu	Leu
1310						1315					1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
1325						1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
1340						1345					1350			
Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Tyr	Leu	Val	Ala
1355						1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Ser	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
1370						1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys
1385						1390					1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
1400						1405					1410			
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
1415						1420					1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val
1430						1435					1440			
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe
1445						1450					1455			
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Thr	Phe	Glu	Gln	Thr

1460		1465		1470
Asp Ser His Val Ile Phe Thr Ala Ser His Phe Thr His Tyr Ala				
1475		1480		1485
Phe Val Tyr Glu Ser Ala Glu Lys Pro Gln Pro Ala Lys Pro Ala				
1490		1495		1500
Pro Gln Asn Thr Val Leu Pro Lys Pro Thr Tyr Gln Pro Ala Ser				
1505		1510		1515
Asp Gln Gln Lys Ala Pro Lys Leu Glu Val Gln Glu Glu Lys Val				
1520		1525		1530
Ala Phe His Arg Gln Glu His Glu Asn Ala Glu Met Leu Val Gly				
1535		1540		1545
Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu Arg His				
1550		1555		1560
Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg Ser Thr				
1565		1570		1575
Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile Gly Thr				
1580		1585		1590
Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu Lys Pro				
1595		1600		1605
Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys Gln Leu				
1610		1615		1620
Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile Ala Gly				
1625		1630		1635
Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu Arg Arg				
1640		1645		1650
Lys Arg Glu Asp Lys Asp				
1655				

<210> 69  
 <211> 1646  
 <212> PRT  
 <213> Streptococcus pneumoniae Pj-1233  
 <400> 69

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

Tyr Trp Gln Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro  
245 250 255

Thr Pro Asp Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr  
260 265 270

Gly Thr Leu Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg  
275 280 285

Phe Ala Glu Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala  
290 295 300

Arg Lys Leu Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe  
305 310 315 320

Ile Asn Gln Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys  
325 330 335

Met Arg Gln Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn  
340 345 350

His Pro Ile Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly  
355 360 365

Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln  
370 375 380

Pro Glu Gly Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn  
385 390 395 400

Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile  
405 410 415

Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly  
420 425 430

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

Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr  
450 455 460

Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe  
465 470 475 480

Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys



485

490

495

Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val  
500 505 510

Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp  
515 520 525

Phe Val Asp Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser  
530 535 540

Val Ser Gly Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly  
545 550 555 560

Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly  
565 570 575

Asn Ser Leu Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp  
580 585 590

Val Arg Leu Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu  
595 600 605

Arg Val Ala His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe  
610 615 620

Ser Thr Thr Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu  
625 630 635 640

Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu Glu Phe Ala Leu Ser Ser  
645 650 655

Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu  
660 665 670

Gly Ala Val Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser  
675 680 685

Asp Asn His Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys  
690 695 700

Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys  
705 710 715 720

Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp  
725 730 735

Ser Trp Lys Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro  
740 745 750

Lys Val Ser Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys  
755 760 765

Val Val Ala Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr  
770 775 780

Thr Phe Asp Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro  
785 790 795 800

Leu Ala Glu Asn Ile Val Pro Gly Ala Thr Val Ile Asp Ser Thr Phe  
805 810 815

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

Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser  
835 840 845

Val Asp Ile Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met  
850 855 860

Asp His Ala Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn  
865 870 875 880

Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys  
885 890 895

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

Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr  
915 920 925

Ser Asp Asn Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys  
930 935 940

Met Tyr Glu Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys  
945 950 955 960

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

Asp Val Pro Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser  
980 985 990

Gln Thr Pro Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala  
995 1000 1005

Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr  
1010 1015 1020

Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val  
1025 1030 1035

Ser Val Gln Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu  
1040 1045 1050

Thr Gly Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp  
1055 1060 1065

Leu Arg Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu  
1070 1075 1080

Asp Glu Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly  
1085 1090 1095

Phe Asp Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr  
1100 1105 1110

Leu Gly Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly  
1115 1120 1125

Gln Asp Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile Glu Val Ser  
1130 1135 1140

Gln Glu Pro Lys Lys Asp Tyr Leu Val Gly Asp Ser Leu Asp Leu  
1145 1150 1155

Ser Glu Gly Arg Phe Ala Val Ala Tyr Ser Asn Asp Thr Met Glu  
1160 1165 1170

Glu His Ser Phe Thr Asp Glu Gly Val Glu Ile Ser Gly Tyr Asp  
1175 1180 1185

Ala Gln Lys Thr Gly Arg Gln Thr Leu Thr Leu His Tyr Gln Gly  
1190 1195 1200

His	Glu	Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu
	1205					1210					1215			
Asn	Asp	Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala
	1220					1225					1230			
Lys	Asn	Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu
	1235					1240					1245			
Ala	Phe	Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp
	1250					1255					1260			
His	Glu	Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys
	1265					1270					1275			
Leu	Thr	Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr
	1280					1285					1290			
Glu	Glu	Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Ala	Gln	Glu
	1295					1300					1305			
Leu	Leu	Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala
	1310					1315					1320			
Pro	Leu	Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu
	1325					1330					1335			
Ser	Pro	Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu
	1340					1345					1350			
Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser
	1355					1360					1365			
Lys	Thr	Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val
	1370					1375					1380			
Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu
	1385					1390					1395			
Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu
	1400					1405					1410			
Gly	Leu	Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser
	1415					1420					1425			
Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val

1430							1435								1440
Phe	Phe	Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu	
1445						1450					1455				
Gln	Thr	Asp	Ser	His	Ile	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	
1460						1465					1470				
Tyr	Ala	Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	
1475						1480					1485				
Pro	Ala	Pro	Gln	Asn	Lys	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro	
1490						1495					1500				
Ala	Ser	Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu	
1505						1510					1515				
Lys	Val	Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Ala	Glu	Met	Leu	
1520						1525					1530				
Val	Gly	Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	Arg	Asp	Gly	Leu	Leu	
1535						1540					1545				
Arg	His	Val	Phe	Glu	Val	Asp	Glu	Asn	Gly	Gln	Arg	Arg	Leu	Arg	
1550						1555					1560				
Ser	Thr	Glu	Val	Ile	Gln	Glu	Ala	Ile	Pro	Glu	Ile	Val	Glu	Ile	
1565						1570					1575				
Gly	Thr	Lys	Val	Lys	Thr	Val	Pro	Ala	Val	Val	Ala	Thr	Gln	Glu	
1580						1585					1590				
Lys	Pro	Ala	Gln	Asn	Thr	Ala	Val	Lys	Ser	Glu	Glu	Ala	Ser	Lys	
1595						1600					1605				
Gln	Leu	Pro	Asn	Thr	Gly	Thr	Ala	Asp	Ala	Asn	Glu	Ala	Leu	Ile	
1610						1615					1620				
Ala	Gly	Leu	Ala	Ser	Leu	Gly	Leu	Ala	Ser	Leu	Ala	Leu	Thr	Leu	
1625						1630					1635				
Arg	Arg	Lys	Arg	Glu	Asp	Lys	Asp								
1640						1645									

<210> 70  
 <211> 1659

<212> PRT  
<213> Streptococcus pneumoniae Pj-1234

<400> 70

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Val  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Thr Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
85 90 95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
100 105 110

Glu Glu Lys Ala Gly Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys Thr Glu Lys  
145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460

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

465																	
Lys	Thr	Gly	Glu	Asp	Tyr	His	Lys	Asn	Glu	Asp	Ile	Phe	Phe	Thr	Gly		
				485					490					495			
Tyr	Gln	Gly	Asp	Pro	Thr	Gly	Gln	Lys	Pro	Gly	Asp	Lys	Asp	Trp	Tyr		
			500					505					510				
Gly	Ile	Ala	Asn	Leu	Val	Ala	Asp	Arg	Thr	Pro	Ala	Val	Gly	Asn	Thr		
		515					520					525					
Phe	Thr	Thr	Ser	Phe	Asn	Thr	Gly	His	Gly	Lys	Lys	Trp	Phe	Val	Asp		
	530					535					540						
Gly	Lys	Val	Ser	Lys	Asp	Ser	Glu	Trp	Asn	Tyr	Arg	Ser	Val	Ser	Gly		
545					550					555					560		
Val	Leu	Pro	Thr	Trp	Arg	Trp	Trp	Gln	Thr	Ser	Thr	Gly	Glu	Lys	Leu		
				565					570					575			
Arg	Ala	Glu	Tyr	Asp	Phe	Thr	Asp	Ala	Tyr	Asn	Gly	Gly	Asn	Ser	Leu		
			580					585					590				
Lys	Phe	Ser	Gly	Asp	Val	Ala	Gly	Lys	Thr	Asp	Gln	Asp	Val	Arg	Leu		
		595					600					605					
Tyr	Ser	Thr	Lys	Leu	Glu	Val	Thr	Glu	Lys	Thr	Lys	Leu	Arg	Val	Ala		
	610					615					620						
His	Lys	Gly	Gly	Lys	Gly	Ser	Lys	Val	Tyr	Met	Ala	Phe	Ser	Thr	Thr		
625					630					635					640		
Pro	Asp	Tyr	Lys	Phe	Asp	Asp	Ala	Asp	Ala	Trp	Lys	Glu	Leu	Thr	Leu		
				645					650					655			
Ser	Asp	Asn	Trp	Thr	Asn	Glu	Glu	Phe	Ala	Leu	Ser	Ser	Leu	Ala	Gly		
			660					665					670				
Lys	Thr	Ile	Tyr	Ala	Val	Lys	Leu	Phe	Phe	Glu	His	Glu	Gly	Ala	Val		
		675					680					685					
Lys	Asp	Tyr	Gln	Phe	Asn	Leu	Gly	Gln	Leu	Thr	Ile	Ser	Asp	Asn	His		
	690					695					700						
Gln	Glu	Pro	Gln	Ser	Pro	Thr	Ser	Phe	Ser	Val	Val	Lys	Gln	Ser	Leu		
705					710					715					720		



Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala  
865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
900 905 910

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

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Pro Thr Pro  
995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
1010 1015 1020

Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr  
1025 1030 1035

Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val  
1040 1045 1050

Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu Thr Gly  
1055 1060 1065

Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp Leu Arg  
1070 1075 1080

Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu Asp Glu  
1085 1090 1095

Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly Phe Asp  
1100 1105 1110

Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr Leu Gly  
1115 1120 1125

Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly Gln Asp  
1130 1135 1140

Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile Glu Val Ser Gln Glu  
1145 1150 1155

Pro Lys Lys Asp Tyr Leu Val Gly Asp Ser Leu Asp Leu Ser Glu  
1160 1165 1170

Gly Arg Phe Ala Val Ala Tyr Ser Asn Asp Thr Met Glu Glu His  
1175 1180 1185

Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln
1190						1195					1200			
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly	His	Glu
1205						1210					1215			
Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
1220						1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
1235						1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu	Ala	Phe
1250						1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
1265						1270					1275			
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
1280						1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr	Glu	Glu
1295						1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Ala	Gln	Glu	Leu	Leu
1310						1315					1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
1325						1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
1340						1345					1350			
Glu	Glu	Leu	Thr	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
1355						1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
1370						1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys
1385						1390					1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
1400						1405					1410			
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu

1415		1420		1425
Asp Glu Lys Gly Gln Asp Val	Asp Leu Ser Tyr Ala	Ser Ile Val		
1430	1435	1440		
Lys Ile Pro Ile Glu Lys Asp	Lys Lys Val Lys Lys	Val Phe Phe		
1445	1450	1455		
Leu Pro Glu Gly Lys Glu Ala	Val Glu Leu Ala Phe	Glu Gln Thr		
1460	1465	1470		
Asp Ser His Val Ile Phe Thr	Ala Pro His Phe Thr	His Tyr Ala		
1475	1480	1485		
Phe Val Tyr Glu Ser Ala Glu	Lys Pro Gln Pro Ala	Lys Pro Ala		
1490	1495	1500		
Pro Gln Asn Lys Val Leu Pro	Lys Pro Thr Tyr Gln	Pro Ala Ser		
1505	1510	1515		
Asp Gln Gln Lys Ala Pro Lys	Leu Glu Val Gln Glu	Glu Lys Val		
1520	1525	1530		
Ala Phe His Arg Gln Glu His	Glu Asn Ala Glu Met	Leu Val Gly		
1535	1540	1545		
Glu Gln Arg Val Ile Ile Gln	Gly Arg Asp Gly Leu	Leu Arg His		
1550	1555	1560		
Val Phe Glu Val Asp Glu Asn	Gly Gln Arg Arg Leu	Arg Ser Thr		
1565	1570	1575		
Glu Val Ile Gln Glu Ala Ile	Pro Glu Ile Val Glu	Ile Gly Thr		
1580	1585	1590		
Lys Val Lys Thr Val Pro Ala	Val Val Ala Thr Gln	Glu Lys Pro		
1595	1600	1605		
Ala Gln Asn Thr Ala Val Lys	Ser Glu Glu Ala Ser	Lys Gln Leu		
1610	1615	1620		
Pro Asn Thr Gly Thr Ala Asp	Ala Asn Glu Ala Leu	Ile Ala Gly		
1625	1630	1635		
Leu Ala Ser Leu Gly Leu Ala	Ser Leu Ala Leu Ile	Leu Arg Arg		
1640	1645	1650		

Lys Arg Glu Asp Glu Asp  
1655

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<211> 1636  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1236  
  
<400> 71

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Ala Ala Ser Ala Ala Lys Pro Glu Glu Lys Ala Gly Glu Val  
85 90 95

Val Ala Glu Thr Pro Ser Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu  
100 105 110

Thr Glu Ala Lys Pro Glu Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro  
115 120 125

Ala Ala Glu Ala Asn Lys Thr Glu Lys Glu Val Gln Pro Asp Val Pro  
130 135 140

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

Trp Glu Glu Leu Leu Lys Trp Glu Pro Gly Ala Arg Glu Asp Asp Ala  
165 170 175

Ile Asn Arg Gly Ser Val Val Leu Ala Ser Arg Arg Thr Gly His Leu  
180 185 190

Val Asn Glu Lys Ala Ser Lys Glu Ala Lys Val Gln Ala Leu Ser Asn  
195 200 205

Thr Asn Ser Lys Ala Lys Asp His Ala Ser Val Gly Gly Glu Glu Phe  
210 215 220

Lys Ala Tyr Ala Phe Asp Tyr Trp Gln Tyr Leu Asp Ser Met Val Phe  
225 230 235 240

Trp Glu Gly Leu Val Pro Thr Pro Asp Val Ile Asp Ala Gly His Arg  
245 250 255

Asn Gly Val Pro Val Tyr Gly Thr Leu Phe Phe Asn Trp Ser Asn Ser  
260 265 270

Ile Ala Asp Gln Glu Arg Phe Ala Glu Ala Leu Lys Gln Asp Ala Asp  
275 280 285

Gly Ser Phe Pro Ile Ala Arg Lys Leu Val Asp Met Ala Lys Tyr Tyr  
290 295 300

Gly Tyr Asp Gly Tyr Phe Ile Asn Gln Glu Thr Thr Gly Asp Leu Val  
305 310 315 320

Lys Pro Leu Gly Glu Lys Met Arg Gln Phe Met Leu Tyr Ser Lys Glu  
325 330 335

Tyr Ala Ala Lys Val Asn His Pro Ile Lys Tyr Ser Trp Tyr Asp Ala  
340 345 350

Met Thr Tyr Asn Tyr Gly Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr  
355 360 365

Asn Tyr Gln Phe Met Gln Pro Glu Gly Asp Lys Val Pro Ala Asp Asn  
370 375 380

Phe Phe Ala Asn Phe Asn Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile  
385 390 395 400

Ala Thr Ala Asn Trp Ile Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly  
405 410 415

Leu Glu Leu Gln Gln Gly Gly Ser Tyr Lys Thr Lys Val Lys Trp Asn  
420 425 430

Asp Ile Leu Asp Glu Asn Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe

435		440		445
Ala Pro Asp Thr Ile Thr Ser Leu Gly Lys Thr Gly Glu Asp Tyr His				
450		455		460
Lys Asn Glu Asp Ile Phe Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly				
465		470		475
				480
Gln Lys Pro Gly Asp Lys Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala				
		485		490
				495
Asp Arg Thr Pro Ala Val Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr				
		500		505
				510
Gly His Gly Lys Lys Trp Phe Val Asp Gly Lys Val Ser Lys Asp Ser				
		515		520
				525
Glu Trp Asn Tyr Arg Ser Val Ser Gly Val Leu Pro Thr Trp Arg Trp				
		530		535
				540
Trp Gln Thr Ser Thr Gly Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr				
545		550		555
				560
Asp Ala Tyr Asn Gly Gly Asn Ser Leu Lys Phe Ser Gly Asp Val Ala				
		565		570
				575
Gly Lys Thr Asp Gln Asp Val Arg Leu Tyr Ser Thr Lys Leu Glu Val				
		580		585
				590
Thr Glu Lys Thr Lys Leu Arg Val Ala His Lys Gly Gly Lys Gly Ser				
		595		600
				605
Lys Val Tyr Met Ala Phe Ser Thr Thr Pro Asp Tyr Lys Phe Asp Asp				
		610		615
				620
Ala Asp Ala Trp Lys Glu Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu				
625		630		635
				640
Glu Phe Asp Leu Ser Ser Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys				
		645		650
				655
Leu Phe Phe Glu His Glu Gly Ala Val Lys Asp Tyr Arg Phe Asn Leu				
		660		665
				670
Gly Gln Leu Thr Ile Ser Asp Asn His Gln Glu Pro Gln Ser Pro Thr				
		675		680
				685

Ser Phe Ser Val Val Lys Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu  
690 695 700

Ala Val Val Gln Phe Lys Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val  
705 710 715 720

Tyr Glu Lys Asp Gly Asp Ser Trp Lys Leu Leu Thr Gly Ser Ser Ser  
725 730 735

Thr Thr Ile Tyr Leu Pro Lys Val Ser Arg Ser Ala Ser Ala Gln Gly  
740 745 750

Thr Thr Gln Glu Leu Lys Val Val Ala Val Gly Lys Asn Gly Val Arg  
755 760 765

Ser Glu Ala Ala Thr Thr Thr Phe Glu Trp Gly Met Thr Val Gln Asp  
770 775 780

Thr Ser Leu Pro Arg Pro Leu Ala Glu Asn Ile Val Pro Gly Ala Thr  
785 790 795 800

Val Ile Gly Ser Thr Phe Pro Asp Thr Glu Gly Gly Glu Gly Ile Glu  
805 810 815

Gly Met Leu Asn Gly Thr Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser  
820 825 830

Ala Gln Leu Ser Gly Ser Val Asp Ile Arg Leu Thr Lys Pro Arg Thr  
835 840 845

Val Val Arg Trp Val Met Asp His Ala Gly Ala Gly Gly Glu Ser Val  
850 855 860

Asn Asp Gly Leu Met Asn Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp  
865 870 875 880

Ala Asp Gly Glu Trp Lys Leu Ala Lys Glu Val Arg Gly Asn Lys Ala  
885 890 895

His Val Thr Asp Ile Thr Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp  
900 905 910

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



Arg Ile Tyr Asn Trp Lys Met Tyr Glu Lys Leu Asp Thr Glu Ser Val  
930 935 940

Asn Ile Pro Met Ala Lys Ala Ala Ala Arg Ser Leu Gly Asn Asn Lys  
945 950 955 960

Val Gln Val Gly Phe Ala Asp Val Pro Ala Gly Ala Thr Ile Thr Val  
965 970 975

Tyr Asp Asn Pro Asn Ser Gln Thr Pro Leu Ala Thr Leu Lys Ser Glu  
980 985 990

Val Gly Gly Asp Leu Ala Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser  
995 1000 1005

Gly Leu Leu Tyr Tyr Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser  
1010 1015 1020

Asn Val Leu Ala Val Ser Val Pro Lys Asp Asp Arg Arg Ile Lys  
1025 1030 1035

Ser Val Ser Leu Glu Thr Gly Pro Lys Lys Thr Ser Tyr Ala Glu  
1040 1045 1050

Gly Glu Asp Leu Asp Leu Arg Gly Gly Val Leu Arg Val Gln Tyr  
1055 1060 1065

Glu Gly Gly Thr Glu Asp Glu Leu Ile Arg Leu Thr His Ala Gly  
1070 1075 1080

Val Ser Val Ser Gly Phe Asp Thr His His Lys Gly Glu Gln Asn  
1085 1090 1095

Leu Thr Leu Gln Tyr Leu Gly Gln Pro Val Asn Ala Asn Leu Ser  
1100 1105 1110

Val Thr Val Thr Gly Gln Asp Glu Ala Ser Pro Lys Thr Ile Leu  
1115 1120 1125

Gly Ile Glu Val Ser Gln Glu Pro Lys Lys Asp Tyr Leu Val Gly  
1130 1135 1140

Asp Ser Leu Asp Leu Ser Glu Gly Arg Phe Ala Val Ala Tyr Ser  
1145 1150 1155

Asn	Asp	Thr	Met	Glu	Glu	His	Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu
1160						1165					1170			
Ile	Ser	Gly	Tyr	Asp	Ala	Gln	Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr
1175						1180					1185			
Leu	Arg	Tyr	Gln	Gly	His	Glu	Val	Asn	Phe	Asp	Val	Leu	Val	Ser
1190						1195					1200			
Pro	Lys	Ala	Ala	Leu	Asn	Asp	Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala
1205						1210					1215			
Glu	Val	Glu	Ala	Ala	Lys	Asn	Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser
1220						1225					1230			
Pro	Glu	Val	Lys	Glu	Ala	Phe	Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu
1235						1240					1245			
Gln	Val	Leu	Lys	Asp	His	Glu	Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn
1250						1255					1260			
Asp	Arg	Leu	Asn	Lys	Leu	Thr	Glu	Ala	His	Lys	Ala	Leu	Asn	Gly
1265						1270					1275			
Gln	Glu	Lys	Phe	Lys	Glu	Glu	Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr
1280						1285					1290			
Gly	Glu	Val	Gln	Glu	Leu	Leu	Ala	Ala	Lys	Pro	Asn	His	Pro	Ser
1295						1300					1305			
Gly	Ser	Ala	Leu	Ala	Pro	Leu	Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val
1310						1315					1320			
Glu	Lys	Val	Asp	Leu	Ser	Pro	Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln
1325						1330					1335			
Ser	Leu	Lys	Asp	Leu	Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala
1340						1345					1350			
Val	Phe	Ser	Asp	Ser	Lys	Thr	Gly	Val	Glu	Val	His	Phe	Ser	Asn
1355						1360					1365			
Lys	Glu	Lys	Thr	Val	Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val	Gln
1370						1375					1380			
Ala	Ser	Ala	Glu	Glu	Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His

1385						1390						1395			
Val	Phe	Glu	Ile	Glu	Gly	Trp	Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	
1400						1405					1410				
Leu	Ser	Tyr	Ala	Ser	Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	
1415						1420					1425				
Lys	Val	Lys	Lys	Val	Phe	Phe	Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	
1430						1435					1440				
Glu	Leu	Ala	Phe	Glu	Gln	Thr	Asp	Ser	His	Val	Ile	Phe	Thr	Ala	
1445						1450					1455				
Pro	His	Phe	Thr	His	Tyr	Ala	Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	
1460						1465					1470				
Pro	Gln	Pro	Ala	Lys	Pro	Ala	Pro	Gln	Asn	Thr	Val	Leu	Pro	Lys	
1475						1480					1485				
Pro	Thr	Tyr	Gln	Pro	Ala	Ser	Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	
1490						1495					1500				
Glu	Val	Gln	Glu	Glu	Lys	Val	Ala	Phe	His	Arg	Gln	Glu	His	Glu	
1505						1510					1515				
Asn	Ala	Glu	Met	Leu	Val	Gly	Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	
1520						1525					1530				
Arg	Asp	Gly	Leu	Leu	Arg	His	Val	Phe	Glu	Val	Asp	Glu	Asn	Gly	
1535						1540					1545				
Gln	Arg	Arg	Leu	Arg	Ser	Thr	Glu	Val	Ile	Gln	Glu	Ala	Ile	Pro	
1550						1555					1560				
Glu	Ile	Val	Glu	Ile	Gly	Thr	Lys	Val	Lys	Thr	Val	Pro	Ala	Val	
1565						1570					1575				
Val	Ala	Thr	Gln	Glu	Lys	Pro	Ala	Gln	Asn	Thr	Ala	Val	Lys	Ser	
1580						1585					1590				
Glu	Glu	Ala	Ser	Lys	Gln	Leu	Pro	Asn	Thr	Gly	Thr	Ala	Asp	Ala	
1595						1600					1605				
Asn	Glu	Ala	Leu	Ile	Ala	Gly	Leu	Ala	Ser	Leu	Gly	Leu	Ala	Ser	
1610						1615					1620				

Leu Ala Leu Thr Leu Arg Arg Lys Arg Glu Asp Lys Asp  
1625 1630 1635

<210> 72  
<211> 1659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1237  
  
<400> 72

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
1 5 10 15

Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

Gly Pro Ala Leu Ala Glu Glu Thr Ala Val Pro Glu Asn Ser Arg Ala  
35 40 45

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
85 90 95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Glu Glu Ala Asn Lys Thr Glu Lys  
145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr

445

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala  
865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
1010 1015 1020

Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr  
1025 1030 1035

Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val  
1040 1045 1050

Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu Thr Gly  
1055 1060 1065

Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp Leu Arg  
1070 1075 1080

Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu Asp Glu  
1085 1090 1095

Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly Phe Asp  
1100 1105 1110

Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr Leu Gly  
1115 1120 1125

Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly Gln Asp  
1130 1135 1140

Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile Glu Val Ser Gln Glu  
1145 1150 1155



Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu	Ser	Glu
	1160					1165					1170			
Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	Glu	His
	1175					1180					1185			
Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln
	1190					1195					1200			
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly	His	Glu
	1205					1210					1215			
Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
	1220					1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
	1235					1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu	Ala	Phe
	1250					1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
	1265					1270					1275			
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
	1280					1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys	Glu	Glu
	1295					1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu
	1310					1315					1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
	1325					1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
	1340					1345					1350			
Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
	1355					1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Ser	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
	1370					1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys

1385						1390						1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys	
1400						1405					1410				
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu	
1415						1420					1425				
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val	
1430						1435					1440				
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe	
1445						1450					1455				
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu	Gln	Thr	
1460						1465					1470				
Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	Tyr	Ala	
1475						1480					1485				
Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	Pro	Ala	
1490						1495					1500				
Pro	Gln	Asn	Thr	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro	Ala	Ser	
1505						1510					1515				
Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu	Lys	Val	
1520						1525					1530				
Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Ala	Glu	Met	Leu	Val	Gly	
1535						1540					1545				
Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	Arg	Asp	Gly	Leu	Leu	Arg	His	
1550						1555					1560				
Val	Phe	Glu	Val	Asp	Glu	Asn	Gly	Gln	Arg	Arg	Leu	Arg	Ser	Thr	
1565						1570					1575				
Glu	Val	Ile	Gln	Glu	Ala	Ile	Pro	Glu	Ile	Val	Glu	Ile	Gly	Thr	
1580						1585					1590				
Lys	Val	Lys	Thr	Val	Pro	Ala	Val	Val	Ala	Thr	Gln	Glu	Lys	Pro	
1595						1600					1605				
Ala	Gln	Asn	Thr	Ala	Val	Lys	Ser	Glu	Glu	Ala	Ser	Lys	Gln	Leu	
1610						1615					1620				

Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile Ala Gly  
1625 1630 1635

Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu Arg Arg  
1640 1645 1650

Lys Arg Glu Asp Lys Asp  
1655

<210> 73  
<211> 1646  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1241

<400> 73

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
1 5 10 15

Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Glu Ala Ala Ser Ala  
85 90 95

Ala Lys Pro Glu Glu Lys Ala Ser Glu Val Ile Ala Glu Thr Pro Ser  
100 105 110

Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu  
115 120 125

Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys  
130 135 140

Thr Glu Lys Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr  
145 150 155 160

Leu Lys Pro Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys  
165 170 175

Trp Glu Pro Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val  
180 185 190

Val Leu Ala Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser  
195 200 205

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

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

Tyr Trp Gln Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro  
245 250 255

Thr Pro Asp Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr  
260 265 270

Gly Thr Leu Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg  
275 280 285

Phe Ala Glu Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala  
290 295 300

Arg Lys Leu Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe  
305 310 315 320

Ile Asn Gln Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys  
325 330 335

Met Arg Gln Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn  
340 345 350

His Pro Ile Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly  
355 360 365

Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln  
370 375 380

Pro Glu Gly Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn  
385 390 395 400

Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile

405

410

415

Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly  
 420 425 430

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

Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr  
 450 455 460

Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe  
 465 470 475 480

Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys  
 485 490 495

Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val  
 500 505 510

Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp  
 515 520 525

Phe Val Asp Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser  
 530 535 540

Val Ser Gly Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly  
 545 550 555 560

Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly  
 565 570 575

Asn Ser Leu Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp  
 580 585 590

Val Arg Leu Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu  
 595 600 605

Arg Val Ala His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe  
 610 615 620

Ser Thr Thr Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu  
 625 630 635 640

Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser  
 645 650 655

Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu  
660 665 670

Gly Ala Val Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser  
675 680 685

Asp Asn His Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys  
690 695 700

Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys  
705 710 715 720

Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp  
725 730 735

Asn Trp Lys Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro  
740 745 750

Lys Val Ser Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys  
755 760 765

Val Val Ala Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr  
770 775 780

Thr Phe Asp Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro  
785 790 795 800

Leu Ala Glu Asn Ile Val Pro Gly Ala Thr Val Ile Asp Ser Thr Phe  
805 810 815

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

Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser  
835 840 845

Val Asp Ile Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met  
850 855 860

Asp His Ala Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn  
865 870 875 880

Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys  
885 890 895

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

Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr  
915 920 925

Ser Asp Asn Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys  
930 935 940

Met Tyr Glu Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys  
945 950 955 960

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

Asp Val Pro Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser  
980 985 990

Gln Thr Pro Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala  
995 1000 1005

Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr  
1010 1015 1020

Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val  
1025 1030 1035

Ser Val Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu  
1040 1045 1050

Thr Gly Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp  
1055 1060 1065

Leu Arg Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu  
1070 1075 1080

Asp Glu Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly  
1085 1090 1095

Phe Asp Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr  
1100 1105 1110

Leu Gly Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly  
1115 1120 1125

Gln	Asp	Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser
1130						1135					1140			
Gln	Glu	Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu
1145						1150					1155			
Ser	Glu	Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu
1160						1165					1170			
Glu	His	Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp
1175						1180					1185			
Ala	Gln	Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly
1190						1195					1200			
His	Glu	Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu
1205						1210					1215			
Asn	Asp	Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala
1220						1225					1230			
Lys	Asn	Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu
1235						1240					1245			
Val	Phe	Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp
1250						1255					1260			
His	Glu	Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys
1265						1270					1275			
Leu	Thr	Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys
1280						1285					1290			
Glu	Glu	Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu
1295						1300					1305			
Leu	Leu	Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala
1310						1315					1320			
Pro	Leu	Leu	Glu	Lys	Asn	Lys	Val	Leu	Val	Glu	Lys	Val	Asp	Leu
1325						1330					1335			
Ser	Pro	Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu
1340						1345					1350			
Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser



1355						1360						1365			
Lys Thr Gly Val Glu Val	His Phe Ser Asn Lys Glu	Lys Thr Val													
1370	1375	1380													
Ile Lys Gly Leu Lys Val	Glu Arg Val Gln Ala Ser	Ala Glu Glu													
1385	1390	1395													
Lys Lys Tyr Phe Ala Gly	Glu Asp Ala His Val Phe	Glu Ile Glu													
1400	1405	1410													
Gly Leu Asp Glu Lys Gly	Gln Asp Val Asp Leu Ser	Tyr Ala Ser													
1415	1420	1425													
Ile Val Lys Ile Pro Ile	Glu Lys Asp Lys Lys Val	Lys Lys Val													
1430	1435	1440													
Phe Phe Leu Pro Glu Gly	Lys Glu Ala Val Glu Leu	Ala Phe Glu													
1445	1450	1455													
Gln Thr Asp Ser His Val	Ile Phe Thr Ala Pro His	Phe Thr His													
1460	1465	1470													
Tyr Ala Phe Val Tyr Glu	Ser Ala Glu Lys Pro Gln	Pro Ala Lys													
1475	1480	1485													
Pro Ala Pro Gln Asn Lys	Val Leu Pro Lys Pro Thr	Tyr Gln Pro													
1490	1495	1500													
Ala Ser Asp Gln Gln Lys	Ala Pro Lys Leu Glu Val	Gln Glu Glu													
1505	1510	1515													
Lys Val Ala Phe His Arg	Gln Glu His Glu Asn Thr	Glu Met Leu													
1520	1525	1530													
Val Gly Glu Gln Arg Val	Ile Ile Gln Gly Arg Asp	Gly Leu Leu													
1535	1540	1545													
Arg His Val Phe Glu Val	Asp Glu Asn Gly Gln Arg	Arg Leu Arg													
1550	1555	1560													
Ser Thr Glu Val Ile Gln	Glu Ala Ile Pro Glu Ile	Val Glu Ile													
1565	1570	1575													
Gly Thr Lys Val Lys Thr	Val Pro Ala Val Val Ala	Thr Gln Glu													
1580	1585	1590													

Lys Pro Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys  
1595 1600 1605

Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile  
1610 1615 1620

Ala Gly Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu  
1625 1630 1635

Arg Arg Lys Arg Glu Asp Lys Asp  
1640 1645

<210> 74  
<211> 1659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1242

<400> 74

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
1 5 10 15

Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
85 90 95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Glu Glu Ala Asn Lys Thr Glu Lys  
145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly

385		390		395		400
Asp Lys Val Pro	Ala Asp Asn Phe Phe	Ala Asn Phe Asn Trp	Asp Lys			
	405	410	415			
Ala Lys Asn Asp	Tyr Thr Ile Ala Thr	Ala Asn Trp Ile	Gly Arg Asn			
	420	425	430			
Pro Tyr Asp Val	Phe Ala Gly Leu Glu Leu	Gln Gln Gly Gly	Ser Tyr			
	435	440	445			
Lys Thr Lys Val	Lys Trp Asn Asp Ile Leu	Asp Glu Asn Gly	Lys Leu			
	450	455	460			
Arg Leu Ser Leu	Gly Leu Phe Ala Pro Asp Thr	Ile Thr Ser Leu	Gly			
	465	470	475	480		
Lys Thr Gly Glu	Asp Tyr His Lys Asn	Glu Asp Ile Phe Phe	Thr Gly			
	485	490	495			
Tyr Gln Gly Asp	Pro Thr Gly Gln Lys Pro	Gly Asp Lys Asp	Trp Tyr			
	500	505	510			
Gly Ile Ala Asn	Leu Val Ala Asp Arg Thr	Pro Ala Val Gly	Asn Thr			
	515	520	525			
Phe Thr Thr Ser	Phe Asn Thr Gly His Gly	Lys Lys Trp Phe	Val Asp			
	530	535	540			
Gly Lys Val Ser	Lys Asp Ser Glu Trp Asn	Tyr Arg Ser Val	Ser Gly			
	545	550	555	560		
Val Leu Pro Thr	Trp Arg Trp Trp Gln Thr	Ser Thr Gly Glu	Lys Leu			
	565	570	575			
Arg Ala Glu Tyr	Asp Phe Thr Asp Ala Tyr	Asn Gly Gly Asn	Ser Leu			
	580	585	590			
Lys Phe Ser Gly	Asp Val Ala Gly Lys Thr	Asp Gln Asp Val	Arg Leu			
	595	600	605			
Tyr Ser Thr Lys	Leu Glu Val Thr Glu Lys	Thr Lys Leu Arg	Val Ala			
	610	615	620			
His Lys Gly Gly	Lys Gly Ser Lys Val Tyr	Met Ala Phe Ser	Thr Thr			
	625	630	635	640		

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
850 855 860

Arg Leu Thr Lys Ser Arg Thr Val Val Arg Trp Val Met Asp His Ala  
865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
1010 1015 1020

Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr  
1025 1030 1035

Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val  
1040 1045 1050

Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu Thr Gly  
1055 1060 1065

Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp Leu Arg  
1070 1075 1080

Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu Asp Glu  
1085 1090 1095

Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly Phe Asp  
1100 1105 1110

Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr	Leu	Gly
	1115					1120					1125			
Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly	Gln	Asp
	1130					1135					1140			
Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser	Gln	Glu
	1145					1150					1155			
Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu	Ser	Glu
	1160					1165					1170			
Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	Glu	His
	1175					1180					1185			
Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln
	1190					1195					1200			
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly	His	Glu
	1205					1210					1215			
Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
	1220					1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
	1235					1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu	Ala	Phe
	1250					1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
	1265					1270					1275			
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
	1280					1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr	Glu	Glu
	1295					1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Ala	Gln	Glu	Leu	Leu
	1310					1315					1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
	1325					1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro

1340						1345						1350			
Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala	
1355						1360					1365				
Leu	Leu	Lys	Glu	Asp	Lys	Ser	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr	
1370						1375					1380				
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys	
1385						1390					1395				
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys	
1400						1405					1410				
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu	
1415						1420					1425				
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val	
1430						1435					1440				
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe	
1445						1450					1455				
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu	Gln	Thr	
1460						1465					1470				
Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	Tyr	Ala	
1475						1480					1485				
Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	Pro	Ala	
1490						1495					1500				
Pro	Gln	Asn	Thr	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro	Ala	Ser	
1505						1510					1515				
Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu	Lys	Val	
1520						1525					1530				
Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Ala	Glu	Met	Leu	Val	Gly	
1535						1540					1545				
Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	Arg	Asp	Gly	Leu	Leu	Arg	His	
1550						1555					1560				
Val	Phe	Glu	Val	Asp	Glu	Asn	Gly	Gln	Arg	Arg	Leu	Arg	Ser	Thr	
1565						1570					1575				



Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile Gly Thr  
1580 1585 1590

Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu Lys Pro  
1595 1600 1605

Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys Gln Leu  
1610 1615 1620

Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile Ala Gly  
1625 1630 1635

Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu Arg Arg  
1640 1645 1650

Lys Arg Glu Asp Lys Asp  
1655

<210> 75  
<211> 1646  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1248

<400> 75

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Thr Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Glu Ala Ala Ser Ala  
85 90 95

Ala Lys Pro Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser  
100 105 110

Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu  
115 120 125

Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys  
130 135 140

Thr Glu Lys Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr  
145 150 155 160

Leu Lys Pro Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys  
165 170 175

Trp Glu Pro Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val  
180 185 190

Val Leu Ala Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser  
195 200 205

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

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

Tyr Trp Gln Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro  
245 250 255

Thr Pro Asp Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr  
260 265 270

Gly Thr Leu Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg  
275 280 285

Phe Ala Glu Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala  
290 295 300

Arg Lys Leu Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe  
305 310 315 320

Ile Asn Gln Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys  
325 330 335

Met Arg Gln Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn  
340 345 350

His Pro Ile Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly

355

360

365

Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln  
 370 375 380

Pro Glu Gly Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn  
 385 390 395 400

Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile  
 405 410 415

Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly  
 420 425 430

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

Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr  
 450 455 460

Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe  
 465 470 475 480

Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys  
 485 490 495

Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val  
 500 505 510

Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp  
 515 520 525

Phe Val Asp Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser  
 530 535 540

Val Ser Gly Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly  
 545 550 555 560

Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly  
 565 570 575

Asn Ser Leu Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp  
 580 585 590

Val Arg Leu Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu  
 595 600 605

Arg Val Ala His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe  
610 615 620

Ser Thr Thr Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu  
625 630 635 640

Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser  
645 650 655

Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu  
660 665 670

Gly Ala Val Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser  
675 680 685

Asp Asn His Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys  
690 695 700

Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys  
705 710 715 720

Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp  
725 730 735

Ser Trp Lys Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro  
740 745 750

Lys Val Ser Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys  
755 760 765

Val Val Ala Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr  
770 775 780

Thr Phe Asp Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro  
785 790 795 800

Leu Ala Glu Asn Ile Val Pro Gly Ala Thr Val Ile Asp Ser Thr Phe  
805 810 815

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

Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser  
835 840 845

Val Asp Ile Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met  
850 855 860

Asp His Ala Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn  
865 870 875 880

Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys  
885 890 895

Leu Ala Lys Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr  
900 905 910

Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr  
915 920 925

Ser Asp Asn Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys  
930 935 940

Met Tyr Glu Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys  
945 950 955 960

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

Asp Val Pro Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser  
980 985 990

Gln Thr Pro Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala  
995 1000 1005

Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr  
1010 1015 1020

Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val  
1025 1030 1035

Ser Val Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu  
1040 1045 1050

Thr Gly Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp  
1055 1060 1065

Leu Arg Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu  
1070 1075 1080

Asp	Glu	Leu	Ile	Arg	Leu	Thr	His	Ala	Gly	Val	Ser	Val	Ser	Gly
1085						1090					1095			
Phe	Asp	Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr
1100						1105					1110			
Leu	Gly	Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly
1115						1120					1125			
Gln	Asp	Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser
1130						1135					1140			
Gln	Glu	Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu
1145						1150					1155			
Ser	Glu	Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu
1160						1165					1170			
Glu	His	Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp
1175						1180					1185			
Ala	Gln	Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	His	Tyr	Gln	Gly
1190						1195					1200			
His	Glu	Val	Ser	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu
1205						1210					1215			
Asn	Asp	Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala
1220						1225					1230			
Lys	Asn	Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Ser	Glu	Val	Lys	Glu
1235						1240					1245			
Ala	Phe	Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp
1250						1255					1260			
His	Glu	Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys
1265						1270					1275			
Leu	Thr	Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr
1280						1285					1290			
Glu	Glu	Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu
1295						1300					1305			
Leu	Leu	Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala

1310							1315					1320			
Pro	Leu	Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	
1325						1330					1335				
Ser	Pro	Glu	Glu	Leu	Thr	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	
1340						1345					1350				
Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	
1355						1360					1365				
Lys	Thr	Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	
1370						1375					1380				
Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	
1385						1390					1395				
Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	
1400						1405					1410				
Gly	Leu	Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	
1415						1420					1425				
Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	
1430						1435					1440				
Phe	Phe	Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu	
1445						1450					1455				
Gln	Thr	Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	
1460						1465					1470				
Tyr	Ala	Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	
1475						1480					1485				
Pro	Ala	Pro	Gln	Asn	Thr	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro	
1490						1495					1500				
Thr	Ser	Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu	
1505						1510					1515				
Lys	Val	Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Thr	Glu	Met	Leu	
1520						1525					1530				
Val	Gly	Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	Arg	Asp	Gly	Leu	Leu	
1535						1540					1545				

Arg His Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg  
1550 1555 1560

Ser Thr Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile  
1565 1570 1575

Gly Thr Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu  
1580 1585 1590

Lys Pro Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys  
1595 1600 1605

Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile  
1610 1615 1620

Ala Gly Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu  
1625 1630 1635

Arg Arg Lys Arg Glu Asp Lys Asp  
1640 1645

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<213> Streptococcus pneumoniae Pj-1250

<400> 76

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
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Gly Pro Ala Leu Ala Glu Glu Thr Ala Val Pro Glu Asn Ser Gly Ala  
35 40 45

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
85 90 95



Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys Thr Glu Lys  
145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln

340

345

350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
 355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
 370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
 385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
 405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
 420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
 435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
 450 455 460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
 465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
 485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
 500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
 515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
 530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
 545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
 565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
 580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Lys Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala  
865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
1010 1015 1020

Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr  
1025 1030 1035

Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val  
1040 1045 1050

Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu Thr Gly  
1055 1060 1065

Pro	Lys	Lys	Thr	Ser	Tyr	Ala	Glu	Gly	Glu	Asp	Leu	Asp	Leu	Arg
	1070					1075					1080			
Gly	Gly	Val	Leu	Arg	Val	Gln	Tyr	Glu	Gly	Gly	Thr	Glu	Asp	Glu
	1085					1090					1095			
Leu	Ile	Arg	Leu	Thr	His	Ala	Gly	Val	Ser	Val	Ser	Gly	Phe	Asp
	1100					1105					1110			
Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr	Leu	Gly
	1115					1120					1125			
Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly	Gln	Asp
	1130					1135					1140			
Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser	Gln	Glu
	1145					1150					1155			
Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu	Ser	Glu
	1160					1165					1170			
Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	Glu	His
	1175					1180					1185			
Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln
	1190					1195					1200			
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	His	Tyr	Gln	Gly	His	Glu
	1205					1210					1215			
Val	Ser	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
	1220					1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
	1235					1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Ser	Glu	Val	Lys	Glu	Ala	Phe
	1250					1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
	1265					1270					1275			
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
	1280					1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys	Glu	Glu

1295						1300						1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu	
1310						1315					1320				
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu	
1325						1330					1335				
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro	
1340						1345					1350				
Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala	
1355						1360					1365				
Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr	
1370						1375					1380				
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys	
1385						1390					1395				
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys	
1400						1405					1410				
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu	
1415						1420					1425				
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val	
1430						1435					1440				
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe	
1445						1450					1455				
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu	Gln	Thr	
1460						1465					1470				
Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	Tyr	Ala	
1475						1480					1485				
Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	Pro	Ala	
1490						1495					1500				
Pro	Gln	Asn	Lys	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro	Ala	Ser	
1505						1510					1515				
Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu	Lys	Val	
1520						1525					1530				

Ala Phe His Arg Gln Glu His Glu Asn Ala Glu Met Leu Val Gly  
1535 1540 1545

Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu Arg His  
1550 1555 1560

Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg Ser Thr  
1565 1570 1575

Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile Gly Thr  
1580 1585 1590

Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu Lys Pro  
1595 1600 1605

Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys Gln Leu  
1610 1615 1620

Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile Ala Gly  
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Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu Arg Arg  
1640 1645 1650

Lys Arg Glu Asp Lys Asp  
1655

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<213> Streptococcus pneumoniae Pj-1255  
  
<400> 77

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
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Gly Pro Ala Leu Ala Glu Glu Thr Ala Val Pro Glu Asn Ser Gly Ala  
35 40 45

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Thr Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Glu Ala Ala Ser Ala  
85 90 95

Ala Lys Pro Glu Glu Lys Ala Ser Glu Ala Val Ala Glu Thr Pro Ser  
100 105 110

Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu  
115 120 125

Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys  
130 135 140

Thr Glu Lys Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr  
145 150 155 160

Leu Lys Pro Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys  
165 170 175

Trp Glu Pro Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val  
180 185 190

Val Leu Ala Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser  
195 200 205

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

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

Tyr Trp Gln Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro  
245 250 255

Thr Pro Asp Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr  
260 265 270

Gly Thr Leu Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg  
275 280 285

Phe Ala Glu Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala  
290 295 300

Arg Lys Leu Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe



305		310		315		320
Ile Asn Gln Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys						
		325		330		335
Met Arg Gln Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn						
		340		345		350
His Pro Ile Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly						
		355		360		365
Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln						
		370		375		380
Pro Glu Gly Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn						
		385		390		400
Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile						
		405		410		415
Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly						
		420		425		430
Gly Ser Tyr Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn						
		435		440		445
Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr						
		450		455		460
Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe						
		465		470		480
Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys						
		485		490		495
Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val						
		500		505		510
Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp						
		515		520		525
Phe Val Asp Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser						
		530		535		540
Val Ser Gly Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly						
		545		550		555
						560

Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly  
565 570 575

Asn Ser Leu Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Val Gln Asp  
580 585 590

Val Arg Leu Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu  
595 600 605

Arg Val Ala His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe  
610 615 620

Ser Thr Thr Ser Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu  
625 630 635 640

Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser  
645 650 655

Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu  
660 665 670

Gly Ala Val Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser  
675 680 685

Asp Asn His Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys  
690 695 700

Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys  
705 710 715 720

Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp  
725 730 735

Ser Trp Lys Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro  
740 745 750

Lys Val Ser Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys  
755 760 765

Val Val Ala Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr  
770 775 780

Thr Phe Asp Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro  
785 790 795 800

Leu Ala Glu Asn Ile Val Pro Gly Ala Thr Val Ile Asp Ser Thr Phe  
805 810 815

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

Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser  
835 840 845

Val Asp Ile Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met  
850 855 860

Asp His Ala Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn  
865 870 875 880

Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys  
885 890 895

Leu Ala Lys Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr  
900 905 910

Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr  
915 920 925

Ser Asp Asn Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys  
930 935 940

Met Tyr Glu Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys  
945 950 955 960

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

Asp Val Pro Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser  
980 985 990

Gln Thr Pro Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala  
995 1000 1005

Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr  
1010 1015 1020

Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val  
1025 1030 1035

Ser	Val	Pro	Lys	Asp	Asp	Arg	Arg	Ile	Lys	Ser	Val	Ser	Leu	Glu
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Thr	Gly	Pro	Lys	Lys	Thr	Ser	Tyr	Ala	Glu	Gly	Glu	Asp	Leu	Asp
1055						1060					1065			
Leu	Arg	Gly	Gly	Val	Leu	Arg	Val	Gln	Tyr	Glu	Gly	Gly	Thr	Glu
1070						1075					1080			
Asp	Glu	Leu	Ile	Arg	Leu	Thr	His	Ala	Gly	Val	Ser	Val	Ser	Gly
1085						1090					1095			
Phe	Asp	Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr
1100						1105					1110			
Leu	Gly	Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly
1115						1120					1125			
Lys	Asp	Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser
1130						1135					1140			
Gln	Glu	Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu
1145						1150					1155			
Ser	Glu	Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu
1160						1165					1170			
Glu	His	Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp
1175						1180					1185			
Ala	Gln	Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	His	Tyr	Gln	Gly
1190						1195					1200			
His	Glu	Val	Ser	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu
1205						1210					1215			
Asn	Asp	Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala
1220						1225					1230			
Lys	Asn	Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu
1235						1240					1245			
Ala	Phe	Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp
1250						1255					1260			
His	Glu	Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys

1265						1270						1275			
Leu Thr	Glu Ala His Lys	Ala	Leu Asn Gly Gln	Glu	Lys Phe Lys										
1280						1285						1290			
Glu Glu	Lys Thr Glu Leu	Asp	Arg Leu Thr Gly	Glu	Val Gln Glu										
1295						1300						1305			
Leu Leu	Ala Ala Lys Pro	Asn	His Pro Ser Gly	Ser	Ala Leu Ala										
1310						1315						1320			
Pro Leu	Leu Glu Lys Asn	Lys	Ala Leu Val Glu	Lys	Val Asp Leu										
1325						1330						1335			
Ser Pro	Glu Glu Leu Thr	Thr	Ala Lys Gln Ser	Leu	Lys Asp Leu										
1340						1345						1350			
Val Ala	Leu Leu Lys Glu	Asp	Lys Pro Ala Val	Phe	Ser Asp Ser										
1355						1360						1365			
Lys Thr	Gly Val Glu Val	His	Phe Ser Asn Lys	Glu	Lys Thr Val										
1370						1375						1380			
Ile Lys	Gly Leu Lys Val	Glu	Arg Val Gln Ala	Ser	Ala Glu Glu										
1385						1390						1395			
Lys Lys	Tyr Phe Ala Gly	Glu	Asp Ala His Val	Phe	Glu Ile Glu										
1400						1405						1410			
Gly Leu	Asp Glu Lys Gly	Gln	Asp Val Asp Leu	Ser	Tyr Ala Ser										
1415						1420						1425			
Ile Val	Lys Ile Pro Ile	Glu	Lys Asp Lys Lys	Val	Lys Lys Val										
1430						1435						1440			
Phe Phe	Leu Pro Glu Gly	Lys	Glu Ala Val Glu	Leu	Ala Phe Glu										
1445						1450						1455			
Gln Thr	Asp Ser His Val	Ile	Phe Thr Ala Pro	His	Phe Thr His										
1460						1465						1470			
Tyr Ala	Phe Val Tyr Glu	Ser	Ala Glu Lys Pro	Gln	Pro Ala Lys										
1475						1480						1485			
Pro Ala	Pro Gln Asn Thr	Val	Leu Pro Lys Pro	Thr	Tyr Gln Pro										
1490						1495						1500			

Ala Ser Asp Gln Gln Lys Ala Pro Lys Leu Glu Val Gln Glu Glu  
1505 1510 1515

Lys Val Ala Phe His Arg Gln Glu His Glu Asn Ala Glu Met Leu  
1520 1525 1530

Val Gly Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu  
1535 1540 1545

Arg His Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg  
1550 1555 1560

Ser Thr Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile  
1565 1570 1575

Gly Thr Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu  
1580 1585 1590

Lys Pro Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys  
1595 1600 1605

Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile  
1610 1615 1620

Ala Gly Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu  
1625 1630 1635

Arg Arg Lys Arg Glu Asp Lys Asp  
1640 1645

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<213> Streptococcus pneumoniae Pj-1262

<400> 78

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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
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Gly Pro Ala Leu Ala Glu Glu Thr Ala Val Pro Glu Asn Ser Gly Ala  
35 40 45

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Ala Ala Ser Ala Ala Lys Pro Glu Glu Lys Ala Gly Glu Val  
85 90 95

Val Ala Glu Thr Pro Ser Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu  
100 105 110

Thr Glu Ala Lys Pro Glu Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro  
115 120 125

Ala Ala Glu Ala Asn Lys Thr Glu Lys Glu Val Gln Pro Asp Val Pro  
130 135 140

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

Trp Glu Glu Leu Leu Lys Trp Glu Pro Gly Ala Arg Glu Asp Asp Ala  
165 170 175

Ile Asn Arg Gly Ser Val Val Leu Ala Ser Arg Arg Thr Gly His Leu  
180 185 190

Val Asn Glu Lys Ala Ser Lys Glu Ala Lys Val Gln Ala Leu Ser Asn  
195 200 205

Thr Asn Ser Lys Ala Lys Asp His Ala Ser Val Gly Gly Glu Glu Phe  
210 215 220

Lys Ala Tyr Ala Phe Asp Tyr Trp Gln Tyr Leu Asp Ser Met Val Phe  
225 230 235 240

Trp Glu Gly Leu Val Pro Thr Pro Asp Val Ile Asp Ala Gly His Arg  
245 250 255

Asn Gly Val Pro Val Tyr Gly Thr Leu Phe Phe Asn Trp Ser Asn Ser  
260 265 270

Ile Ala Asp Gln Glu Arg Phe Ala Glu Ala Leu Lys Gln Asp Ala Asp  
275 280 285

Gly Ser Phe Pro Ile Ala Arg Lys Leu Val Asp Met Ala Lys Tyr Tyr

290

295

300

Gly Tyr Asp Gly Tyr Phe Ile Asn Gln Glu Thr Thr Gly Asp Leu Val  
 305 310 315 320

Lys Pro Leu Gly Glu Lys Met Arg Gln Phe Met Leu Tyr Ser Lys Glu  
 325 330 335

Tyr Ala Ala Lys Val Asn His Pro Ile Lys Tyr Ser Trp Tyr Asp Ala  
 340 345 350

Met Thr Tyr Asn Tyr Gly Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr  
 355 360 365

Asn Tyr Gln Phe Met Gln Pro Glu Gly Asp Lys Val Pro Ala Asp Asn  
 370 375 380

Phe Phe Ala Asn Phe Asn Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile  
 385 390 395 400

Ala Thr Ala Asn Trp Ile Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly  
 405 410 415

Leu Glu Leu Gln Gln Gly Gly Ser Tyr Lys Thr Lys Val Lys Trp Asn  
 420 425 430

Asp Ile Leu Asp Glu Asn Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe  
 435 440 445

Ala Pro Asp Thr Ile Thr Ser Leu Gly Lys Thr Gly Glu Asp Tyr His  
 450 455 460

Lys Asn Glu Asp Ile Phe Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly  
 465 470 475 480

Gln Lys Pro Gly Asp Lys Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala  
 485 490 495

Asp Arg Thr Pro Ala Val Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr  
 500 505 510

Gly His Gly Lys Lys Trp Phe Val Asp Gly Lys Val Ser Lys Asp Ser  
 515 520 525

Glu Trp Asn Tyr Arg Ser Val Ser Gly Val Leu Pro Thr Trp Arg Trp  
 530 535 540



Trp Gln Thr Ser Thr Gly Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr  
545 550 555 560

Asp Ala Tyr Asn Gly Gly Asn Ser Leu Lys Phe Ser Gly Asp Val Ala  
565 570 575

Gly Lys Thr Asp Gln Asp Val Arg Leu Tyr Ser Thr Lys Leu Glu Val  
580 585 590

Thr Glu Lys Thr Lys Leu Arg Val Ala His Lys Gly Gly Lys Gly Ser  
595 600 605

Lys Val Tyr Met Ala Phe Ser Thr Thr Pro Asp Tyr Lys Phe Asp Asp  
610 615 620

Ala Asp Ala Trp Lys Glu Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu  
625 630 635 640

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

Leu Phe Phe Glu His Glu Gly Ala Val Lys Asp Tyr Arg Phe Asn Leu  
660 665 670

Gly Gln Leu Thr Ile Ser Asp Asn His Gln Glu Pro Gln Ser Pro Thr  
675 680 685

Ser Phe Ser Val Val Lys Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu  
690 695 700

Ala Val Val Gln Phe Lys Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val  
705 710 715 720

Tyr Glu Lys Asp Gly Asp Ser Trp Lys Leu Leu Thr Gly Ser Ser Ser  
725 730 735

Thr Thr Ile Tyr Leu Pro Lys Val Ser Arg Ser Ala Ser Ala Gln Gly  
740 745 750

Thr Thr Gln Glu Leu Lys Val Val Ala Val Gly Lys Asn Gly Val Arg  
755 760 765

Ser Glu Ala Ala Thr Thr Thr Phe Glu Trp Gly Met Thr Val Gln Asp  
770 775 780

Thr Ser Leu Pro Arg Pro Leu Ala Glu Asn Ile Val Pro Gly Ala Thr  
785 790 795 800

Val Ile Gly Ser Thr Phe Pro Asp Thr Glu Gly Gly Glu Gly Ile Glu  
805 810 815

Gly Met Leu Asn Gly Thr Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser  
820 825 830

Ala Gln Leu Ser Gly Ser Val Asp Ile Arg Leu Thr Lys Pro Arg Thr  
835 840 845

Val Val Arg Trp Val Met Asp His Ala Gly Ala Gly Gly Glu Ser Val  
850 855 860

Asn Asp Gly Leu Met Asn Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp  
865 870 875 880

Ala Asp Gly Glu Trp Lys Leu Ala Lys Glu Val Arg Gly Asn Lys Ala  
885 890 895

His Val Thr Asp Ile Thr Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp  
900 905 910

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

Arg Ile Tyr Asn Trp Lys Met Tyr Glu Lys Leu Asp Thr Glu Ser Val  
930 935 940

Asn Ile Pro Met Ala Lys Ala Ala Ala Arg Ser Leu Gly Asn Asn Lys  
945 950 955 960

Val Gln Val Gly Phe Ala Asp Val Pro Ala Gly Ala Thr Ile Thr Val  
965 970 975

Tyr Asp Asn Pro Asn Ser Gln Thr Pro Leu Ala Thr Leu Lys Ser Glu  
980 985 990

Val Gly Gly Asp Leu Ala Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser  
995 1000 1005

Gly Leu Leu Tyr Tyr Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser  
1010 1015 1020

Asn	Val	Leu	Ala	Val	Ser	Val	Pro	Lys	Asp	Asp	Arg	Arg	Ile	Lys
1025						1030					1035			
Ser	Val	Ser	Leu	Glu	Thr	Gly	Pro	Lys	Lys	Thr	Ser	Tyr	Ala	Glu
1040						1045					1050			
Gly	Glu	Asp	Leu	Asp	Leu	Arg	Gly	Gly	Val	Leu	Arg	Val	Gln	Tyr
1055						1060					1065			
Glu	Gly	Gly	Thr	Glu	Asp	Glu	Leu	Ile	Arg	Leu	Thr	His	Ala	Gly
1070						1075					1080			
Val	Ser	Val	Ser	Gly	Phe	Asp	Thr	His	His	Lys	Gly	Glu	Gln	Asn
1085						1090					1095			
Leu	Thr	Leu	Gln	Tyr	Leu	Gly	Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser
1100						1105					1110			
Val	Thr	Val	Thr	Gly	Gln	Asp	Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu
1115						1120					1125			
Gly	Ile	Glu	Val	Ser	Gln	Glu	Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly
1130						1135					1140			
Asp	Ser	Leu	Asp	Leu	Ser	Glu	Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser
1145						1150					1155			
Asn	Asp	Thr	Met	Glu	Glu	His	Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu
1160						1165					1170			
Ile	Ser	Gly	Tyr	Asp	Ala	Gln	Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr
1175						1180					1185			
Leu	Arg	Tyr	Gln	Gly	His	Glu	Val	Asn	Phe	Asp	Val	Leu	Val	Ser
1190						1195					1200			
Pro	Lys	Ala	Ala	Leu	Asn	Asp	Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala
1205						1210					1215			
Glu	Val	Glu	Ala	Ala	Lys	Asn	Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser
1220						1225					1230			
Pro	Glu	Val	Lys	Glu	Ala	Phe	Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu
1235						1240					1245			
Gln	Val	Leu	Lys	Asp	His	Glu	Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn

1250															
Asp	Arg	Leu	Asn	Lys	Leu	Thr	Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	
1265						1270					1275				
Gln	Glu	Lys	Phe	Lys	Glu	Glu	Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	
1280						1285					1290				
Gly	Glu	Val	Gln	Glu	Leu	Leu	Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	
1295						1300					1305				
Gly	Ser	Ala	Leu	Ala	Pro	Leu	Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	
1310						1315					1320				
Glu	Lys	Val	Asp	Leu	Ser	Pro	Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	
1325						1330					1335				
Ser	Leu	Lys	Asp	Leu	Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	
1340						1345					1350				
Val	Phe	Ser	Asp	Ser	Lys	Thr	Gly	Val	Glu	Val	His	Phe	Ser	Asn	
1355						1360					1365				
Lys	Glu	Lys	Thr	Val	Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	
1370						1375					1380				
Ala	Ser	Ala	Glu	Glu	Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	
1385						1390					1395				
Val	Phe	Glu	Ile	Glu	Gly	Leu	Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	
1400						1405					1410				
Leu	Ser	Tyr	Ala	Ser	Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	
1415						1420					1425				
Lys	Val	Lys	Lys	Val	Phe	Phe	Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	
1430						1435					1440				
Glu	Leu	Ala	Phe	Glu	Gln	Thr	Asp	Ser	His	Val	Ile	Phe	Thr	Ala	
1445						1450					1455				
Pro	His	Phe	Thr	His	Tyr	Ala	Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	
1460						1465					1470				
Pro	Gln	Pro	Ala	Lys	Pro	Ala	Pro	Gln	Asn	Thr	Val	Leu	Pro	Lys	
1475						1480					1485				

Pro Thr Tyr Gln Pro Ala Ser Asp Gln Gln Lys Ala Pro Lys Leu  
1490 1495 1500

Glu Val Gln Glu Glu Lys Val Ala Phe His Arg Gln Glu His Glu  
1505 1510 1515

Asn Ala Glu Met Leu Val Gly Glu Gln Arg Val Ile Ile Gln Gly  
1520 1525 1530

Arg Asp Gly Leu Leu Arg His Val Phe Glu Val Asp Glu Asn Gly  
1535 1540 1545

Gln Arg Arg Leu Arg Ser Thr Glu Val Ile Gln Glu Ala Ile Pro  
1550 1555 1560

Glu Ile Val Glu Ile Gly Thr Lys Val Lys Thr Val Pro Ala Val  
1565 1570 1575

Val Ala Thr Gln Glu Lys Pro Ala Gln Asn Thr Ala Val Lys Ser  
1580 1585 1590

Glu Glu Ala Ser Lys Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala  
1595 1600 1605

Asn Glu Ala Leu Ile Ala Gly Leu Ala Ser Leu Gly Leu Ala Ser  
1610 1615 1620

Leu Ala Leu Thr Leu Arg Arg Lys Arg Glu Asp Lys Asp  
1625 1630 1635

<210> 79  
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<213> Streptococcus pneumoniae Pj-1279

<400> 79

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
85 90 95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Thr Lys Pro  
100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Val Glu Ala  
115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys Thr Glu Lys  
145 150 155 160

Glu Val Gln Ser Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu

290					295					300					
Ala 305	Leu	Lys	Gln	Asp	Ala 310	Asp	Gly	Ser	Phe	Pro 315	Ile	Ala	Arg	Lys	Leu 320
Val	Asp	Met	Ala	Lys 325	Tyr	Tyr	Gly	Tyr	Asp 330	Gly	Tyr	Phe	Ile	Asn 335	Gln
Glu	Thr	Thr	Gly 340	Asp	Leu	Val	Lys	Pro 345	Leu	Gly	Glu	Lys	Met 350	Arg	Gln
Phe	Met	Leu 355	Tyr	Ser	Lys	Glu	Tyr 360	Ala	Ala	Lys	Val	Asn 365	His	Pro	Ile
Lys 370	Tyr	Ser	Trp	Tyr	Asp	Ala 375	Met	Thr	Tyr	Asn	Tyr 380	Gly	Arg	Tyr	His
Gln 385	Asp	Gly	Leu	Gly	Glu 390	Tyr	Asn	Tyr	Gln	Phe 395	Met	Gln	Pro	Glu	Gly 400
Asp	Lys	Val	Pro	Ala 405	Asp	Asn	Phe	Phe	Ala 410	Asn	Phe	Asn	Trp	Asp 415	Lys
Ala	Lys	Asn	Asp 420	Tyr	Thr	Ile	Ala	Thr 425	Ala	Asn	Trp	Ile	Gly 430	Arg	Asn
Pro	Tyr	Asp 435	Val	Phe	Ala	Gly	Leu 440	Glu	Leu	Gln	Gln	Gly 445	Gly	Ser	Tyr
Lys 450	Thr	Lys	Val	Lys	Trp	Asn 455	Asp	Ile	Leu	Asp	Glu 460	Asn	Gly	Lys	Leu
Arg 465	Leu	Ser	Leu	Gly	Leu 470	Phe	Ala	Pro	Asp 475	Thr	Ile	Thr	Ser	Leu	Gly 480
Lys	Thr	Gly	Glu	Asp 485	Tyr	His	Lys	Asn	Glu 490	Asp	Ile	Phe	Phe	Thr 495	Gly
Tyr	Gln	Gly	Asp 500	Pro	Thr	Gly	Gln	Lys 505	Pro	Gly	Asp	Lys	Asp 510	Trp	Tyr
Gly	Ile	Ala 515	Asn	Leu	Val	Ala	Asp 520	Arg	Thr	Pro	Ala	Val 525	Gly	Asn	Thr
Phe 530	Thr	Thr	Ser	Phe	Asn	Thr 535	Gly	His	Gly	Lys	Lys 540	Trp	Phe	Val	Asp

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Ala Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780



Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala  
865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
1010 1015 1020

Pro	Leu	Asp	Leu	Thr	Asn	Gln	Ser	Gly	Leu	Leu	Tyr	Tyr	Arg	Thr
1025						1030					1035			
Gln	Leu	Pro	Gly	Lys	Glu	Ile	Ser	Asn	Val	Leu	Ala	Val	Ser	Val
1040						1045					1050			
Pro	Lys	Asp	Asp	Arg	Arg	Ile	Lys	Ser	Val	Ser	Leu	Glu	Thr	Gly
1055						1060					1065			
Pro	Lys	Lys	Thr	Ser	Tyr	Ala	Glu	Gly	Glu	Asp	Leu	Asp	Leu	Arg
1070						1075					1080			
Gly	Gly	Val	Leu	Arg	Val	Gln	Tyr	Glu	Gly	Gly	Thr	Glu	Asp	Glu
1085						1090					1095			
Leu	Ile	Arg	Leu	Thr	His	Ala	Gly	Val	Ser	Val	Ser	Gly	Phe	Asp
1100						1105					1110			
Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr	Leu	Gly
1115						1120					1125			
Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly	Gln	Asp
1130						1135					1140			
Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser	Gln	Glu
1145						1150					1155			
Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu	Ser	Glu
1160						1165					1170			
Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	Glu	His
1175						1180					1185			
Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln
1190						1195					1200			
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	His	Tyr	Gln	Gly	His	Glu
1205						1210					1215			
Val	Ser	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
1220						1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
1235						1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu	Ala	Phe

1250						1255						1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu	
1265						1270					1275				
Ile	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr	
1280						1285					1290				
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys	Glu	Glu	
1295						1300					1305				
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu	
1310						1315					1320				
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu	
1325						1330					1335				
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro	
1340						1345					1350				
Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala	
1355						1360					1365				
Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr	
1370						1375					1380				
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys	
1385						1390					1395				
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys	
1400						1405					1410				
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu	
1415						1420					1425				
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val	
1430						1435					1440				
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe	
1445						1450					1455				
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu	Gln	Thr	
1460						1465					1470				
Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	Tyr	Ala	
1475						1480					1485				

Phe Val Tyr Glu Ser Ala Glu Lys Pro Gln Pro Ala Lys Pro Ala  
1490 1495 1500

Pro Gln Asn Thr Val Leu Pro Lys Pro Thr Tyr Gln Pro Ala Ser  
1505 1510 1515

Asp Gln Gln Lys Ala Pro Lys Leu Glu Val Gln Glu Glu Lys Val  
1520 1525 1530

Ala Phe His Arg Gln Glu His Glu Asn Ala Glu Met Leu Val Gly  
1535 1540 1545

Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu Arg His  
1550 1555 1560

Val Phe Glu Val Asp Glu Lys Gly Gln Arg Arg Leu Arg Ser Thr  
1565 1570 1575

Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile Gly Thr  
1580 1585 1590

Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu Lys Pro  
1595 1600 1605

Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys Gln Leu  
1610 1615 1620

Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Thr Leu Ile Ala Gly  
1625 1630 1635

Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu Arg Arg  
1640 1645 1650

Lys Arg Glu Asp Lys Asp  
1655

<210> 80  
<211> 1646  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1283

<400> 80

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Glu Ala Ala Ser Ala  
85 90 95

Ala Lys Pro Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser  
100 105 110

Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu  
115 120 125

Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys  
130 135 140

Thr Glu Lys Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr  
145 150 155 160

Leu Lys Pro Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys  
165 170 175

Trp Glu Pro Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val  
180 185 190

Val Leu Ala Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser  
195 200 205

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

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

Tyr Trp Gln Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro  
245 250 255

Thr Pro Asp Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr

260

265

270

Gly Thr Leu Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg  
 275 280 285

Phe Ala Glu Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala  
 290 295 300

Arg Lys Leu Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe  
 305 310 315 320

Ile Asn Gln Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys  
 325 330 335

Met Arg Gln Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn  
 340 345 350

His Pro Ile Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly  
 355 360 365

Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln  
 370 375 380

Pro Glu Gly Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn  
 385 390 395 400

Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile  
 405 410 415

Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly  
 420 425 430

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

Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr  
 450 455 460

Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe  
 465 470 475 480

Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys  
 485 490 495

Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val  
 500 505 510

Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp  
515 520 525

Phe Val Asp Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser  
530 535 540

Val Ser Gly Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly  
545 550 555 560

Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly  
565 570 575

Asn Ser Leu Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp  
580 585 590

Val Arg Leu Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu  
595 600 605

Arg Val Ala His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe  
610 615 620

Ser Thr Thr Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu  
625 630 635 640

Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu Glu Phe Ala Leu Ser Ser  
645 650 655

Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu  
660 665 670

Gly Ala Val Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser  
675 680 685

Asp Asn His Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys  
690 695 700

Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys  
705 710 715 720

Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp  
725 730 735

Ser Trp Lys Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro  
740 745 750

Lys Val Ser Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys  
755 760 765

Val Val Ala Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr  
770 775 780

Thr Phe Asp Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro  
785 790 795 800

Leu Ala Glu Asn Ile Val Pro Gly Ala Thr Val Ile Asp Ser Thr Phe  
805 810 815

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

Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser  
835 840 845

Val Asp Ile Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met  
850 855 860

Asp His Ala Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn  
865 870 875 880

Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys  
885 890 895

Leu Ala Lys Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr  
900 905 910

Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr  
915 920 925

Ser Asp Asn Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys  
930 935 940

Met Tyr Glu Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys  
945 950 955 960

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

Asp Val Pro Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser  
980 985 990



Gln Thr Pro Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala  
995 1000 1005

Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr  
1010 1015 1020

Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val  
1025 1030 1035

Ser Val Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu  
1040 1045 1050

Thr Gly Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp  
1055 1060 1065

Leu Arg Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu  
1070 1075 1080

Asp Glu Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly  
1085 1090 1095

Phe Asp Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr  
1100 1105 1110

Leu Gly Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly  
1115 1120 1125

Gln Asp Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile Glu Val Ser  
1130 1135 1140

Gln Glu Pro Lys Lys Asp Tyr Leu Val Gly Asp Asn Leu Asp Leu  
1145 1150 1155

Ser Glu Gly Arg Phe Ala Val Ala Tyr Ser Asn Asp Thr Met Glu  
1160 1165 1170

Glu His Ser Phe Thr Asp Glu Gly Val Glu Ile Ser Gly Tyr Asp  
1175 1180 1185

Ala Gln Lys Thr Gly Arg Gln Thr Leu Thr Leu Arg Tyr Gln Gly  
1190 1195 1200

His Glu Val Asn Phe Asp Val Leu Val Ser Pro Lys Ala Ala Leu  
1205 1210 1215

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

1220		1225		1230
Lys Asn Lys Val Val Tyr Asn Phe Ala Ser Pro Glu Val Lys Glu				
1235		1240		1245
Ala Phe Leu Lys Ala Ile Glu Ala Ala Glu Gln Val Leu Lys Asp				
1250		1255		1260
His Glu Thr Ser Thr Gln Asp Gln Val Asn Asp Arg Leu Asn Lys				
1265		1270		1275
Leu Thr Glu Ala His Lys Ala Leu Asn Gly Gln Glu Lys Phe Thr				
1280		1285		1290
Glu Glu Lys Thr Glu Leu Asp Arg Leu Thr Gly Glu Ala Gln Glu				
1295		1300		1305
Leu Leu Ala Ala Lys Pro Asn His Pro Ser Gly Ser Ala Leu Ala				
1310		1315		1320
Pro Leu Leu Glu Lys Asn Lys Ala Leu Val Glu Lys Val Asp Leu				
1325		1330		1335
Ser Pro Glu Glu Leu Ala Thr Ala Lys Gln Ser Leu Lys Asp Leu				
1340		1345		1350
Val Ala Leu Leu Lys Glu Asp Lys Ser Ala Val Phe Ser Asp Ser				
1355		1360		1365
Lys Thr Gly Val Glu Val His Phe Ser Asn Lys Glu Lys Thr Val				
1370		1375		1380
Ile Lys Gly Leu Lys Val Glu Arg Val Gln Ala Ser Ala Glu Glu				
1385		1390		1395
Lys Lys Tyr Phe Ala Gly Glu Asp Ala His Val Phe Glu Ile Glu				
1400		1405		1410
Gly Leu Asp Glu Lys Gly Gln Asp Val Asp Leu Ser Tyr Ala Ser				
1415		1420		1425
Ile Val Lys Ile Pro Ile Glu Lys Asp Lys Lys Val Lys Lys Val				
1430		1435		1440
Phe Phe Leu Pro Glu Gly Lys Glu Ala Val Glu Leu Ala Phe Glu				
1445		1450		1455

Gln Thr Asp Ser His Val Ile Phe Thr Ala Pro His Phe Thr His  
1460 1465 1470

Tyr Ala Phe Val Tyr Glu Ser Ala Glu Lys Pro Gln Pro Ala Lys  
1475 1480 1485

Pro Ala Pro Gln Asn Lys Val Leu Pro Lys Pro Thr Tyr Gln Pro  
1490 1495 1500

Ala Ser Asp Gln Gln Lys Ala Pro Lys Leu Glu Val Gln Glu Glu  
1505 1510 1515

Lys Val Ala Phe His Arg Gln Glu His Glu Asn Ala Glu Met Leu  
1520 1525 1530

Val Gly Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu  
1535 1540 1545

Arg His Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg  
1550 1555 1560

Ser Thr Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile  
1565 1570 1575

Gly Thr Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu  
1580 1585 1590

Lys Pro Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys  
1595 1600 1605

Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile  
1610 1615 1620

Ala Gly Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu  
1625 1630 1635

Arg Arg Lys Arg Glu Asp Lys Asp  
1640 1645

<210> 81  
<211> 1659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1284

<400> 81

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

245								250				255			
Tyr	Leu	Asp	Ser	Met	Val	Phe	Trp	Glu	Gly	Leu	Val	Pro	Thr	Pro	Asp
			260				265						270		
Val	Ile	Asp	Ala	Gly	His	Arg	Asn	Gly	Val	Pro	Val	Tyr	Gly	Thr	Leu
			275				280						285		
Phe	Phe	Asn	Trp	Ser	Asn	Ser	Ile	Ala	Asp	Gln	Glu	Arg	Phe	Ala	Glu
			290				295						300		
Ala	Leu	Lys	Gln	Asp	Ala	Asp	Gly	Ser	Phe	Pro	Ile	Ala	Arg	Lys	Leu
			305	310						315			320		
Val	Asp	Met	Ala	Lys	Tyr	Tyr	Gly	Tyr	Asp	Gly	Tyr	Phe	Ile	Asn	Gln
			325				330						335		
Glu	Thr	Thr	Gly	Asp	Leu	Val	Lys	Pro	Leu	Gly	Glu	Lys	Met	Arg	Gln
			340				345						350		
Phe	Met	Leu	Tyr	Ser	Lys	Glu	Tyr	Ala	Ala	Lys	Val	Asn	His	Pro	Ile
			355				360						365		
Lys	Tyr	Ser	Trp	Tyr	Asp	Ala	Met	Thr	Tyr	Asn	Tyr	Gly	Arg	Tyr	His
			370	375						380					
Gln	Asp	Gly	Leu	Gly	Glu	Tyr	Asn	Tyr	Gln	Phe	Met	Gln	Pro	Glu	Gly
			385	390						395			400		
Asp	Lys	Val	Pro	Ala	Asp	Asn	Phe	Phe	Ala	Asn	Phe	Asn	Trp	Asp	Lys
			405				410						415		
Ala	Lys	Asn	Asp	Tyr	Thr	Ile	Ala	Thr	Ala	Asn	Trp	Ile	Gly	Arg	Asn
			420				425						430		
Pro	Tyr	Asp	Val	Phe	Ala	Gly	Leu	Glu	Leu	Gln	Gln	Gly	Gly	Ser	Tyr
			435				440						445		
Lys	Thr	Lys	Val	Lys	Trp	Asn	Asp	Ile	Leu	Asp	Glu	Asn	Gly	Lys	Leu
			450	455						460					
Arg	Leu	Ser	Leu	Gly	Leu	Phe	Ala	Pro	Asp	Thr	Ile	Thr	Ser	Leu	Gly
			465	470						475			480		
Lys	Thr	Gly	Glu	Asp	Tyr	His	Lys	Asn	Glu	Asp	Ile	Phe	Phe	Thr	Gly
			485				490						495		

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala  
865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
1010 1015 1020

Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr  
1025 1030 1035

Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val  
1040 1045 1050

Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu Thr Gly  
1055 1060 1065

Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp Leu Arg  
1070 1075 1080

Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu Asp Glu  
1085 1090 1095

Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly Phe Asp  
1100 1105 1110

Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr Leu Gly  
1115 1120 1125

Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly Gln Asp  
1130 1135 1140

Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile Glu Val Ser Gln Glu  
1145 1150 1155

Pro Lys Lys Asp Tyr Leu Val Gly Asp Ser Leu Asp Leu Ser Glu  
1160 1165 1170

Gly Arg Phe Ala Val Ala Tyr Ser Asn Asp Thr Met Glu Glu His  
1175 1180 1185

Ser Phe Thr Asp Glu Gly Val Glu Ile Ser Gly Tyr Asp Ala Gln  
1190 1195 1200

Lys Thr Gly Arg Gln Thr Leu Thr Leu His Tyr Gln Gly His Glu



1205						1210						1215			
Val	Ser	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp	
1220						1225						1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn	
1235						1240						1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Ser	Glu	Val	Lys	Glu	Ala	Phe	
1250						1255						1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu	
1265						1270						1275			
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr	
1280						1285						1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys	Glu	Glu	
1295						1300						1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu	
1310						1315						1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu	
1325						1330						1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro	
1340						1345						1350			
Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala	
1355						1360						1365			
Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr	
1370						1375						1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys	
1385						1390						1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys	
1400						1405						1410			
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu	
1415						1420						1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val	
1430						1435						1440			

[illegible]

<210> 82  
<211> 1659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1291

<400> 82

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
85 90 95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys Thr Glu Lys  
145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala

210		215		220
Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala				
225		230		240
Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln				
	245		250	255
Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp				
	260		265	270
Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu				
	275		280	285
Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu				
	290		295	300
Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu				
	305		310	315
Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln				
	325		330	335
Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln				
	340		345	350
Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile				
	355		360	365
Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His				
	370		375	380
Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly				
	385		390	395
Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys				
	405		410	415
Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn				
	420		425	430
Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr				
	435		440	445
Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu				
	450		455	460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
850 855 860

Arg Leu Thr Lys Ser Arg Thr Val Val Arg Trp Val Met Asp His Ala  
865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
1010 1015 1020

Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr  
1025 1030 1035

Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val  
1040 1045 1050

Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu Thr Gly  
1055 1060 1065

Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp Leu Arg  
1070 1075 1080

Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu Asp Glu  
1085 1090 1095

Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly Phe Asp  
1100 1105 1110

Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr Leu Gly  
1115 1120 1125

Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly Gln Asp  
1130 1135 1140

Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile Glu Val Ser Gln Glu  
1145 1150 1155

Pro Lys Lys Asp Tyr Leu Val Gly Asp Ser Leu Asp Leu Ser Glu  
1160 1165 1170

Gly Arg Phe Ala Val Ala Tyr Ser Asn Asp Thr Met Glu Glu His

1175						1180						1185			
Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln	
1190						1195					1200				
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly	His	Glu	
1205						1210					1215				
Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp	
1220						1225					1230				
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn	
1235						1240					1245				
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu	Ala	Phe	
1250						1255					1260				
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu	
1265						1270					1275				
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr	
1280						1285					1290				
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr	Glu	Glu	
1295						1300					1305				
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Ala	Gln	Glu	Leu	Leu	
1310						1315					1320				
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu	
1325						1330					1335				
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro	
1340						1345					1350				
Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala	
1355						1360					1365				
Leu	Leu	Lys	Glu	Asp	Lys	Ser	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr	
1370						1375					1380				
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys	
1385						1390					1395				
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys	
1400						1405					1410				



Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
1415						1420					1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val
1430						1435					1440			
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe
1445						1450					1455			
Leu	Pro	Glu	Gly	Lys	Gly	Ala	Val	Glu	Leu	Ala	Phe	Glu	Gln	Thr
1460						1465					1470			
Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	Tyr	Ala
1475						1480					1485			
Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	Pro	Ala
1490						1495					1500			
Pro	Gln	Asn	Lys	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro	Ala	Ser
1505						1510					1515			
Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu	Lys	Val
1520						1525					1530			
Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Thr	Glu	Met	Leu	Val	Gly
1535						1540					1545			
Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	Arg	Asp	Gly	Leu	Leu	Arg	His
1550						1555					1560			
Val	Phe	Glu	Val	Asp	Glu	Lys	Gly	Gln	Arg	Arg	Leu	Arg	Ser	Thr
1565						1570					1575			
Glu	Val	Ile	Gln	Glu	Ala	Ile	Pro	Glu	Ile	Val	Glu	Ile	Gly	Thr
1580						1585					1590			
Lys	Val	Lys	Thr	Val	Pro	Ala	Val	Val	Ala	Thr	Gln	Glu	Lys	Pro
1595						1600					1605			
Ala	Gln	Asn	Thr	Ala	Val	Lys	Ser	Glu	Glu	Ala	Ser	Lys	Gln	Leu
1610						1615					1620			
Pro	Asn	Thr	Gly	Thr	Ala	Asp	Ala	Asn	Glu	Ala	Leu	Ile	Ala	Gly
1625						1630					1635			

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1640 1645 1650

Lys Arg Glu Asp Lys Asp  
1655

<210> 83  
<211> 1646  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1297  
  
<400> 83

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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Thr Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Glu Ala Ala Ser Ala  
85 90 95

Ala Lys Pro Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser  
100 105 110

Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu  
115 120 125

Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys  
130 135 140

Thr Glu Lys Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr  
145 150 155 160

Leu Lys Pro Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys  
165 170 175

Trp Glu Pro Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val

			180				185				190				
Val	Leu	Ala	Ser	Arg	Arg	Thr	Gly	His	Leu	Val	Asn	Glu	Lys	Ala	Ser
		195					200					205			
Lys	Glu	Ala	Lys	Val	Gln	Ala	Leu	Ser	Asn	Thr	Asn	Ser	Lys	Ala	Lys
		210				215					220				
Asp	His	Ala	Ser	Val	Gly	Gly	Glu	Glu	Phe	Lys	Ala	Tyr	Ala	Phe	Asp
225					230					235					240
Tyr	Trp	Gln	Tyr	Leu	Asp	Ser	Met	Val	Phe	Trp	Glu	Gly	Leu	Val	Pro
				245					250					255	
Thr	Pro	Asp	Val	Ile	Asp	Ala	Gly	His	Arg	Asn	Gly	Val	Pro	Val	Tyr
			260					265					270		
Gly	Thr	Leu	Phe	Phe	Asn	Trp	Ser	Asn	Ser	Ile	Ala	Asp	Gln	Glu	Arg
		275					280					285			
Phe	Ala	Glu	Ala	Leu	Lys	Gln	Asp	Ala	Asp	Gly	Ser	Phe	Pro	Ile	Ala
		290				295					300				
Arg	Lys	Leu	Val	Asp	Met	Ala	Lys	Tyr	Tyr	Gly	Tyr	Asp	Gly	Tyr	Phe
305					310					315					320
Ile	Asn	Gln	Glu	Thr	Thr	Gly	Asp	Leu	Val	Lys	Pro	Leu	Gly	Glu	Lys
				325					330					335	
Met	Arg	Gln	Phe	Met	Leu	Tyr	Ser	Lys	Glu	Tyr	Ala	Ala	Lys	Val	Asn
			340					345					350		
His	Pro	Ile	Lys	Tyr	Ser	Trp	Tyr	Asp	Ala	Met	Thr	Tyr	Asn	Tyr	Gly
		355					360					365			
Arg	Tyr	His	Gln	Asp	Gly	Leu	Gly	Glu	Tyr	Asn	Tyr	Gln	Phe	Met	Gln
		370				375					380				
Pro	Glu	Gly	Asp	Lys	Val	Pro	Ala	Asp	Asn	Phe	Phe	Ala	Asn	Phe	Asn
385					390					395					400
Trp	Asp	Lys	Ala	Lys	Asn	Asp	Tyr	Thr	Ile	Ala	Thr	Ala	Asn	Trp	Ile
				405					410					415	
Gly	Arg	Asn	Pro	Tyr	Asp	Val	Phe	Ala	Gly	Leu	Glu	Leu	Gln	Gln	Gly
			420					425					430		

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

Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr  
450 455 460

Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe  
465 470 475 480

Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys  
485 490 495

Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val  
500 505 510

Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp  
515 520 525

Phe Val Asp Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser  
530 535 540

Val Ser Gly Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly  
545 550 555 560

Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly  
565 570 575

Asn Ser Leu Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp  
580 585 590

Val Arg Leu Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu  
595 600 605

Arg Val Ala His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe  
610 615 620

Ser Thr Thr Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu  
625 630 635 640

Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser  
645 650 655

Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu  
660 665 670

Gly Ala Val Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser  
675 680 685

Asp Asn His Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys  
690 695 700

Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys  
705 710 715 720

Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp  
725 730 735

Asn Trp Lys Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro  
740 745 750

Lys Val Ser Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys  
755 760 765

Val Val Ala Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr  
770 775 780

Thr Phe Asp Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro  
785 790 795 800

Leu Ala Glu Asn Ile Val Pro Gly Ala Thr Val Ile Asp Ser Thr Phe  
805 810 815

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

Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser  
835 840 845

Val Asp Ile Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met  
850 855 860

Asp His Ala Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn  
865 870 875 880

Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys  
885 890 895

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

Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr  
915 920 925

Ser Asp Asn Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys  
930 935 940

Met Tyr Glu Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys  
945 950 955 960

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

Asp Val Pro Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser  
980 985 990

Gln Thr Pro Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala  
995 1000 1005

Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr  
1010 1015 1020

Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val  
1025 1030 1035

Ser Val Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu  
1040 1045 1050

Thr Gly Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp  
1055 1060 1065

Leu Arg Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu  
1070 1075 1080

Asp Glu Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly  
1085 1090 1095

Phe Asp Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr  
1100 1105 1110

Leu Gly Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly  
1115 1120 1125

Gln Asp Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile Glu Val Ser  
1130 1135 1140

Gln Glu Pro Lys Lys Asp Tyr Leu Val Gly Asp Ser Leu Asp Leu

1145						1150						1155			
Ser	Glu	Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	
1160						1165					1170				
Glu	His	Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	
1175						1180					1185				
Ala	Gln	Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly	
1190						1195					1200				
His	Glu	Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	
1205						1210					1215				
Asn	Asp	Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	
1220						1225					1230				
Lys	Asn	Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu	
1235						1240					1245				
Ala	Phe	Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	
1250						1255					1260				
His	Glu	Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	
1265						1270					1275				
Leu	Thr	Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys	
1280						1285					1290				
Glu	Glu	Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	
1295						1300					1305				
Leu	Leu	Ala	Thr	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	
1310						1315					1320				
Pro	Leu	Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	
1325						1330					1335				
Ser	Pro	Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	
1340						1345					1350				
Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	
1355						1360					1365				
Lys	Thr	Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	
1370						1375					1380				

Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu
1385						1390					1395			
Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu
1400						1405					1410			
Gly	Leu	Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser
1415						1420					1425			
Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val
1430						1435					1440			
Phe	Phe	Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu
1445						1450					1455			
Gln	Thr	Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His
1460						1465					1470			
Tyr	Ala	Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys
1475						1480					1485			
Pro	Ala	Pro	Gln	Asn	Lys	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro
1490						1495					1500			
Ala	Ser	Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu
1505						1510					1515			
Lys	Val	Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Thr	Glu	Met	Leu
1520						1525					1530			
Val	Gly	Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	Arg	Asp	Gly	Leu	Leu
1535						1540					1545			
Arg	His	Val	Phe	Glu	Val	Asp	Glu	Asn	Gly	Gln	Arg	Arg	Leu	Arg
1550						1555					1560			
Ser	Thr	Glu	Val	Ile	Gln	Glu	Ala	Ile	Pro	Glu	Ile	Val	Glu	Ile
1565						1570					1575			
Gly	Thr	Lys	Val	Lys	Thr	Val	Pro	Ala	Val	Val	Ala	Thr	Gln	Glu
1580						1585					1590			
Lys	Pro	Ala	Gln	Asn	Thr	Ala	Val	Lys	Ser	Glu	Glu	Ala	Ser	Lys
1595						1600					1605			



Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile  
1610 1615 1620

Ala Gly Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu  
1625 1630 1635

Arg Arg Lys Arg Glu Asp Lys Asp  
1640 1645

<210> 84  
<211> 1682  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1298

<400> 84

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Pro Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Glu Ala Ala Ser Ala  
85 90 95

Ala Lys Pro Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser  
100 105 110

Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu  
115 120 125

Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys  
130 135 140

Thr Glu Lys Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr  
145 150 155 160

Leu Lys Pro Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys

165

170

175

Trp Glu Pro Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val  
 180 185 190

Val Leu Ala Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser  
 195 200 205

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

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

Tyr Trp Gln Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro  
 245 250 255

Thr Pro Asp Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr  
 260 265 270

Gly Thr Leu Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg  
 275 280 285

Phe Ala Glu Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala  
 290 295 300

Arg Lys Leu Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe  
 305 310 315 320

Ile Asn Gln Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys  
 325 330 335

Met Arg Gln Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn  
 340 345 350

His Pro Ile Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly  
 355 360 365

Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln  
 370 375 380

Pro Glu Gly Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn  
 385 390 395 400

Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile  
 405 410 415

Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly  
420 425 430

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

Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr  
450 455 460

Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe  
465 470 475 480

Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys  
485 490 495

Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val  
500 505 510

Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp  
515 520 525

Phe Val Asp Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser  
530 535 540

Val Ser Gly Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly  
545 550 555 560

Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly  
565 570 575

Asn Ser Leu Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp  
580 585 590

Val Arg Leu Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu  
595 600 605

Arg Val Ala His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe  
610 615 620

Ser Thr Thr Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu  
625 630 635 640

Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu Glu Phe Ala Leu Ser Ser  
645 650 655

Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu  
660 665 670

Gly Ala Val Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser  
675 680 685

Asp Asn His Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys  
690 695 700

Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys  
705 710 715 720

Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp  
725 730 735

Ser Trp Lys Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro  
740 745 750

Lys Val Ser Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys  
755 760 765

Val Val Ala Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr  
770 775 780

Ile Tyr Leu Pro Lys Val Ser Arg Ser Ala Ser Ala Gln Gly Thr Thr  
785 790 795 800

Gln Glu Leu Lys Val Val Ala Val Gly Lys Asn Gly Val Arg Ser Glu  
805 810 815

Ala Ala Thr Thr Thr Phe Asp Trp Gly Met Thr Val Lys Asp Thr Ser  
820 825 830

Leu Pro Lys Pro Leu Ala Glu Asn Ile Val Pro Gly Ala Thr Val Ile  
835 840 845

Asp Ser Thr Phe Pro Lys Thr Glu Gly Gly Glu Gly Ile Glu Gly Met  
850 855 860

Leu Asn Gly Thr Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser Ala Gln  
865 870 875 880

Leu Ser Gly Ser Val Asp Ile Arg Leu Thr Lys Pro Arg Thr Val Val  
885 890 895

Arg	Trp	Val	Met	Asp	His	Ala	Gly	Ala	Gly	Gly	Glu	Ser	Val	Asn	Asp	900	905	910
Gly	Leu	Met	Asn	Thr	Lys	Asp	Phe	Asp	Leu	Tyr	Tyr	Lys	Asp	Ala	Asp	915	920	925
Gly	Glu	Trp	Lys	Leu	Ala	Lys	Glu	Val	Arg	Gly	Asn	Lys	Ala	His	Val	930	935	940
Thr	Asp	Ile	Thr	Leu	Asp	Lys	Pro	Ile	Thr	Ala	Gln	Asp	Trp	Arg	Leu	945	950	955
Asn	Val	Val	Thr	Ser	Asp	Asn	Gly	Thr	Pro	Trp	Lys	Ala	Ile	Arg	Ile	965	970	975
Tyr	Asn	Trp	Lys	Met	Tyr	Glu	Lys	Leu	Asp	Thr	Glu	Ser	Val	Asn	Ile	980	985	990
Pro	Met	Ala	Lys	Ala	Ala	Ala	Arg	Ser	Leu	Gly	Asn	Asn	Lys	Val	Gln	995	1000	1005
Val	Gly	Phe	Ala	Asp	Val	Pro	Ala	Gly	Ala	Thr	Ile	Thr	Val	Tyr		1010	1015	1020
Asp	Asn	Pro	Asn	Ser	Gln	Thr	Pro	Leu	Ala	Thr	Leu	Lys	Ser	Glu		1025	1030	1035
Val	Gly	Gly	Asp	Leu	Ala	Ser	Ala	Pro	Leu	Asp	Leu	Thr	Asn	Gln		1040	1045	1050
Ser	Gly	Leu	Leu	Tyr	Tyr	Arg	Thr	Gln	Leu	Pro	Gly	Lys	Glu	Ile		1055	1060	1065
Ser	Asn	Val	Leu	Ala	Val	Ser	Val	Pro	Lys	Asp	Asp	Arg	Arg	Ile		1070	1075	1080
Lys	Ser	Val	Ser	Leu	Glu	Thr	Gly	Pro	Lys	Lys	Thr	Ser	Tyr	Ala		1085	1090	1095
Glu	Gly	Glu	Asp	Leu	Asp	Leu	Arg	Gly	Gly	Val	Leu	Arg	Val	Gln		1100	1105	1110
Tyr	Glu	Gly	Gly	Thr	Glu	Asp	Glu	Leu	Ile	Arg	Leu	Thr	His	Ala		1115	1120	1125
Gly	Val	Ser	Val	Ser	Gly	Phe	Asp	Thr	His	His	Lys	Gly	Glu	Gln				

1130						1135						1140			
Asn	Leu	Thr	Leu	Gln	Tyr	Leu	Gly	Gln	Pro	Val	Asn	Ala	Asn	Leu	
1145						1150					1155				
Ser	Val	Thr	Val	Thr	Gly	Gln	Asp	Glu	Ala	Ser	Pro	Lys	Thr	Ile	
1160						1165					1170				
Leu	Gly	Ile	Glu	Val	Ser	Gln	Glu	Pro	Lys	Lys	Asp	Tyr	Leu	Val	
1175						1180					1185				
Gly	Asp	Asn	Leu	Asp	Leu	Ser	Glu	Gly	Arg	Phe	Ala	Val	Ala	Tyr	
1190						1195					1200				
Ser	Asn	Asp	Thr	Met	Glu	Glu	His	Ser	Phe	Thr	Asp	Glu	Gly	Val	
1205						1210					1215				
Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln	Lys	Thr	Gly	Arg	Gln	Thr	Leu	
1220						1225					1230				
Thr	Leu	Arg	Tyr	Gln	Gly	His	Glu	Val	Asn	Phe	Asp	Val	Leu	Val	
1235						1240					1245				
Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp	Glu	Tyr	Leu	Lys	Gln	Lys	Leu	
1250						1255					1260				
Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn	Lys	Val	Val	Tyr	Asn	Phe	Ala	
1265						1270					1275				
Ser	Pro	Glu	Val	Lys	Glu	Ala	Phe	Leu	Lys	Ala	Ile	Glu	Ala	Ala	
1280						1285					1290				
Glu	Gln	Val	Leu	Lys	Asp	His	Glu	Thr	Ser	Thr	Gln	Asp	Gln	Val	
1295						1300					1305				
Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr	Glu	Ala	His	Lys	Ala	Leu	Asn	
1310						1315					1320				
Gly	Gln	Glu	Lys	Phe	Thr	Glu	Glu	Lys	Thr	Glu	Leu	Asp	Arg	Leu	
1325						1330					1335				
Thr	Gly	Glu	Ala	Gln	Glu	Leu	Leu	Ala	Ala	Lys	Pro	Asn	His	Pro	
1340						1345					1350				
Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu	Leu	Glu	Lys	Asn	Lys	Ala	Leu	
1355						1360					1365				

Val	Glu	Lys	Val	Asp	Leu	Ser	Pro	Glu	Glu	Leu	Ala	Thr	Ala	Lys
1370						1375					1380			
Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Ser
1385						1390					1395			
Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr	Gly	Val	Glu	Val	His	Phe	Ser
1400						1405					1410			
Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val
1415						1420					1425			
Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala
1430						1435					1440			
His	Val	Phe	Glu	Ile	Glu	Gly	Leu	Asp	Glu	Lys	Gly	Gln	Asp	Val
1445						1450					1455			
Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp
1460						1465					1470			
Lys	Lys	Val	Lys	Lys	Val	Phe	Phe	Leu	Pro	Glu	Gly	Lys	Glu	Ala
1475						1480					1485			
Val	Glu	Leu	Ala	Phe	Glu	Gln	Thr	Asp	Ser	His	Val	Ile	Phe	Thr
1490						1495					1500			
Ala	Pro	His	Phe	Thr	His	Tyr	Ala	Phe	Val	Tyr	Glu	Ser	Ala	Glu
1505						1510					1515			
Lys	Pro	Gln	Pro	Ala	Lys	Pro	Ala	Pro	Gln	Asn	Lys	Val	Leu	Pro
1520						1525					1530			
Lys	Pro	Thr	Tyr	Gln	Pro	Ala	Ser	Asp	Gln	Gln	Lys	Ala	Pro	Lys
1535						1540					1545			
Leu	Glu	Val	Gln	Glu	Glu	Lys	Val	Ala	Phe	His	Arg	Gln	Glu	His
1550						1555					1560			
Glu	Asn	Ala	Glu	Met	Leu	Val	Gly	Glu	Gln	Arg	Val	Ile	Ile	Gln
1565						1570					1575			
Gly	Arg	Asp	Gly	Leu	Leu	Arg	His	Val	Phe	Glu	Val	Asp	Glu	Asn
1580						1585					1590			

Gly Gln Arg Arg Leu Arg Ser Thr Glu Val Ile Gln Glu Ala Ile  
1595 1600 1605

Pro Glu Ile Val Glu Ile Gly Thr Lys Val Lys Thr Val Pro Ala  
1610 1615 1620

Val Val Ala Thr Gln Glu Lys Pro Ala Gln Asn Thr Ala Val Lys  
1625 1630 1635

Ser Glu Glu Ala Ser Lys Gln Leu Pro Asn Thr Gly Thr Ala Asp  
1640 1645 1650

Ala Asn Glu Ala Leu Ile Ala Gly Leu Ala Ser Leu Gly Leu Ala  
1655 1660 1665

Ser Leu Ala Leu Thr Leu Arg Arg Lys Arg Glu Asp Lys Asp  
1670 1675 1680

<210> 85  
<211> 1636  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1300

<400> 85

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
1 5 10 15

Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Ala Ala Ser Ala Ala Lys Pro Glu Glu Lys Ala Gly Glu Val  
85 90 95

Val Ala Glu Thr Pro Ser Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu  
100 105 110

Thr Glu Ala Lys Pro Glu Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro



115																			
Ala	Ala	Glu	Ala	Asn	Lys	Thr	Glu	Lys	Glu	Val	Gln	Pro	Asp	Val	Pro				
130						135					140								
Lys	Asn	Thr	Glu	Lys	Thr	Leu	Lys	Pro	Lys	Glu	Ile	Lys	Phe	Asn	Ser				
145					150					155					160				
Trp	Glu	Glu	Leu	Leu	Lys	Trp	Glu	Pro	Gly	Ala	Arg	Glu	Asp	Asp	Ala				
				165					170					175					
Ile	Asn	Arg	Gly	Ser	Val	Val	Leu	Ala	Ser	Arg	Arg	Thr	Gly	His	Leu				
			180					185					190						
Val	Asn	Glu	Lys	Ala	Ser	Lys	Glu	Ala	Lys	Val	Gln	Ala	Leu	Ser	Asn				
		195					200					205							
Thr	Asn	Ser	Lys	Ala	Lys	Asp	His	Ala	Ser	Val	Gly	Gly	Glu	Glu	Phe				
210						215					220								
Lys	Ala	Tyr	Ala	Phe	Asp	Tyr	Trp	Gln	Tyr	Leu	Asp	Ser	Met	Val	Phe				
225					230					235					240				
Trp	Glu	Gly	Leu	Val	Pro	Thr	Pro	Asp	Val	Ile	Asp	Ala	Gly	His	Arg				
				245					250					255					
Asn	Gly	Val	Pro	Val	Tyr	Gly	Thr	Leu	Phe	Phe	Asn	Trp	Ser	Asn	Ser				
			260					265					270						
Ile	Ala	Asp	Gln	Glu	Arg	Phe	Ala	Glu	Ala	Leu	Lys	Gln	Asp	Ala	Asp				
		275					280					285							
Gly	Ser	Phe	Pro	Ile	Ala	Arg	Lys	Leu	Val	Asp	Met	Ala	Lys	Tyr	Tyr				
290						295					300								
Gly	Tyr	Asp	Gly	Tyr	Phe	Ile	Asn	Gln	Glu	Thr	Thr	Gly	Asp	Leu	Val				
305					310					315				320					
Lys	Pro	Leu	Gly	Glu	Lys	Met	Arg	Gln	Phe	Met	Leu	Tyr	Ser	Lys	Glu				
				325					330					335					
Tyr	Ala	Ala	Lys	Val	Asn	His	Pro	Ile	Lys	Tyr	Ser	Trp	Tyr	Asp	Ala				
			340					345					350						
Met	Thr	Tyr	Asn	Tyr	Gly	Arg	Tyr	His	Gln	Asp	Gly	Leu	Gly	Glu	Tyr				
		355					360					365							

Asn Tyr Gln Phe Met Gln Pro Glu Gly Asp Lys Val Pro Ala Asp Asn  
370 375 380

Phe Phe Ala Asn Phe Asn Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile  
385 390 395 400

Ala Thr Ala Asn Trp Ile Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly  
405 410 415

Leu Glu Leu Gln Gln Gly Gly Ser Tyr Lys Thr Lys Val Lys Trp Asn  
420 425 430

Asp Ile Leu Asp Glu Asn Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe  
435 440 445

Ala Pro Asp Thr Ile Thr Ser Leu Gly Lys Thr Gly Glu Asp Tyr His  
450 455 460

Lys Asn Glu Asp Ile Phe Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly  
465 470 475 480

Gln Lys Pro Gly Asp Lys Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala  
485 490 495

Asp Arg Thr Pro Ala Val Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr  
500 505 510

Gly His Gly Lys Lys Trp Phe Val Asp Gly Lys Val Ser Lys Asp Ser  
515 520 525

Glu Trp Asn Tyr Arg Ser Val Ser Gly Val Leu Pro Thr Trp Arg Trp  
530 535 540

Trp Gln Thr Ser Thr Gly Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr  
545 550 555 560

Asp Ala Tyr Asn Gly Gly Asn Ser Leu Lys Phe Ser Gly Asp Val Ala  
565 570 575

Gly Lys Thr Asp Gln Asp Val Arg Leu Tyr Ser Thr Lys Leu Glu Val  
580 585 590

Thr Glu Lys Thr Lys Leu Arg Val Ala His Lys Gly Gly Lys Gly Ser  
595 600 605

Lys Val Tyr Met Ala Phe Ser Thr Thr Pro Asp Tyr Lys Phe Asp Asp  
610 615 620

Ala Asp Ala Trp Lys Glu Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu  
625 630 635 640

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

Leu Phe Phe Glu His Glu Gly Ala Val Lys Asp Tyr Gln Phe Asn Leu  
660 665 670

Gly Gln Leu Thr Ile Ser Asp Asn His Gln Glu Pro Gln Ser Pro Thr  
675 680 685

Ser Phe Ser Val Val Lys Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu  
690 695 700

Ala Val Val Gln Phe Lys Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val  
705 710 715 720

Tyr Glu Lys Asp Gly Asp Ser Trp Lys Leu Leu Thr Gly Ser Ser Ser  
725 730 735

Thr Thr Ile Tyr Leu Pro Lys Val Ser Arg Ser Ala Ser Ala Gln Gly  
740 745 750

Thr Thr Gln Glu Leu Lys Val Val Ala Val Gly Lys Asn Gly Val Arg  
755 760 765

Ser Glu Ala Ala Thr Thr Thr Phe Glu Trp Gly Met Thr Val Gln Asp  
770 775 780

Thr Ser Leu Pro Arg Pro Leu Ala Glu Asn Ile Val Pro Gly Ala Thr  
785 790 795 800

Val Ile Gly Ser Thr Phe Pro Asp Thr Glu Gly Gly Glu Gly Ile Glu  
805 810 815

Gly Met Leu Asn Gly Thr Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser  
820 825 830

Ala Gln Leu Ser Gly Ser Val Asp Ile Arg Leu Thr Lys Pro Arg Thr  
835 840 845

Val Val Arg Trp Val Met Asp His Ala Gly Ala Gly Gly Glu Ser Val  
 850 855 860

Asn Asp Gly Leu Met Asn Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp  
 865 870 875 880

Ala Asp Gly Lys Trp Lys Leu Ala Lys Glu Val Arg Gly Asn Lys Ala  
 885 890 895

His Val Thr Asp Ile Thr Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp  
 900 905 910

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

Arg Ile Tyr Asn Trp Lys Met Tyr Glu Lys Leu Asp Thr Glu Ser Val  
 930 935 940

Asn Ile Pro Met Ala Lys Ala Ala Ala Arg Ser Leu Gly Asn Asn Lys  
 945 950 955 960

Val Gln Val Gly Phe Ala Asp Val Pro Ala Gly Ala Thr Ile Thr Val  
 965 970 975

Tyr Asp Asn Pro Asn Ser Gln Thr Pro Leu Ala Thr Leu Lys Ser Glu  
 980 985 990

Val Gly Gly Asp Leu Ala Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser  
 995 1000 1005

Gly Leu Leu Tyr Tyr Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser  
 1010 1015 1020

Asn Val Leu Ala Val Ser Val Pro Lys Asp Asp Arg Arg Ile Lys  
 1025 1030 1035

Ser Val Ser Leu Glu Thr Gly Pro Lys Lys Thr Ser Tyr Ala Glu  
 1040 1045 1050

Gly Glu Asp Leu Asp Leu Arg Gly Gly Val Leu Arg Val Gln Tyr  
 1055 1060 1065

Glu Gly Gly Thr Glu Asp Glu Leu Ile Arg Leu Thr His Ala Gly  
 1070 1075 1080

Val Ser Val Ser Gly Phe Asp Thr His His Lys Gly Glu Gln Asn

	1085					1090					1095				
Leu	Thr	Leu	Gln	Tyr	Leu	Gly	Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	
	1100					1105					1110				
Val	Thr	Val	Thr	Gly	Gln	Asp	Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	
	1115					1120					1125				
Gly	Ile	Glu	Val	Ser	Gln	Glu	Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	
	1130					1135					1140				
Asp	Ser	Leu	Asp	Leu	Ser	Glu	Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	
	1145					1150					1155				
Asn	Asp	Thr	Met	Glu	Glu	His	Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	
	1160					1165					1170				
Ile	Ser	Gly	Tyr	Asp	Ala	Gln	Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	
	1175					1180					1185				
Leu	Arg	Tyr	Gln	Gly	His	Glu	Val	Asn	Phe	Asp	Val	Leu	Val	Ser	
	1190					1195					1200				
Pro	Lys	Ala	Ala	Leu	Asn	Asp	Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	
	1205					1210					1215				
Glu	Val	Glu	Ala	Ala	Lys	Asn	Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	
	1220					1225					1230				
Pro	Glu	Val	Lys	Glu	Ala	Phe	Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	
	1235					1240					1245				
Gln	Val	Leu	Lys	Asp	His	Glu	Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	
	1250					1255					1260				
Asp	Arg	Leu	Asn	Lys	Leu	Thr	Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	
	1265					1270					1275				
Gln	Glu	Lys	Phe	Lys	Glu	Glu	Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	
	1280					1285					1290				
Gly	Glu	Val	Gln	Glu	Leu	Leu	Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	
	1295					1300					1305				
Gly	Ser	Ala	Leu	Ala	Pro	Leu	Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	
	1310					1315					1320				

Glu	Lys	Val	Asp	Leu	Ser	Pro	Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln
1325						1330					1335			
Ser	Leu	Lys	Asp	Leu	Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala
1340						1345					1350			
Val	Phe	Ser	Asp	Ser	Lys	Thr	Gly	Val	Glu	Val	His	Phe	Ser	Asn
1355						1360					1365			
Lys	Glu	Lys	Thr	Val	Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val	Gln
1370						1375					1380			
Ala	Ser	Ala	Glu	Glu	Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His
1385						1390					1395			
Val	Phe	Glu	Ile	Glu	Gly	Leu	Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp
1400						1405					1410			
Leu	Ser	Tyr	Ala	Ser	Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys
1415						1420					1425			
Lys	Val	Lys	Lys	Val	Phe	Phe	Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val
1430						1435					1440			
Glu	Leu	Ala	Phe	Glu	Gln	Thr	Asp	Ser	His	Val	Ile	Phe	Thr	Ala
1445						1450					1455			
Pro	His	Phe	Thr	His	Tyr	Ala	Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys
1460						1465					1470			
Pro	Gln	Pro	Ala	Lys	Pro	Ala	Pro	Gln	Asn	Lys	Val	Leu	Pro	Lys
1475						1480					1485			
Pro	Thr	Tyr	Gln	Pro	Ala	Ser	Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu
1490						1495					1500			
Glu	Val	Gln	Glu	Glu	Lys	Val	Ala	Phe	His	Arg	Gln	Glu	His	Glu
1505						1510					1515			
Asn	Thr	Glu	Met	Leu	Val	Gly	Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly
1520						1525					1530			
Arg	Asp	Gly	Leu	Leu	Arg	His	Val	Phe	Glu	Val	Asp	Glu	Asn	Gly
1535						1540					1545			

Gln Arg Arg Leu Arg Ser Thr Glu Val Ile Gln Glu Ala Ile Pro  
1550 1555 1560

Glu Ile Val Glu Ile Gly Thr Lys Val Lys Thr Val Pro Ala Val  
1565 1570 1575

Val Ala Thr Gln Glu Lys Pro Ala Gln Asn Thr Ala Val Lys Ser  
1580 1585 1590

Glu Glu Ala Ser Lys Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala  
1595 1600 1605

Asn Glu Ala Leu Ile Ala Gly Leu Ala Ser Leu Gly Leu Ala Ser  
1610 1615 1620

Leu Ala Leu Thr Leu Arg Arg Lys Arg Glu Asp Lys Asp  
1625 1630 1635

<210> 86  
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<212> PRT  
<213> Streptococcus pneumoniae Pj-1322

<400> 86

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Thr Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Glu Ala Ala Ser Ala  
85 90 95

Ala Lys Pro Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser  
100 105 110

Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu

115					120					125						
Ala	Thr	Asn	Gln	Gly	Asp	Glu	Ser	Lys	Pro	Ala	Ala	Glu	Ala	Asn	Lys	
130						135				140						
Thr	Glu	Lys	Glu	Val	Gln	Pro	Asp	Val	Pro	Lys	Asn	Thr	Glu	Lys	Thr	
145						150				155		160				
Leu	Lys	Pro	Lys	Glu	Ile	Lys	Phe	Asn	Ser	Trp	Glu	Glu	Leu	Leu	Lys	
				165						170		175				
Trp	Glu	Pro	Gly	Ala	Arg	Glu	Asp	Asp	Ala	Ile	Asn	Arg	Gly	Ser	Val	
			180						185		190					
Val	Leu	Ala	Ser	Arg	Arg	Thr	Gly	His	Leu	Val	Asn	Glu	Lys	Ala	Ser	
195						200						205				
Lys	Glu	Ala	Lys	Val	Gln	Ala	Leu	Ser	Asn	Thr	Asn	Ser	Lys	Ala	Lys	
210						215						220				
Asp	His	Ala	Ser	Val	Gly	Gly	Glu	Glu	Phe	Lys	Ala	Tyr	Ala	Phe	Asp	
225						230						235		240		
Tyr	Trp	Gln	Tyr	Leu	Asp	Ser	Met	Val	Phe	Trp	Glu	Gly	Leu	Val	Pro	
				245						250		255				
Thr	Pro	Asp	Val	Ile	Asp	Ala	Gly	His	Arg	Asn	Gly	Val	Pro	Val	Tyr	
			260						265		270					
Gly	Thr	Leu	Phe	Phe	Asn	Trp	Ser	Asn	Ser	Ile	Ala	Asp	Gln	Glu	Arg	
275						280						285				
Phe	Ala	Glu	Ala	Leu	Lys	Gln	Asp	Ala	Asp	Gly	Ser	Phe	Pro	Ile	Ala	
290						295						300				
Arg	Lys	Leu	Val	Asp	Met	Ala	Lys	Tyr	Tyr	Gly	Tyr	Asp	Gly	Tyr	Phe	
305						310						315		320		
Ile	Asn	Gln	Glu	Thr	Thr	Gly	Asp	Leu	Val	Lys	Pro	Leu	Gly	Glu	Lys	
				325						330		335				
Met	Arg	Gln	Phe	Met	Leu	Tyr	Ser	Lys	Glu	Tyr	Ala	Ala	Lys	Val	Asn	
			340						345		350					
His	Pro	Ile	Lys	Tyr	Ser	Trp	Tyr	Asp	Ala	Met	Thr	Tyr	Asn	Tyr	Gly	
355						360						365				



Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln  
370 375 380

Pro Glu Gly Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn  
385 390 395 400

Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile  
405 410 415

Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly  
420 425 430

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

Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr  
450 455 460

Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe  
465 470 475 480

Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys  
485 490 495

Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val  
500 505 510

Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp  
515 520 525

Phe Val Asp Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser  
530 535 540

Val Ser Gly Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly  
545 550 555 560

Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly  
565 570 575

Asn Ser Leu Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp  
580 585 590

Val Arg Leu Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu  
595 600 605

Arg Val Ala His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe  
610 615 620

Ser Thr Thr Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu  
625 630 635 640

Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser  
645 650 655

Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu  
660 665 670

Gly Ala Val Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser  
675 680 685

Asp Asn His Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys  
690 695 700

Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys  
705 710 715 720

Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp  
725 730 735

Ser Trp Lys Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro  
740 745 750

Lys Val Ser Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys  
755 760 765

Val Val Ala Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr  
770 775 780

Thr Phe Asp Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro  
785 790 795 800

Leu Ala Glu Asn Ile Val Pro Gly Ala Thr Val Ile Asp Ser Thr Phe  
805 810 815

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

Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser  
835 840 845

Val Asp Ile Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met  
850 855 860

Asp His Ala Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn  
865 870 875 880

Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys  
885 890 895

Leu Ala Lys Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr  
900 905 910

Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr  
915 920 925

Ser Asp Asn Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys  
930 935 940

Met Tyr Glu Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys  
945 950 955 960

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

Asp Val Pro Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser  
980 985 990

Gln Thr Pro Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala  
995 1000 1005

Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr  
1010 1015 1020

Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val  
1025 1030 1035

Ser Val Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu  
1040 1045 1050

Thr Gly Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp  
1055 1060 1065

Leu Arg Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu  
1070 1075 1080

Asp Glu Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly

1085						1090						1095			
Phe	Asp	Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr	
1100						1105					1110				
Leu	Gly	Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly	
1115						1120					1125				
Gln	Asp	Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser	
1130						1135					1140				
Gln	Lys	Pro	Lys	Lys	Asn	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu	
1145						1150					1155				
Ser	Glu	Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	
1160						1165					1170				
Glu	His	Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	
1175						1180					1185				
Ala	Gln	Lys	Ile	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly	
1190						1195					1200				
His	Glu	Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	
1205						1210					1215				
Asn	Asp	Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	
1220						1225					1230				
Lys	Asn	Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Glu	
1235						1240					1245				
Ala	Phe	Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	
1250						1255					1260				
His	Glu	Ile	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	
1265						1270					1275				
Leu	Thr	Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys	
1280						1285					1290				
Glu	Glu	Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	
1295						1300					1305				
Leu	Leu	Asp	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	
1310						1315					1320				

Pro	Leu	Leu	Glu	Lys	Asn	Lys	Val	Leu	Val	Glu	Lys	Val	Asp	Leu
1325						1330					1335			
Ser	Pro	Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu
1340						1345					1350			
Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser
1355						1360					1365			
Lys	Thr	Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val
1370						1375					1380			
Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu
1385						1390					1395			
Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu
1400						1405					1410			
Gly	Leu	Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser
1415						1420					1425			
Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val
1430						1435					1440			
Phe	Phe	Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu
1445						1450					1455			
Gln	Thr	Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His
1460						1465					1470			
Tyr	Ala	Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys
1475						1480					1485			
Pro	Ala	Pro	Gln	Asn	Lys	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro
1490						1495					1500			
Ala	Ser	Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu
1505						1510					1515			
Lys	Val	Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Ala	Glu	Met	Leu
1520						1525					1530			
Val	Gly	Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	Arg	Asp	Gly	Leu	Leu
1535						1540					1545			

Arg His Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg  
1550 1555 1560

Ser Thr Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile  
1565 1570 1575

Gly Thr Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu  
1580 1585 1590

Lys Pro Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys  
1595 1600 1605

Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile  
1610 1615 1620

Ala Gly Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu  
1625 1630 1635

Arg Arg Lys Arg Glu Asp Lys Asp  
1640 1645

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<211> 1646  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1330  
  
<400> 87

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
1 5 10 15

Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Thr Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Glu Ala Ala Ser Ala  
85 90 95

Ala Lys Pro Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser

100	105	110
Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu		
115	120	125
Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys		
130	135	140
Thr Glu Lys Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr		
145	150	155
Leu Lys Pro Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys		
165	170	175
Trp Glu Pro Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val		
180	185	190
Val Leu Ala Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser		
195	200	205
Lys Glu Ala Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys		
210	215	220
Asp His Ala Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp		
225	230	235
Tyr Trp Gln Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro		
245	250	255
Thr Pro Asp Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr		
260	265	270
Gly Thr Leu Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg		
275	280	285
Phe Ala Glu Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala		
290	295	300
Arg Lys Leu Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe		
305	310	315
Ile Asn Gln Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys		
325	330	335
Met Arg Gln Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn		
340	345	350

His Pro Ile Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly  
355 360 365

Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln  
370 375 380

Pro Glu Gly Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn  
385 390 395 400

Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile  
405 410 415

Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly  
420 425 430

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

Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr  
450 455 460

Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe  
465 470 475 480

Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys  
485 490 495

Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val  
500 505 510

Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp  
515 520 525

Phe Val Asp Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser  
530 535 540

Val Ser Gly Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly  
545 550 555 560

Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly  
565 570 575

Asn Ser Leu Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp  
580 585 590



Val Arg Leu Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu  
595 600 605

Arg Val Ala His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe  
610 615 620

Ser Thr Thr Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu  
625 630 635 640

Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser  
645 650 655

Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu  
660 665 670

Gly Ala Val Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser  
675 680 685

Asp Asn His Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys  
690 695 700

Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys  
705 710 715 720

Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp  
725 730 735

Ser Trp Lys Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro  
740 745 750

Lys Val Ser Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys  
755 760 765

Val Val Ala Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr  
770 775 780

Thr Phe Asp Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro  
785 790 795 800

Leu Ala Glu Asn Ile Val Pro Gly Ala Thr Val Ile Asp Ser Thr Phe  
805 810 815

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

Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser  
835 840 845

Val Asp Ile Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met  
850 855 860

Asp His Ala Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn  
865 870 875 880

Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys  
885 890 895

Leu Ala Lys Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr  
900 905 910

Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr  
915 920 925

Ser Asp Asn Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys  
930 935 940

Met Tyr Glu Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys  
945 950 955 960

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

Asp Val Pro Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser  
980 985 990

Gln Thr Pro Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala  
995 1000 1005

Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr  
1010 1015 1020

Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val  
1025 1030 1035

Ser Val Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu  
1040 1045 1050

Thr Gly Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp  
1055 1060 1065

Leu Arg Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu

1070	1075	1080
Asp Glu Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly 1085	1090	1095
Phe Asp Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr 1100	1105	1110
Leu Gly Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly 1115	1120	1125
Gln Asp Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile Glu Val Ser 1130	1135	1140
Gln Glu Pro Lys Lys Asp Tyr Leu Val Gly Asp Ser Leu Asp Leu 1145	1150	1155
Ser Glu Gly Arg Phe Ala Val Ala Tyr Ser Asn Asp Thr Met Glu 1160	1165	1170
Glu His Ser Phe Thr Asp Glu Gly Val Glu Ile Ser Gly Tyr Asp 1175	1180	1185
Ala Gln Lys Thr Gly Arg Gln Thr Leu Thr Leu His Tyr Gln Gly 1190	1195	1200
His Glu Val Ser Phe Asp Val Leu Val Ser Pro Lys Ala Ala Leu 1205	1210	1215
Asn Asp Glu Tyr Leu Lys Gln Lys Leu Ala Glu Val Glu Ala Ala 1220	1225	1230
Lys Asn Lys Val Val Tyr Asn Phe Ala Ser Ser Glu Val Lys Glu 1235	1240	1245
Ala Phe Leu Lys Ala Ile Glu Ala Ala Glu Gln Val Leu Lys Asp 1250	1255	1260
His Glu Thr Ser Thr Gln Asp Gln Val Asn Asp Arg Leu Asn Lys 1265	1270	1275
Leu Thr Glu Ala His Lys Ala Leu Asn Gly Gln Glu Lys Phe Thr 1280	1285	1290
Glu Glu Lys Thr Glu Leu Asp Arg Leu Thr Gly Glu Val Gln Glu 1295	1300	1305

Leu	Leu	Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala
1310						1315					1320			
Pro	Leu	Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu
1325						1330					1335			
Ser	Pro	Glu	Glu	Leu	Thr	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu
1340						1345					1350			
Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser
1355						1360					1365			
Lys	Thr	Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val
1370						1375					1380			
Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu
1385						1390					1395			
Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu
1400						1405					1410			
Gly	Leu	Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser
1415						1420					1425			
Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val
1430						1435					1440			
Phe	Phe	Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu
1445						1450					1455			
Gln	Thr	Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His
1460						1465					1470			
Tyr	Ala	Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys
1475						1480					1485			
Pro	Ala	Pro	Gln	Asn	Thr	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro
1490						1495					1500			
Thr	Ser	Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu
1505						1510					1515			
Lys	Val	Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Thr	Glu	Met	Leu
1520						1525					1530			

Val Gly Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu  
1535 1540 1545

Arg His Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg  
1550 1555 1560

Ser Thr Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile  
1565 1570 1575

Gly Thr Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu  
1580 1585 1590

Lys Pro Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys  
1595 1600 1605

Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile  
1610 1615 1620

Ala Gly Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu  
1625 1630 1635

Arg Arg Lys Arg Glu Asp Lys Asp  
1640 1645

<210> 88  
<211> 1659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1347

<400> 88

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
1 5 10 15

Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn

85

90

95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
 100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
 115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
 130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Glu Glu Ala Asn Lys Thr Glu Lys  
 145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
 165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
 180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
 195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
 210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
 225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
 245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
 260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
 275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
 290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
 305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
 325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
805 810 815



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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
850 855 860

Arg Leu Thr Lys Ser Arg Thr Val Val Arg Trp Val Met Asp His Ala  
865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro  
980 985 990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
1010 1015 1020

Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr  
1025 1030 1035

Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val  
1040 1045 1050

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

1055						1060						1065			
Pro	Lys	Lys	Thr	Ser	Tyr	Ala	Glu	Gly	Glu	Asp	Leu	Asp	Leu	Arg	
1070						1075					1080				
Gly	Gly	Val	Leu	Arg	Val	Gln	Tyr	Glu	Gly	Gly	Thr	Glu	Asp	Glu	
1085						1090					1095				
Leu	Ile	Arg	Leu	Thr	His	Ala	Gly	Val	Ser	Val	Ser	Gly	Phe	Asp	
1100						1105					1110				
Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr	Leu	Gly	
1115						1120					1125				
Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly	Gln	Asp	
1130						1135					1140				
Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser	Gln	Glu	
1145						1150					1155				
Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu	Ser	Glu	
1160						1165					1170				
Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	Glu	His	
1175						1180					1185				
Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln	
1190						1195					1200				
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	Arg	Tyr	Gln	Gly	His	Glu	
1205						1210					1215				
Val	Asn	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp	
1220						1225					1230				
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn	
1235						1240					1245				
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Pro	Glu	Val	Lys	Ala	Ala	Phe	
1250						1255					1260				
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu	
1265						1270					1275				
Ile	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr	
1280						1285					1290				

Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys	Glu	Glu
1295						1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu
1310						1315					1320			
Asp	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
1325						1330					1335			
Leu	Glu	Lys	Asn	Lys	Val	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
1340						1345					1350			
Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
1355						1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
1370						1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys
1385						1390					1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
1400						1405					1410			
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
1415						1420					1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val
1430						1435					1440			
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe
1445						1450					1455			
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu	Gln	Thr
1460						1465					1470			
Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	Tyr	Ala
1475						1480					1485			
Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	Pro	Ala
1490						1495					1500			
Pro	Gln	Asn	Thr	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro	Ala	Ser
1505						1510					1515			

Asp Gln Gln Lys Ala Pro Lys Leu Glu Val Gln Glu Glu Lys Val  
1520 1525 1530

Ala Phe His Arg Gln Glu His Glu Asn Ala Glu Met Leu Val Gly  
1535 1540 1545

Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu Arg His  
1550 1555 1560

Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg Ser Thr  
1565 1570 1575

Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile Gly Thr  
1580 1585 1590

Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu Lys Pro  
1595 1600 1605

Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys Gln Leu  
1610 1615 1620

Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile Ala Gly  
1625 1630 1635

Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu Arg Arg  
1640 1645 1650

Lys Arg Glu Asp Lys Asp  
1655

<210> 89  
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<213> Streptococcus pneumoniae Pj-1369

<400> 89

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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala

50																
Asp	Lys	Gln	Asn	Glu	Gly	Glu	His	Thr	Arg	Glu	Asn	Lys	Leu	Glu	Lys	
65					70					75					80	
Ala	Glu	Gly	Val	Ala	Thr	Ala	Ser	Glu	Thr	Ala	Glu	Ala	Ala	Ser	Ala	
				85					90					95		
Ala	Lys	Pro	Glu	Glu	Lys	Ala	Ser	Glu	Val	Val	Ala	Glu	Thr	Pro	Ser	
			100					105					110			
Ala	Glu	Ala	Lys	Pro	Lys	Ser	Asp	Lys	Glu	Thr	Glu	Ala	Lys	Pro	Glu	
		115					120					125				
Ala	Thr	Asn	Gln	Gly	Asp	Glu	Ser	Lys	Pro	Ala	Ala	Glu	Ala	Asn	Lys	
	130					135						140				
Thr	Glu	Lys	Glu	Val	Gln	Pro	Asp	Val	Pro	Lys	Asn	Thr	Glu	Lys	Thr	
145					150					155					160	
Leu	Lys	Pro	Lys	Glu	Ile	Lys	Phe	Asn	Ser	Trp	Glu	Glu	Leu	Leu	Lys	
				165					170					175		
Trp	Glu	Pro	Gly	Ala	Arg	Glu	Asp	Asp	Ala	Ile	Asn	Arg	Gly	Ser	Val	
			180					185					190			
Val	Leu	Ala	Ser	Arg	Arg	Thr	Gly	His	Leu	Val	Asn	Glu	Lys	Ala	Ser	
		195					200					205				
Lys	Glu	Ala	Lys	Val	Gln	Ala	Leu	Ser	Asn	Thr	Asn	Ser	Lys	Ala	Lys	
	210					215					220					
Asp	His	Ala	Ser	Val	Gly	Gly	Glu	Glu	Phe	Lys	Ala	Tyr	Ala	Phe	Asp	
225					230					235					240	
Tyr	Trp	Gln	Tyr	Leu	Asp	Ser	Met	Val	Phe	Trp	Glu	Gly	Leu	Val	Pro	
				245					250					255		
Thr	Pro	Asp	Val	Ile	Asp	Ala	Gly	His	Arg	Asn	Gly	Val	Pro	Val	Tyr	
			260					265					270			
Gly	Thr	Leu	Phe	Phe	Asn	Trp	Ser	Asn	Ser	Ile	Ala	Asp	Gln	Glu	Arg	
		275					280					285				
Phe	Ala	Glu	Ala	Leu	Lys	Gln	Asp	Ala	Asp	Gly	Ser	Phe	Pro	Ile	Ala	
	290					295					300					

Arg Lys Leu Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe  
305 310 315 320

Ile Asn Gln Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys  
325 330 335

Met Arg Gln Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn  
340 345 350

His Pro Ile Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly  
355 360 365

Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln  
370 375 380

Pro Glu Gly Asp Lys Val Pro Val Asp Asn Phe Phe Ala Asn Phe Asn  
385 390 395 400

Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile  
405 410 415

Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly  
420 425 430

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

Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr  
450 455 460

Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe  
465 470 475 480

Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys  
485 490 495

Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val  
500 505 510

Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp  
515 520 525

Phe Val Asp Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser  
530 535 540

Val Ser Gly Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly  
545 550 555 560

Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly  
565 570 575

Asn Ser Leu Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp  
580 585 590

Val Arg Leu Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu  
595 600 605

Arg Val Ala His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe  
610 615 620

Ser Thr Thr Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu  
625 630 635 640

Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser  
645 650 655

Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu  
660 665 670

Gly Ala Val Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser  
675 680 685

Asp Asn His Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys  
690 695 700

Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys  
705 710 715 720

Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp  
725 730 735

Asn Trp Lys Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro  
740 745 750

Lys Val Ser Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys  
755 760 765

Val Val Ala Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr  
770 775 780

Thr Phe Asp Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro  
785 790 795 800

Leu Ala Glu Asn Ile Val Pro Gly Ala Thr Val Ile Asp Ser Thr Phe  
805 810 815

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

Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser  
835 840 845

Val Asp Ile Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met  
850 855 860

Asp His Ala Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn  
865 870 875 880

Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys  
885 890 895

Leu Ala Lys Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr  
900 905 910

Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr  
915 920 925

Ser Asp Asn Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys  
930 935 940

Met Tyr Glu Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys  
945 950 955 960

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

Asp Val Pro Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser  
980 985 990

Gln Thr Pro Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala  
995 1000 1005

Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr  
1010 1015 1020

Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val



1025		1030		1035
Ser Val Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu				
1040		1045		1050
Thr Gly Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp				
1055		1060		1065
Leu Arg Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu				
1070		1075		1080
Asp Glu Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly				
1085		1090		1095
Phe Asp Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr				
1100		1105		1110
Leu Gly Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly				
1115		1120		1125
Gln Asp Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile Glu Val Ser				
1130		1135		1140
Gln Glu Pro Lys Lys Asp Tyr Leu Val Gly Asp Ser Leu Asp Leu				
1145		1150		1155
Ser Glu Gly Arg Phe Ala Val Ala Tyr Ser Asn Asp Thr Met Glu				
1160		1165		1170
Glu His Ser Phe Thr Asp Glu Gly Val Glu Ile Ser Gly Tyr Asp				
1175		1180		1185
Ala Gln Lys Thr Gly Arg Gln Thr Leu Thr Leu His Tyr Gln Gly				
1190		1195		1200
His Glu Val Ser Phe Asp Val Leu Val Ser Pro Lys Ala Ala Leu				
1205		1210		1215
Asn Asp Glu Tyr Leu Lys Gln Lys Leu Ala Glu Val Glu Ala Ala				
1220		1225		1230
Lys Asn Lys Val Val Tyr Asn Phe Ala Ser Ser Glu Val Lys Glu				
1235		1240		1245
Ala Phe Leu Lys Ala Ile Glu Ala Ala Glu Gln Val Leu Lys Asp				
1250		1255		1260

His	Glu	Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Glu
1265						1270					1275			
Leu	Thr	Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr
1280						1285					1290			
Glu	Glu	Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu
1295						1300					1305			
Leu	Leu	Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala
1310						1315					1320			
Pro	Leu	Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu
1325						1330					1335			
Ser	Pro	Glu	Glu	Leu	Thr	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu
1340						1345					1350			
Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser
1355						1360					1365			
Lys	Thr	Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val
1370						1375					1380			
Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu
1385						1390					1395			
Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu
1400						1405					1410			
Gly	Leu	Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser
1415						1420					1425			
Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val
1430						1435					1440			
Phe	Phe	Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu
1445						1450					1455			
Gln	Thr	Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His
1460						1465					1470			
Tyr	Ala	Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys
1475						1480					1485			

Pro Ala Pro Gln Asn Thr Val Leu Pro Lys Pro Thr Tyr Gln Pro  
1490 1495 1500

Thr Ser Asp Gln Gln Lys Ala Pro Lys Leu Glu Val Gln Glu Glu  
1505 1510 1515

Lys Val Ala Phe His Arg Gln Glu His Glu Asn Thr Glu Met Leu  
1520 1525 1530

Val Gly Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu  
1535 1540 1545

Arg His Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg  
1550 1555 1560

Ser Thr Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile  
1565 1570 1575

Gly Thr Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu  
1580 1585 1590

Lys Pro Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys  
1595 1600 1605

Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile  
1610 1615 1620

Ala Gly Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu  
1625 1630 1635

Arg Arg Lys Arg Glu Asp Lys Asp  
1640 1645

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<213> Streptococcus pneumoniae Pj-1386

<400> 90

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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
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Gly Pro Ala Leu Ala Glu Glu Thr Ala Val Pro Glu Asn Ser Gly Ala

35

40

45

Asn Pro Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Glu Ala Ala Ser Ala  
85 90 95

Ala Lys Pro Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser  
100 105 110

Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu  
115 120 125

Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys  
130 135 140

Thr Glu Lys Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr  
145 150 155 160

Leu Lys Pro Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys  
165 170 175

Trp Glu Pro Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val  
180 185 190

Val Leu Ala Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser  
195 200 205

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

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

Tyr Trp Gln Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro  
245 250 255

Thr Pro Asp Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr  
260 265 270

Gly Thr Leu Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg  
275 280 285

Phe Ala Glu Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala  
290 295 300

Arg Lys Leu Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe  
305 310 315 320

Ile Asn Gln Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys  
325 330 335

Met Arg Gln Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn  
340 345 350

His Pro Ile Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly  
355 360 365

Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln  
370 375 380

Pro Glu Gly Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn  
385 390 395 400

Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile  
405 410 415

Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly  
420 425 430

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

Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr  
450 455 460

Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe  
465 470 475 480

Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys  
485 490 495

Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val  
500 505 510

Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp  
515 520 525

Phe Val Asp Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser  
530 535 540

Val Ser Gly Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly  
545 550 555 560

Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly  
565 570 575

Asn Ser Leu Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp  
580 585 590

Val Arg Leu Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu  
595 600 605

Arg Val Ala His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe  
610 615 620

Ser Thr Thr Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu  
625 630 635 640

Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu Glu Phe Ala Leu Ser Ser  
645 650 655

Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu  
660 665 670

Gly Ala Val Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser  
675 680 685

Asp Asn His Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys  
690 695 700

Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys  
705 710 715 720

Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp  
725 730 735

Ser Trp Lys Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro  
740 745 750

Lys Val Ser Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys  
755 760 765

Val Val Ala Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr  
770 775 780

Thr Phe Asp Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro  
785 790 795 800

Leu Ala Glu Asn Ile Val Pro Gly Ala Thr Val Ile Asp Ser Thr Phe  
805 810 815

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

Ile Thr Ser Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser  
835 840 845

Val Asp Ile Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met  
850 855 860

Asp His Ala Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn  
865 870 875 880

Thr Lys Asp Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys  
885 890 895

Leu Ala Lys Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr  
900 905 910

Leu Asp Lys Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr  
915 920 925

Ser Asp Asn Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys  
930 935 940

Met Tyr Glu Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys  
945 950 955 960

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

Asp Val Pro Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser  
980 985 990

Gln Thr Pro Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala  
995 1000 1005

Ser Ala Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr

1010		1015		1020
Arg Thr Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val				
1025		1030		1035
Ser Val Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu				
1040		1045		1050
Thr Gly Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp				
1055		1060		1065
Leu Arg Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu				
1070		1075		1080
Asp Glu Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly				
1085		1090		1095
Phe Asp Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr				
1100		1105		1110
Leu Gly Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly				
1115		1120		1125
Gln Asp Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile Glu Val Ser				
1130		1135		1140
Gln Glu Pro Lys Lys Asp Tyr Leu Val Gly Asp Asn Leu Asp Leu				
1145		1150		1155
Ser Glu Gly Arg Phe Ala Val Ala Tyr Ser Asn Asp Thr Met Glu				
1160		1165		1170
Glu His Ser Phe Thr Asp Glu Gly Val Glu Ile Ser Gly Tyr Asp				
1175		1180		1185
Ala Gln Lys Thr Gly Arg Gln Thr Leu Thr Leu Arg Tyr Gln Gly				
1190		1195		1200
His Glu Val Asn Phe Asp Val Leu Val Ser Pro Lys Ala Ala Leu				
1205		1210		1215
Asn Asp Glu Tyr Leu Lys Gln Lys Leu Ala Glu Val Glu Ala Ala				
1220		1225		1230
Lys Asn Lys Val Val Tyr Asn Phe Ala Ser Pro Glu Val Lys Glu				
1235		1240		1245



Ala	Phe	Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp
1250						1255					1260			
His	Glu	Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys
1265						1270					1275			
Leu	Thr	Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr
1280						1285					1290			
Glu	Glu	Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Ala	Gln	Glu
1295						1300					1305			
Leu	Leu	Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala
1310						1315					1320			
Pro	Leu	Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu
1325						1330					1335			
Ser	Pro	Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu
1340						1345					1350			
Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Ser	Ala	Val	Phe	Ser	Asp	Ser
1355						1360					1365			
Lys	Thr	Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val
1370						1375					1380			
Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu
1385						1390					1395			
Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu
1400						1405					1410			
Gly	Leu	Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser
1415						1420					1425			
Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val
1430						1435					1440			
Phe	Phe	Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu
1445						1450					1455			
Gln	Thr	Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His
1460						1465					1470			

Tyr Ala Phe Val Tyr Glu Ser Ala Glu Lys Pro Gln Pro Ala Lys  
1475 1480 1485

Pro Ala Pro Gln Asn Lys Val Leu Pro Lys Pro Thr Tyr Gln Pro  
1490 1495 1500

Ala Ser Asp Gln Gln Lys Ala Pro Lys Leu Glu Val Gln Glu Glu  
1505 1510 1515

Lys Val Ala Phe His Arg Gln Glu His Glu Asn Ala Glu Met Leu  
1520 1525 1530

Val Gly Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu  
1535 1540 1545

Arg His Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg  
1550 1555 1560

Ser Thr Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile  
1565 1570 1575

Gly Thr Lys Val Lys Thr Val Pro Ala Val Val Ala Thr Gln Glu  
1580 1585 1590

Lys Pro Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys  
1595 1600 1605

Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile  
1610 1615 1620

Ala Gly Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu  
1625 1630 1635

Arg Arg Lys Arg Glu Asp Lys Asp  
1640 1645

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<213> Streptococcus pneumoniae PBI-71

<400> 91

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala

20

25

30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
 50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
 65 70 75 80

Ala Glu Gly Val Ala Thr Ala Ser Glu Thr Ala Glu Ala Ala Ser Ala  
 85 90 95

Ala Lys Pro Glu Glu Lys Ala Gly Glu Val Val Ala Glu Thr Pro Ser  
 100 105 110

Ala Glu Ala Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu  
 115 120 125

Ala Thr Asn Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys  
 130 135 140

Thr Glu Lys Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr  
 145 150 155 160

Leu Lys Pro Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys  
 165 170 175

Trp Glu Pro Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val  
 180 185 190

Val Leu Ala Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser  
 195 200 205

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

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

Tyr Trp Gln Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro  
 245 250 255

Thr Pro Asp Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr  
 260 265 270

Gly Thr Leu Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg  
275 280 285

Phe Ala Glu Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala  
290 295 300

Arg Lys Leu Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe  
305 310 315 320

Ile Asn Gln Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys  
325 330 335

Met Arg Gln Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn  
340 345 350

His Pro Ile Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly  
355 360 365

Arg Tyr His Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln  
370 375 380

Pro Glu Gly Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn  
385 390 395 400

Trp Asp Lys Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile  
405 410 415

Gly Arg Asn Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly  
420 425 430

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

Gly Lys Leu Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr  
450 455 460

Ser Leu Gly Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe  
465 470 475 480

Phe Thr Gly Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys  
485 490 495

Asp Trp Tyr Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val  
500 505 510

Gly Asn Thr Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp  
515 520 525

Phe Val Asp Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser  
530 535 540

Val Ser Gly Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly  
545 550 555 560

Glu Lys Leu Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly  
565 570 575

Asn Ser Leu Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp  
580 585 590

Val Arg Leu Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu  
595 600 605

Arg Val Ala His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe  
610 615 620

Ser Thr Thr Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu  
625 630 635 640

Leu Thr Leu Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser  
645 650 655

Leu Ala Gly Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu  
660 665 670

Gly Ala Val Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser  
675 680 685

Asp Asn His Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys  
690 695 700

Gln Ser Leu Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys  
705 710 715 720

Gly Asn Lys Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp  
725 730 735

Ser Trp Lys Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro  
740 745 750

Lys	Val	Ser	Arg	Ser	Ala	Ser	Ala	Gln	Gly	Thr	Thr	Gln	Glu	Leu	Lys	755	760	765
Val	Val	Ala	Val	Gly	Lys	Asn	Gly	Val	Arg	Ser	Glu	Ala	Ala	Thr	Thr	770	775	780
Thr	Phe	Asp	Trp	Gly	Met	Thr	Val	Lys	Asp	Thr	Ser	Leu	Pro	Lys	Pro	785	790	795
Leu	Ala	Glu	Asn	Ile	Val	Pro	Gly	Ala	Thr	Val	Ile	Asp	Ser	Thr	Phe	805	810	815
Pro	Lys	Thr	Glu	Gly	Gly	Glu	Gly	Ile	Glu	Gly	Met	Leu	Asn	Gly	Thr	820	825	830
Ile	Thr	Ser	Leu	Ser	Asp	Lys	Trp	Ser	Ser	Ala	Gln	Leu	Ser	Gly	Ser	835	840	845
Val	Asp	Ile	Arg	Leu	Thr	Lys	Pro	Arg	Thr	Val	Val	Arg	Trp	Val	Met	850	855	860
Asp	His	Ala	Gly	Ala	Gly	Gly	Glu	Ser	Val	Asn	Asp	Gly	Leu	Met	Asn	865	870	875
Thr	Lys	Asp	Phe	Asp	Leu	Tyr	Tyr	Lys	Asp	Ala	Asp	Gly	Glu	Trp	Lys	885	890	895
Leu	Ala	Lys	Glu	Val	Arg	Gly	Asn	Lys	Ala	His	Val	Thr	Asp	Ile	Thr	900	905	910
Leu	Asp	Lys	Pro	Ile	Thr	Ala	Gln	Asp	Trp	Arg	Leu	Asn	Val	Val	Thr	915	920	925
Ser	Asp	Asn	Gly	Thr	Pro	Trp	Lys	Ala	Ile	Arg	Ile	Tyr	Asn	Trp	Lys	930	935	940
Met	Tyr	Glu	Lys	Leu	Asp	Thr	Glu	Ser	Val	Asn	Ile	Pro	Met	Ala	Lys	945	950	955
Ala	Ala	Ala	Arg	Ser	Leu	Gly	Asn	Asn	Lys	Val	Gln	Val	Gly	Phe	Ala	965	970	975
Asp	Val	Pro	Ala	Gly	Ala	Thr	Ile	Thr	Val	Tyr	Asp	Asn	Pro	Asn	Ser	980	985	990
Gln	Ile	Pro	Leu	Ala	Thr	Leu	Lys	Ser	Glu	Val	Gly	Gly	Asp	Leu	Ala			

995	1000	1005
Ser Ala Pro Leu Asp Leu Thr 1010	Asn Gln Ser Gly Leu 1015	Leu Tyr Tyr 1020
Arg Thr Gln Leu Pro Gly Lys 1025	Glu Ile Ser Asn Val 1030	Leu Ala Val 1035
Ser Val Pro Lys Asp Asp Arg 1040	Arg Ile Lys Ser Val 1045	Ser Leu Glu 1050
Thr Gly Pro Lys Lys Thr Ser 1055	Tyr Ala Glu Gly Glu 1060	Asp Leu Asp 1065
Leu Arg Gly Gly Val Leu Arg 1070	Val Gln Tyr Glu Gly 1075	Gly Thr Glu 1080
Asp Glu Leu Ile Arg Leu Thr 1085	His Ala Gly Val Ser 1090	Val Ser Gly 1095
Phe Asp Thr His His Lys Gly 1100	Glu Gln Asn Leu Thr 1105	Leu Gln Tyr 1110
Leu Gly Gln Pro Val Asn Ala 1115	Asn Leu Ser Val Thr 1120	Val Thr Gly 1125
Gln Asp Glu Ala Ser Pro Lys 1130	Thr Ile Leu Gly Ile 1135	Glu Val Ser 1140
Gln Glu Pro Lys Lys Asp Tyr 1145	Leu Val Gly Asp Ser 1150	Leu Asp Leu 1155
Ser Glu Gly Arg Phe Ala Val 1160	Ala Tyr Ser Asn Asp 1165	Thr Met Glu 1170
Glu His Ser Phe Thr Asp Glu 1175	Gly Val Glu Ile Ser 1180	Gly Tyr Asp 1185
Ala Gln Lys Thr Gly Arg Gln 1190	Thr Leu Thr Leu His 1195	Tyr Gln Gly 1200
His Glu Val Ser Phe Asp Val 1205	Leu Val Ser Pro Lys 1210	Ala Ala Leu 1215
Asn Asp Glu Tyr Leu Lys Gln 1220	Lys Leu Ala Glu Val 1225	Glu Ala Ala 1230

Lys	Asn	Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Ser	Glu	Val	Lys	Glu
1235						1240					1245			
Ala	Phe	Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp
1250						1255					1260			
His	Glu	Ile	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys
1265						1270					1275			
Leu	Thr	Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Lys
1280						1285					1290			
Glu	Glu	Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu
1295						1300					1305			
Leu	Leu	Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala
1310						1315					1320			
Pro	Leu	Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu
1325						1330					1335			
Ser	Pro	Glu	Glu	Leu	Ala	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu
1340						1345					1350			
Val	Ala	Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser
1355						1360					1365			
Lys	Thr	Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val
1370						1375					1380			
Ile	Lys	Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu
1385						1390					1395			
Lys	Lys	Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu
1400						1405					1410			
Gly	Leu	Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser
1415						1420					1425			
Ile	Val	Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val
1430						1435					1440			
Phe	Phe	Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu
1445						1450					1455			



Gln Thr Asp Ser His Val Ile Phe Thr Ala Pro His Phe Thr His  
1460 1465 1470

Tyr Ala Phe Val Tyr Glu Ser Ala Glu Lys Pro Gln Pro Ala Lys  
1475 1480 1485

Pro Ala Pro Gln Asn Lys Val Leu Pro Lys Pro Thr Tyr Gln Pro  
1490 1495 1500

Ala Ser Asp Gln Gln Lys Ala Pro Lys Leu Glu Val Gln Glu Glu  
1505 1510 1515

Lys Val Ala Phe His Arg Gln Glu His Glu Asn Ala Glu Met Leu  
1520 1525 1530

Val Gly Glu Gln Arg Val Ile Ile Gln Gly Arg Asp Gly Leu Leu  
1535 1540 1545

Arg His Val Phe Glu Val Asp Glu Asn Gly Gln Arg Arg Leu Arg  
1550 1555 1560

Ser Thr Glu Val Ile Gln Glu Ala Ile Pro Glu Ile Val Glu Ile  
1565 1570 1575

Gly Thr Lys Val Lys Thr Val Pro Ala Ile Val Ala Thr Gln Glu  
1580 1585 1590

Lys Pro Ala Gln Asn Thr Ala Val Lys Ser Glu Glu Ala Ser Lys  
1595 1600 1605

Gln Leu Pro Asn Thr Gly Thr Ala Asp Ala Asn Glu Ala Leu Ile  
1610 1615 1620

Ala Gly Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu  
1625 1630 1635

Arg Arg Lys Arg Glu Asp Lys Asp  
1640 1645

<210> 92  
<211> 1659  
<212> PRT  
<213> Streptococcus pneumoniae TIGR4\_DB

<400> 92

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys

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Leu	Ser	Val	Gly	Ala	Cys	Ser	Leu	Met	Ile	Gly	Ala	Val	Leu	Phe	Ala				
			20					25					30						
Gly	Pro	Ala	Leu	Ala	Glu	Glu	Thr	Ala	Val	Pro	Glu	Asn	Ser	Gly	Ala				
		35					40					45							
Asn	Thr	Glu	Leu	Val	Ser	Gly	Glu	Ser	Glu	His	Ser	Thr	Asn	Glu	Ala				
	50					55					60								
Asp	Lys	Gln	Asn	Glu	Gly	Glu	His	Ala	Arg	Glu	Asn	Lys	Leu	Glu	Lys				
65					70					75					80				
Ala	Glu	Gly	Val	Ala	Ile	Ala	Ser	Glu	Thr	Ala	Ser	Pro	Ala	Ser	Asn				
				85					90					95					
Glu	Ala	Ala	Thr	Thr	Glu	Thr	Ala	Glu	Ala	Ala	Ser	Ala	Ala	Lys	Pro				
			100					105					110						
Glu	Glu	Lys	Ala	Ser	Glu	Val	Val	Ala	Glu	Thr	Pro	Ser	Ala	Glu	Ala				
		115					120					125							
Lys	Pro	Lys	Ser	Asp	Lys	Glu	Thr	Glu	Ala	Lys	Pro	Glu	Ala	Thr	Asn				
	130					135					140								
Gln	Gly	Asp	Glu	Ser	Lys	Pro	Ala	Ala	Glu	Ala	Asn	Lys	Thr	Glu	Lys				
145					150					155					160				
Glu	Val	Gln	Pro	Asp	Val	Pro	Lys	Asn	Thr	Glu	Lys	Thr	Leu	Lys	Pro				
				165					170					175					
Lys	Glu	Ile	Lys	Phe	Asn	Ser	Trp	Glu	Glu	Leu	Leu	Lys	Trp	Glu	Pro				
			180					185					190						
Gly	Ala	Arg	Glu	Asp	Asp	Ala	Ile	Asn	Arg	Gly	Ser	Val	Val	Leu	Ala				
		195					200					205							
Ser	Arg	Arg	Thr	Gly	His	Leu	Val	Asn	Glu	Lys	Ala	Ser	Lys	Glu	Ala				
	210					215					220								
Lys	Val	Gln	Ala	Leu	Ser	Asn	Thr	Asn	Ser	Lys	Ala	Lys	Asp	His	Ala				
225					230					235					240				
Ser	Val	Gly	Gly	Glu	Glu	Phe	Lys	Ala	Tyr	Ala	Phe	Asp	Tyr	Trp	Gln				
				245					250					255					

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala  
865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu  
945 950 955 960

Lys Leu Asp Thr Glu Ser Val Asn Ile Pro Met Ala Lys Ala Ala Ala  
965 970 975

Arg Ser Leu Gly Asn Asn Lys Val Gln Val Gly Phe Ala Asp Val Pro

980

985

990

Ala Gly Ala Thr Ile Thr Val Tyr Asp Asn Pro Asn Ser Gln Thr Pro  
 995 1000 1005

Leu Ala Thr Leu Lys Ser Glu Val Gly Gly Asp Leu Ala Ser Ala  
 1010 1015 1020

Pro Leu Asp Leu Thr Asn Gln Ser Gly Leu Leu Tyr Tyr Arg Thr  
 1025 1030 1035

Gln Leu Pro Gly Lys Glu Ile Ser Asn Val Leu Ala Val Ser Val  
 1040 1045 1050

Pro Lys Asp Asp Arg Arg Ile Lys Ser Val Ser Leu Glu Thr Gly  
 1055 1060 1065

Pro Lys Lys Thr Ser Tyr Ala Glu Gly Glu Asp Leu Asp Leu Arg  
 1070 1075 1080

Gly Gly Val Leu Arg Val Gln Tyr Glu Gly Gly Thr Glu Asp Glu  
 1085 1090 1095

Leu Ile Arg Leu Thr His Ala Gly Val Ser Val Ser Gly Phe Asp  
 1100 1105 1110

Thr His His Lys Gly Glu Gln Asn Leu Thr Leu Gln Tyr Leu Gly  
 1115 1120 1125

Gln Pro Val Asn Ala Asn Leu Ser Val Thr Val Thr Gly Gln Asp  
 1130 1135 1140

Glu Ala Ser Pro Lys Thr Ile Leu Gly Ile Glu Val Ser Gln Glu  
 1145 1150 1155

Pro Lys Lys Asp Tyr Leu Val Gly Asp Ser Leu Asp Leu Ser Glu  
 1160 1165 1170

Gly Arg Phe Ala Val Ala Tyr Ser Asn Asp Thr Met Glu Glu His  
 1175 1180 1185

Ser Phe Thr Asp Glu Gly Val Glu Ile Ser Gly Tyr Asp Ala Gln  
 1190 1195 1200

Lys Thr Gly Arg Gln Thr Leu Thr Leu His Tyr Gln Gly His Glu  
 1205 1210 1215

Val	Ser	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
1220						1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
1235						1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Ser	Glu	Val	Lys	Glu	Ala	Phe
1250						1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
1265						1270					1275			
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
1280						1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr	Glu	Glu
1295						1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu
1310						1315					1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
1325						1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
1340						1345					1350			
Glu	Glu	Leu	Thr	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
1355						1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
1370						1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys
1385						1390					1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
1400						1405					1410			
Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
1415						1420					1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val
1430						1435					1440			

[illegible]



<210> 93  
<211> 1659  
<212> PRT  
<213> Streptococcus pneumoniae TIGR4\_IC

<400> 93

Met Lys Asn Pro Phe Phe Glu Arg Arg Cys Arg Tyr Ser Ile Arg Lys  
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Leu Ser Val Gly Ala Cys Ser Leu Met Ile Gly Ala Val Leu Phe Ala  
20 25 30

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

Asn Thr Glu Leu Val Ser Gly Glu Ser Glu His Ser Thr Asn Glu Ala  
50 55 60

Asp Lys Gln Asn Glu Gly Glu His Ala Arg Glu Asn Lys Leu Glu Lys  
65 70 75 80

Ala Glu Gly Val Ala Ile Ala Ser Glu Thr Ala Ser Pro Ala Ser Asn  
85 90 95

Glu Ala Ala Thr Thr Glu Thr Ala Glu Ala Ala Ser Ala Ala Lys Pro  
100 105 110

Glu Glu Lys Ala Ser Glu Val Val Ala Glu Thr Pro Ser Ala Glu Ala  
115 120 125

Lys Pro Lys Ser Asp Lys Glu Thr Glu Ala Lys Pro Glu Ala Thr Asn  
130 135 140

Gln Gly Asp Glu Ser Lys Pro Ala Ala Glu Ala Asn Lys Thr Glu Lys  
145 150 155 160

Glu Val Gln Pro Asp Val Pro Lys Asn Thr Glu Lys Thr Leu Lys Pro  
165 170 175

Lys Glu Ile Lys Phe Asn Ser Trp Glu Glu Leu Leu Lys Trp Glu Pro  
180 185 190

Gly Ala Arg Glu Asp Asp Ala Ile Asn Arg Gly Ser Val Val Leu Ala  
195 200 205

Ser Arg Arg Thr Gly His Leu Val Asn Glu Lys Ala Ser Lys Glu Ala  
210 215 220

Lys Val Gln Ala Leu Ser Asn Thr Asn Ser Lys Ala Lys Asp His Ala  
225 230 235 240

Ser Val Gly Gly Glu Glu Phe Lys Ala Tyr Ala Phe Asp Tyr Trp Gln  
245 250 255

Tyr Leu Asp Ser Met Val Phe Trp Glu Gly Leu Val Pro Thr Pro Asp  
260 265 270

Val Ile Asp Ala Gly His Arg Asn Gly Val Pro Val Tyr Gly Thr Leu  
275 280 285

Phe Phe Asn Trp Ser Asn Ser Ile Ala Asp Gln Glu Arg Phe Ala Glu  
290 295 300

Ala Leu Lys Gln Asp Ala Asp Gly Ser Phe Pro Ile Ala Arg Lys Leu  
305 310 315 320

Val Asp Met Ala Lys Tyr Tyr Gly Tyr Asp Gly Tyr Phe Ile Asn Gln  
325 330 335

Glu Thr Thr Gly Asp Leu Val Lys Pro Leu Gly Glu Lys Met Arg Gln  
340 345 350

Phe Met Leu Tyr Ser Lys Glu Tyr Ala Ala Lys Val Asn His Pro Ile  
355 360 365

Lys Tyr Ser Trp Tyr Asp Ala Met Thr Tyr Asn Tyr Gly Arg Tyr His  
370 375 380

Gln Asp Gly Leu Gly Glu Tyr Asn Tyr Gln Phe Met Gln Pro Glu Gly  
385 390 395 400

Asp Lys Val Pro Ala Asp Asn Phe Phe Ala Asn Phe Asn Trp Asp Lys  
405 410 415

Ala Lys Asn Asp Tyr Thr Ile Ala Thr Ala Asn Trp Ile Gly Arg Asn  
420 425 430

Pro Tyr Asp Val Phe Ala Gly Leu Glu Leu Gln Gln Gly Gly Ser Tyr  
435 440 445

Lys Thr Lys Val Lys Trp Asn Asp Ile Leu Asp Glu Asn Gly Lys Leu  
450 455 460

Arg Leu Ser Leu Gly Leu Phe Ala Pro Asp Thr Ile Thr Ser Leu Gly  
465 470 475 480

Lys Thr Gly Glu Asp Tyr His Lys Asn Glu Asp Ile Phe Phe Thr Gly  
485 490 495

Tyr Gln Gly Asp Pro Thr Gly Gln Lys Pro Gly Asp Lys Asp Trp Tyr  
500 505 510

Gly Ile Ala Asn Leu Val Ala Asp Arg Thr Pro Ala Val Gly Asn Thr  
515 520 525

Phe Thr Thr Ser Phe Asn Thr Gly His Gly Lys Lys Trp Phe Val Asp  
530 535 540

Gly Lys Val Ser Lys Asp Ser Glu Trp Asn Tyr Arg Ser Val Ser Gly  
545 550 555 560

Val Leu Pro Thr Trp Arg Trp Trp Gln Thr Ser Thr Gly Glu Lys Leu  
565 570 575

Arg Ala Glu Tyr Asp Phe Thr Asp Ala Tyr Asn Gly Gly Asn Ser Leu  
580 585 590

Lys Phe Ser Gly Asp Val Ala Gly Lys Thr Asp Gln Asp Val Arg Leu  
595 600 605

Tyr Ser Thr Lys Leu Glu Val Thr Glu Lys Thr Lys Leu Arg Val Ala  
610 615 620

His Lys Gly Gly Lys Gly Ser Lys Val Tyr Met Ala Phe Ser Thr Thr  
625 630 635 640

Pro Asp Tyr Lys Phe Asp Asp Ala Asp Ala Trp Lys Glu Leu Thr Leu  
645 650 655

Ser Asp Asn Trp Thr Asn Glu Glu Phe Asp Leu Ser Ser Leu Ala Gly  
660 665 670

Lys Thr Ile Tyr Ala Val Lys Leu Phe Phe Glu His Glu Gly Ala Val  
675 680 685

Lys Asp Tyr Gln Phe Asn Leu Gly Gln Leu Thr Ile Ser Asp Asn His  
690 695 700

Gln Glu Pro Gln Ser Pro Thr Ser Phe Ser Val Val Lys Gln Ser Leu  
705 710 715 720

Lys Asn Ala Gln Glu Ala Glu Ala Val Val Gln Phe Lys Gly Asn Lys  
725 730 735

Asp Ala Asp Phe Tyr Glu Val Tyr Glu Lys Asp Gly Asp Ser Trp Lys  
740 745 750

Leu Leu Thr Gly Ser Ser Ser Thr Thr Ile Tyr Leu Pro Lys Val Ser  
755 760 765

Arg Ser Ala Ser Ala Gln Gly Thr Thr Gln Glu Leu Lys Val Val Ala  
770 775 780

Val Gly Lys Asn Gly Val Arg Ser Glu Ala Ala Thr Thr Thr Phe Asp  
785 790 795 800

Trp Gly Met Thr Val Lys Asp Thr Ser Leu Pro Lys Pro Leu Ala Glu  
805 810 815

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

Glu Gly Gly Glu Gly Ile Glu Gly Met Leu Asn Gly Thr Ile Thr Ser  
835 840 845

Leu Ser Asp Lys Trp Ser Ser Ala Gln Leu Ser Gly Ser Val Asp Ile  
850 855 860

Arg Leu Thr Lys Pro Arg Thr Val Val Arg Trp Val Met Asp His Ala  
865 870 875 880

Gly Ala Gly Gly Glu Ser Val Asn Asp Gly Leu Met Asn Thr Lys Asp  
885 890 895

Phe Asp Leu Tyr Tyr Lys Asp Ala Asp Gly Glu Trp Lys Leu Ala Lys  
900 905 910

Glu Val Arg Gly Asn Lys Ala His Val Thr Asp Ile Thr Leu Asp Lys  
915 920 925

Pro Ile Thr Ala Gln Asp Trp Arg Leu Asn Val Val Thr Ser Asp Asn  
930 935 940

Gly Thr Pro Trp Lys Ala Ile Arg Ile Tyr Asn Trp Lys Met Tyr Glu

945		950		955		960									
Lys	Leu	Asp	Thr	Glu	Ser	Val	Asn	Ile	Pro	Met	Ala	Lys	Ala	Ala	Ala
				965					970					975	
Arg	Ser	Leu	Gly	Asn	Asn	Lys	Val	Gln	Val	Gly	Phe	Ala	Asp	Val	Pro
			980					985					990		
Ala	Gly	Ala	Thr	Ile	Thr	Val	Tyr	Asp	Asn	Pro	Asn	Ser	Gln	Thr	Pro
		995					1000						1005		
Leu	Ala	Thr	Leu	Lys	Ser	Glu	Val	Gly	Gly	Asp	Leu	Ala	Ser	Ala	
	1010					1015					1020				
Pro	Leu	Asp	Leu	Thr	Asn	Gln	Ser	Gly	Leu	Leu	Tyr	Tyr	Arg	Thr	
	1025					1030					1035				
Gln	Leu	Pro	Gly	Lys	Glu	Ile	Ser	Asn	Val	Leu	Ala	Val	Ser	Val	
	1040					1045					1050				
Pro	Lys	Asp	Asp	Arg	Arg	Ile	Lys	Ser	Val	Ser	Leu	Glu	Thr	Gly	
	1055					1060					1065				
Pro	Lys	Lys	Thr	Ser	Tyr	Ala	Glu	Gly	Glu	Asp	Leu	Asp	Leu	Arg	
	1070					1075					1080				
Gly	Gly	Val	Leu	Arg	Val	Gln	Tyr	Glu	Gly	Gly	Thr	Glu	Asp	Glu	
	1085					1090					1095				
Leu	Ile	Arg	Leu	Thr	His	Ala	Gly	Val	Ser	Val	Ser	Gly	Phe	Asp	
	1100					1105					1110				
Thr	His	His	Lys	Gly	Glu	Gln	Asn	Leu	Thr	Leu	Gln	Tyr	Leu	Gly	
	1115					1120					1125				
Gln	Pro	Val	Asn	Ala	Asn	Leu	Ser	Val	Thr	Val	Thr	Gly	Gln	Asp	
	1130					1135					1140				
Glu	Ala	Ser	Pro	Lys	Thr	Ile	Leu	Gly	Ile	Glu	Val	Ser	Gln	Glu	
	1145					1150					1155				
Pro	Lys	Lys	Asp	Tyr	Leu	Val	Gly	Asp	Ser	Leu	Asp	Leu	Ser	Glu	
	1160					1165					1170				
Gly	Arg	Phe	Ala	Val	Ala	Tyr	Ser	Asn	Asp	Thr	Met	Glu	Glu	His	
	1175					1180					1185				

Ser	Phe	Thr	Asp	Glu	Gly	Val	Glu	Ile	Ser	Gly	Tyr	Asp	Ala	Gln
1190						1195					1200			
Lys	Thr	Gly	Arg	Gln	Thr	Leu	Thr	Leu	His	Tyr	Gln	Gly	His	Glu
1205						1210					1215			
Val	Ser	Phe	Asp	Val	Leu	Val	Ser	Pro	Lys	Ala	Ala	Leu	Asn	Asp
1220						1225					1230			
Glu	Tyr	Leu	Lys	Gln	Lys	Leu	Ala	Glu	Val	Glu	Ala	Ala	Lys	Asn
1235						1240					1245			
Lys	Val	Val	Tyr	Asn	Phe	Ala	Ser	Ser	Glu	Val	Lys	Glu	Ala	Phe
1250						1255					1260			
Leu	Lys	Ala	Ile	Glu	Ala	Ala	Glu	Gln	Val	Leu	Lys	Asp	His	Glu
1265						1270					1275			
Thr	Ser	Thr	Gln	Asp	Gln	Val	Asn	Asp	Arg	Leu	Asn	Lys	Leu	Thr
1280						1285					1290			
Glu	Ala	His	Lys	Ala	Leu	Asn	Gly	Gln	Glu	Lys	Phe	Thr	Glu	Glu
1295						1300					1305			
Lys	Thr	Glu	Leu	Asp	Arg	Leu	Thr	Gly	Glu	Val	Gln	Glu	Leu	Leu
1310						1315					1320			
Ala	Ala	Lys	Pro	Asn	His	Pro	Ser	Gly	Ser	Ala	Leu	Ala	Pro	Leu
1325						1330					1335			
Leu	Glu	Lys	Asn	Lys	Ala	Leu	Val	Glu	Lys	Val	Asp	Leu	Ser	Pro
1340						1345					1350			
Glu	Glu	Leu	Thr	Thr	Ala	Lys	Gln	Ser	Leu	Lys	Asp	Leu	Val	Ala
1355						1360					1365			
Leu	Leu	Lys	Glu	Asp	Lys	Pro	Ala	Val	Phe	Ser	Asp	Ser	Lys	Thr
1370						1375					1380			
Gly	Val	Glu	Val	His	Phe	Ser	Asn	Lys	Glu	Lys	Thr	Val	Ile	Lys
1385						1390					1395			
Gly	Leu	Lys	Val	Glu	Arg	Val	Gln	Ala	Ser	Ala	Glu	Glu	Lys	Lys
1400						1405					1410			

Tyr	Phe	Ala	Gly	Glu	Asp	Ala	His	Val	Phe	Glu	Ile	Glu	Gly	Leu
1415						1420					1425			
Asp	Glu	Lys	Gly	Gln	Asp	Val	Asp	Leu	Ser	Tyr	Ala	Ser	Ile	Val
1430						1435					1440			
Lys	Ile	Pro	Ile	Glu	Lys	Asp	Lys	Lys	Val	Lys	Lys	Val	Phe	Phe
1445						1450					1455			
Leu	Pro	Glu	Gly	Lys	Glu	Ala	Val	Glu	Leu	Ala	Phe	Glu	Gln	Thr
1460						1465					1470			
Asp	Ser	His	Val	Ile	Phe	Thr	Ala	Pro	His	Phe	Thr	His	Tyr	Ala
1475						1480					1485			
Phe	Val	Tyr	Glu	Ser	Ala	Glu	Lys	Pro	Gln	Pro	Ala	Lys	Pro	Ala
1490						1495					1500			
Pro	Gln	Asn	Thr	Val	Leu	Pro	Lys	Pro	Thr	Tyr	Gln	Pro	Thr	Ser
1505						1510					1515			
Asp	Gln	Gln	Lys	Ala	Pro	Lys	Leu	Glu	Val	Gln	Glu	Glu	Lys	Val
1520						1525					1530			
Ala	Phe	His	Arg	Gln	Glu	His	Glu	Asn	Thr	Glu	Met	Leu	Val	Gly
1535						1540					1545			
Glu	Gln	Arg	Val	Ile	Ile	Gln	Gly	Arg	Asp	Gly	Leu	Leu	Arg	His
1550						1555					1560			
Val	Phe	Glu	Val	Asp	Glu	Asn	Gly	Gln	Arg	Arg	Leu	Arg	Ser	Thr
1565						1570					1575			
Glu	Val	Ile	Gln	Glu	Ala	Ile	Pro	Glu	Ile	Val	Glu	Ile	Gly	Thr
1580						1585					1590			
Lys	Val	Lys	Thr	Val	Pro	Ala	Val	Val	Ala	Thr	Gln	Glu	Lys	Pro
1595						1600					1605			
Ala	Gln	Asn	Thr	Ala	Val	Lys	Ser	Glu	Glu	Ala	Ser	Lys	Gln	Leu
1610						1615					1620			
Pro	Asn	Thr	Gly	Thr	Ala	Asp	Ala	Asn	Glu	Ala	Leu	Ile	Ala	Gly
1625						1630					1635			

Leu Ala Ser Leu Gly Leu Ala Ser Leu Ala Leu Thr Leu Arg Arg  
1640 1645 1650

Lys Arg Glu Asp Lys Asp  
1655

<210> 94  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-59

<400> 94

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190



Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Asn Lys Arg Thr Ala  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 95  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-77

<400> 95

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Val Ala Ala Lys Pro Val Gln Ala Asn Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile His Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Glu  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 96  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-93

<400> 96

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Ile Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Thr Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Glu  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Thr Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 97  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-94

<400> 97

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Ser Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Cys Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Thr Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Glu  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp

<210> 98  
 <211> 264  
 <212> PRT  
 <213> Streptococcus pneumoniae Pj-102-98

<400> 98

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
 1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
 20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
 35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
 50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
 65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
 85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
 100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
 115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
 130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
 145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
 165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
 180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Asn Lys Arg Thr Ala  
 195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 99  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-148

<400> 99

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Ser Ser Ile Thr Gln Arg Leu Ile Thr Glu

145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Thr Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Ala  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 100  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-160

<400> 100

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Thr Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Ala  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Thr Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 101  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-161

<400> 101

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn



35

40

45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
 50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
 65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
 85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
 100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
 115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
 130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
 145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
 165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Thr Phe  
 180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Ala  
 195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
 210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Thr Leu Val Thr Lys  
 225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
 245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
 260

<210> 102

<211> 264

<212> PRT  
<213> Streptococcus pneumoniae Pj-102-163

<400> 102

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Ser Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Cys Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Thr Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Glu  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 103  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-228

<400> 103

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Ile Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Thr Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Glu  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Thr Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 104  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-386  
  
<400> 104

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Asn Lys Arg Thr Ala  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 105  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1344

<400> 105

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Glu  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 106  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1490

<400> 106

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

245

250

255

Lys Pro Ser Ser His Thr Ala Asp  
260

&lt;210&gt; 107

&lt;211&gt; 264

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae Pj-1228

&lt;400&gt; 107

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190



Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Glu  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 108  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1229  
  
<400> 108

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Ser  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys

130

135

140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Thr Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Ala  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 109

<211> 264

<212> PRT

<213> Streptococcus pneumoniae Pj-1230

<400> 109

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Val Ala Ala Lys Pro Val Gln Ala Asn Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile His Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Glu  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 110  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1231

<400> 110

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile

			20					25					30				
Gln	Lys	Arg	Gly	Glu	Leu	Val	Val	Gly	Val	Lys	Gln	Asp	Val	Pro	Asn		
35			40					45									
Phe	Gly	Tyr	Lys	Asp	Pro	Lys	Thr	Gly	Thr	Tyr	Ser	Gly	Ile	Glu	Thr		
50			55					60									
Asp	Leu	Ala	Lys	Met	Val	Ala	Asp	Glu	Leu	Lys	Val	Lys	Ile	Arg	Tyr		
65			70					75					80				
Val	Pro	Val	Thr	Ala	Gln	Thr	Arg	Gly	Pro	Leu	Leu	Asp	Asn	Glu	Gln		
			85					90					95				
Val	Asp	Met	Asp	Ile	Ala	Thr	Phe	Thr	Ile	Thr	Asp	Glu	Arg	Lys	Lys		
			100					105					110				
Leu	Tyr	Asn	Phe	Thr	Ser	Pro	Tyr	Tyr	Thr	Asp	Ala	Ser	Gly	Phe	Leu		
115			120					125									
Val	Asn	Lys	Ser	Ala	Lys	Ile	Lys	Lys	Ile	Glu	Asp	Leu	Asn	Gly	Lys		
130			135					140									
Thr	Ile	Gly	Val	Ala	Gln	Gly	Ser	Ile	Thr	Gln	Arg	Leu	Ile	Thr	Glu		
145			150					155					160				
Leu	Gly	Lys	Lys	Lys	Gly	Leu	Lys	Phe	Lys	Phe	Val	Glu	Leu	Gly	Ser		
			165					170					175				
Tyr	Pro	Glu	Leu	Ile	Thr	Ser	Leu	His	Ala	His	Arg	Ile	Asp	Ala	Phe		
			180					185					190				
Ser	Val	Asp	Arg	Ser	Ile	Leu	Ser	Gly	Tyr	Thr	Asn	Lys	Arg	Thr	Ala		
195			200					205									
Leu	Leu	Asp	Asp	Ser	Phe	Lys	Pro	Ser	Asp	Tyr	Gly	Ile	Val	Thr	Lys		
210			215					220									
Lys	Ser	Asn	Thr	Glu	Leu	Asn	Asp	Tyr	Leu	Asp	Asn	Leu	Val	Thr	Lys		
225			230					235					240				
Trp	Ser	Lys	Asp	Gly	Ser	Leu	Gln	Lys	Leu	Tyr	Asp	Arg	Tyr	Lys	Leu		
			245					250					255				
Lys	Pro	Ser	Ser	His	Thr	Ala	Asp										
			260														

<210> 111  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1232

<400> 111

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Val Ala Ala Lys Pro Val Gln Ala Asn Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Thr Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Glu  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 112  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1233

<400> 112

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Cys Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Thr Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Glu  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 113  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1236

<400> 113

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Gly Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Ala  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Phe Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 114  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1237  
  
<400> 114

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45



Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Ser Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Cys Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Thr Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Glu  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 115

<211> 264

<212> PRT

<213> Streptococcus pneumoniae Pj-1241

<400> 115

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Asn Lys Arg Thr Ala  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

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

225		230		235		240									
Trp	Ser	Lys	Asp	Gly	Ser	Leu	Gln	Lys	Leu	Tyr	Asp	Arg	Tyr	Lys	Leu
				245					250					255	
Lys	Pro	Ser	Ser	His	Thr	Ala	Asp								
				260											
<210>	116														
<211>	264														
<212>	PRT														
<213>	Streptococcus pneumoniae Pj-1242														
<400>	116														
Met	Lys	Lys	Lys	Phe	Phe	Leu	Ser	Ala	Leu	Leu	Ile	Ser	Leu	Phe	Gly
1				5					10					15	
Leu	Ala	Ala	Ala	Lys	Pro	Val	Gln	Ala	Asp	Thr	Ser	Ile	Ala	Asp	Ile
			20					25					30		
Gln	Lys	Arg	Gly	Glu	Leu	Val	Val	Gly	Val	Lys	Gln	Asp	Val	Pro	Asn
		35					40					45			
Phe	Gly	Tyr	Lys	Asp	Pro	Lys	Thr	Gly	Thr	Tyr	Ser	Gly	Ile	Glu	Thr
	50					55					60				
Asp	Leu	Ala	Lys	Met	Val	Ala	Asp	Glu	Leu	Lys	Val	Lys	Ile	Arg	Tyr
65					70					75					80
Val	Pro	Val	Thr	Ala	Gln	Thr	Arg	Gly	Pro	Leu	Leu	Asp	Asn	Glu	Gln
				85					90					95	
Val	Asp	Met	Asp	Ile	Ala	Thr	Phe	Thr	Ile	Thr	Asp	Glu	Arg	Lys	Lys
			100					105					110		
Leu	Tyr	Asn	Phe	Thr	Ser	Pro	Tyr	Tyr	Thr	Asp	Ala	Ser	Gly	Phe	Leu
		115					120					125			
Val	Asn	Lys	Ser	Ala	Lys	Ile	Lys	Lys	Ile	Glu	Asp	Leu	Asn	Gly	Lys
	130					135					140				
Thr	Ile	Gly	Val	Ala	Gln	Gly	Ser	Ile	Thr	Gln	Arg	Leu	Ile	Thr	Glu
145					150					155					160
Leu	Gly	Lys	Lys	Lys	Asp	Leu	Lys	Phe	Lys	Phe	Val	Glu	Leu	Gly	Ser
				165					170					175	

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Asn Lys Arg Thr Ala  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 117  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1248

<400> 117

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Gly Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

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

115

120

125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Ala  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Phe Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 118  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1250

<400> 118

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Ala Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Asn Lys Arg Thr Ala  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 119  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1255

<400> 119

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

1		5		10		15													
Leu	Ala	Ala	Ala	Lys	Pro	Val	Gln	Ala	Asp	Thr	Ser	Ile	Ala	Asp	Ile				
			20					25					30						
Gln	Lys	Arg	Gly	Glu	Leu	Val	Val	Gly	Val	Lys	Gln	Asp	Val	Pro	Asn				
		35					40					45							
Phe	Gly	Tyr	Lys	Asp	Pro	Lys	Thr	Gly	Thr	Tyr	Ser	Gly	Ile	Glu	Thr				
	50					55					60								
Asp	Leu	Ala	Lys	Met	Val	Ala	Asp	Glu	Leu	Lys	Val	Lys	Ile	Arg	Tyr				
65					70					75					80				
Val	Pro	Val	Thr	Ala	Gln	Thr	Arg	Gly	Pro	Leu	Leu	Asp	Asn	Glu	Gln				
				85					90					95					
Val	Asp	Met	Asp	Ile	Ala	Thr	Phe	Thr	Ile	Thr	Asp	Glu	Arg	Lys	Lys				
			100					105					110						
Leu	Tyr	Asn	Phe	Thr	Ser	Pro	Tyr	Tyr	Thr	Asp	Ala	Ser	Gly	Phe	Leu				
		115					120					125							
Val	Asn	Lys	Ser	Ala	Lys	Ile	Lys	Lys	Ile	Glu	Asp	Leu	Asn	Gly	Lys				
	130					135					140								
Thr	Ile	Gly	Val	Ala	Gln	Gly	Ser	Ile	Thr	Gln	Arg	Leu	Ile	Thr	Glu				
145					150					155					160				
Leu	Gly	Lys	Lys	Lys	Gly	Leu	Lys	Phe	Lys	Phe	Val	Glu	Leu	Gly	Ser				
				165					170					175					
Tyr	Pro	Glu	Leu	Ile	Thr	Ser	Leu	His	Ala	His	Arg	Ile	Asp	Thr	Phe				
			180					185					190						
Ser	Val	Asp	Arg	Ser	Ile	Leu	Ser	Gly	Tyr	Thr	Ser	Lys	Arg	Thr	Ala				
		195					200					205							
Leu	Leu	Asp	Asp	Ser	Phe	Lys	Pro	Ser	Asp	Tyr	Gly	Ile	Val	Thr	Lys				
	210					215					220								
Lys	Ser	Asn	Thr	Glu	Leu	Asn	Asp	Tyr	Leu	Asp	Thr	Leu	Val	Thr	Lys				
225					230					235					240				
Trp	Ser	Lys	Asp	Gly	Ser	Leu	Gln	Lys	Leu	Tyr	Asp	Arg	Tyr	Lys	Leu				
				245					250					255					

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 120  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1262  
  
<400> 120

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Gly Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190



Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Ala  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Phe Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 121  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1279  
  
<400> 121

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Asn Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Thr Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Ala  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 122  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1283

<400> 122

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Asn Lys Arg Thr Ala  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 123  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1284

<400> 123

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Val Ala Ala Lys Pro Val Gln Ala Asn Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Thr Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Glu  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 124  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1297

<400> 124

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Ser Lys  
130 135 140

Thr Ile Gly Val Ala Gln Ser Ser Ile Thr Gln Cys Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Thr Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Glu  
195 200 205

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

210

215

220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
 225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
 245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
 260

<210> 125  
 <211> 264  
 <212> PRT  
 <213> Streptococcus pneumoniae Pj-1298

<400> 125

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
 1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
 20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
 35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
 50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
 65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
 85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
 100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
 115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
 130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
 145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Asn Lys Arg Thr Ala  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 126  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1300  
  
<400> 126

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys

100

105

110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
 115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
 130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
 145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
 165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
 180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Asn Lys Arg Thr Ala  
 195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
 210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
 225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
 245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
 260

<210> 127

<211> 264

<212> PRT

<213> Streptococcus pneumoniae Pj-1322

<400> 127

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
 1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
 20 25 30

Gln Lys Arg Gly Glu Leu Val Val Asp Val Lys Gln Asp Val Pro Asn  
 35 40 45



Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp His Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Thr Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Glu  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asn Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Gly Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 128  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1330

<400> 128

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Gly Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Ala  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Phe Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 129  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1345

<400> 129

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Ser Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Cys Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Thr Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Glu  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 130  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1369

<400> 130

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Val Ala Ala Lys Pro Val Gln Ala Asn Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Thr Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Glu  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 131  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1386

<400> 131

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Asn Lys Arg Thr Ala  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 132  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae PBI-71

<400> 132

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Thr Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Asn Lys Arg Thr Ala  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 133  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae I-33\_Andersson

<400> 133

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Leu Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Val Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Val Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Ser Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Ile Ser Lys Arg Thr Val



195

200

205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
 210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
 225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
 245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
 260

<210> 134  
 <211> 264  
 <212> PRT  
 <213> Streptococcus pneumoniae Pj-1291\_Andersson  
 <400> 134

Met Lys Lys Lys Phe Phe Leu Tyr Ala Leu Leu Ile Ser Leu Phe Ser  
 1 5 10 15

Leu Thr Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Val Ala Asp Ile  
 20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
 35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Ser Tyr Ser Gly Ile Glu Thr  
 50 55 60

Asp Leu Ala Lys Met Ile Ala Asp Glu Leu Lys Val Lys Val Arg Tyr  
 65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
 85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
 100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
 115 120 125

Val Asn Lys Ser Ala Asn Ile Lys Ser Ile Glu Asp Leu Asn Gly Lys  
 130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Thr Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Ala Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Ile Ser Lys Arg Thr Glu  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Phe Asp Gln Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 135  
<211> 264  
<212> PRT  
<213> Streptococcus pneumoniae TIGR4\_DB

<400> 135

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln

85

90

95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
 100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
 115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
 130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
 145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
 165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Thr Phe  
 180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Ala  
 195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
 210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
 225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
 245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
 260

<210> 136

<211> 264

<212> PRT

<213> Streptococcus pneumoniae TIGR4\_IC

<400> 136

Met Lys Lys Lys Phe Phe Leu Ser Ala Leu Leu Ile Ser Leu Phe Gly  
 1 5 10 15

Leu Ala Ala Ala Lys Pro Val Gln Ala Asp Thr Ser Ile Ala Asp Ile  
 20 25 30

Gln Lys Arg Gly Glu Leu Val Val Gly Val Lys Gln Asp Val Pro Asn  
35 40 45

Phe Gly Tyr Lys Asp Pro Lys Thr Gly Thr Tyr Ser Gly Ile Glu Thr  
50 55 60

Asp Leu Ala Lys Met Val Ala Asp Glu Leu Lys Val Lys Ile Arg Tyr  
65 70 75 80

Val Pro Val Thr Ala Gln Thr Arg Gly Pro Leu Leu Asp Asn Glu Gln  
85 90 95

Val Asp Met Asp Ile Ala Thr Phe Thr Ile Thr Asp Glu Arg Lys Lys  
100 105 110

Leu Tyr Asn Phe Thr Ser Pro Tyr Tyr Thr Asp Ala Ser Gly Phe Leu  
115 120 125

Val Asn Lys Ser Ala Lys Ile Lys Lys Ile Glu Asp Leu Asn Gly Lys  
130 135 140

Thr Ile Gly Val Ala Gln Gly Ser Ile Thr Gln Arg Leu Ile Thr Glu  
145 150 155 160

Leu Gly Lys Lys Lys Gly Leu Lys Phe Lys Phe Val Glu Leu Gly Ser  
165 170 175

Tyr Pro Glu Leu Ile Thr Ser Leu His Ala His Arg Ile Asp Thr Phe  
180 185 190

Ser Val Asp Arg Ser Ile Leu Ser Gly Tyr Thr Ser Lys Arg Thr Ala  
195 200 205

Leu Leu Asp Asp Ser Phe Lys Pro Ser Asp Tyr Gly Ile Val Thr Lys  
210 215 220

Lys Ser Asn Thr Glu Leu Asn Asp Tyr Leu Asp Asn Leu Val Thr Lys  
225 230 235 240

Trp Ser Lys Asp Gly Ser Leu Gln Lys Leu Tyr Asp Arg Tyr Lys Leu  
245 250 255

Lys Pro Ser Ser His Thr Ala Asp  
260

<210> 137  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-62

<400> 137

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Ile Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ser Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

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

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 138  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-70

<400> 138

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30



275

280

285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
 305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
 325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
 340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
 355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
 370 375 380

Lys Pro  
 385

<210> 139  
 <211> 386  
 <212> PRT  
 <213> Streptococcus pneumoniae Pj-102-77

<400> 139

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
 1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
 20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
 35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
 50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
 65 70 75 80

Gln Ile Glu Val Ile Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
 85 90 95



Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 140  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-93

<400> 140

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Ile Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Arg Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asn Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 141  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-98

<400> 141

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys

210

215

220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
 225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
 245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
 260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
 275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
 305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
 325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
 340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
 355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
 370 375 380

Lys Pro  
 385

<210> 142  
 <211> 386  
 <212> PRT  
 <213> Streptococcus pneumoniae Pj-102-148

<400> 142

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
 1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
 20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 143  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-160

<400> 143

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335



Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 144  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-161

<400> 144

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Ile Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser

145				150					155				160				
Phe	Gln	Gly	Lys	Ile	Ile	Ser	Asn	Tyr	Val	Ser	Glu	Lys	Leu	Asn	Ala		
				165						170					175		
Lys	Lys	Val	Val	Leu	Tyr	Thr	Asp	Asn	Ala	Ser	Asp	Tyr	Ala	Lys	Gly		
				180						185					190		
Ile	Ala	Lys	Ser	Phe	Arg	Glu	Ser	Tyr	Lys	Gly	Glu	Ile	Val	Ala	Asp		
				195						200					205		
Glu	Thr	Phe	Val	Ala	Gly	Asp	Thr	Asp	Phe	Gln	Ala	Ala	Leu	Thr	Lys		
				210						215					220		
Met	Lys	Gly	Arg	Asp	Phe	Asp	Ala	Ile	Val	Val	Pro	Gly	Tyr	Tyr	Asn		
225					230						235					240	
Glu	Ala	Gly	Lys	Ile	Val	Asn	Gln	Ala	Arg	Gly	Met	Gly	Ile	Asp	Lys		
				245						250					255		
Pro	Ile	Val	Gly	Gly	Asp	Gly	Phe	Asn	Gly	Glu	Glu	Phe	Val	Gln	Gln		
				260						265					270		
Ala	Thr	Ala	Glu	Lys	Ala	Ser	Asn	Ile	Tyr	Phe	Ile	Ser	Gly	Phe	Ser		
				275						280					285		
Thr	Thr	Val	Glu	Val	Ser	Ala	Lys	Ala	Lys	Ala	Phe	Leu	Asp	Ala	Tyr		
				290						295					300		
Arg	Ala	Lys	Tyr	Asn	Glu	Glu	Pro	Ser	Thr	Phe	Ala	Ala	Leu	Ala	Tyr		
305					310						315					320	
Asp	Ser	Val	His	Leu	Val	Ala	Asn	Ala	Ala	Lys	Gly	Ala	Lys	Asn	Ser		
				325						330					335		
Gly	Glu	Ile	Lys	Asn	Asn	Leu	Ala	Lys	Thr	Lys	Asp	Phe	Glu	Gly	Val		
				340						345					350		
Thr	Gly	Gln	Thr	Ser	Phe	Asp	Ala	Asp	His	Asn	Thr	Val	Lys	Thr	Ala		
				355						360					365		
Tyr	Met	Met	Thr	Met	Asn	Asn	Gly	Lys	Val	Glu	Ala	Ala	Glu	Val	Val		
				370						375					380		
Lys	Pro																
385																	

<210> 145  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-386

<400> 145

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 146  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1344

<400> 146

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Val Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Asn  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 147  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1490

<400> 147

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Val Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala

85

90

95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Asn  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 148  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1228

<400> 148

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Val Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140



Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Asn  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro

385

<210> 149  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1230

<400> 149

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Ile Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 150  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1231

<400> 150

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala

20

25

30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Gly Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asn Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 151  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1232

<400> 151

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser

325

330

335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
 340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
 355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
 370 375 380

Lys Pro  
 385

<210> 152  
 <211> 386  
 <212> PRT  
 <213> Streptococcus pneumoniae Pj-1233

<400> 152

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
 1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
 20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
 35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
 50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
 65 70 75 80

Gln Ile Glu Val Ile Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
 85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
 100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
 115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
 130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380



Lys Pro  
385

<210> 153  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1236

<400> 153

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 154  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1250

<400> 154

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu	Leu	Ala	Ala	Cys	Gly	Glu	Val	Lys	Ser	Gly	Ala	Val	Asn	Thr	Ala		
			20					25					30				
Gly	Asn	Ser	Val	Glu	Glu	Lys	Thr	Ile	Lys	Ile	Gly	Phe	Asn	Phe	Glu		
	35						40					45					
Glu	Ser	Gly	Ser	Leu	Ala	Ala	Tyr	Gly	Thr	Ala	Glu	Gln	Lys	Gly	Ala		
	50					55					60						
Gln	Leu	Ala	Val	Asp	Glu	Ile	Asn	Ala	Ala	Gly	Gly	Ile	Asp	Gly	Lys		
65					70					75					80		
Gln	Ile	Glu	Val	Val	Asp	Lys	Asp	Asn	Lys	Ser	Glu	Thr	Ala	Glu	Ala		
				85					90					95			
Ala	Ser	Val	Thr	Thr	Asn	Leu	Val	Thr	Gln	Ser	Lys	Val	Ser	Ala	Val		
			100					105						110			
Val	Gly	Pro	Ala	Thr	Ser	Gly	Ala	Thr	Ala	Ala	Ala	Val	Ala	Asn	Ala		
		115					120					125					
Thr	Lys	Ala	Gly	Val	Pro	Leu	Ile	Ser	Pro	Ser	Ala	Thr	Gln	Asp	Gly		
	130					135					140						
Leu	Thr	Lys	Gly	Gln	Asp	Tyr	Leu	Phe	Ile	Gly	Thr	Phe	Gln	Asp	Ser		
145					150					155					160		
Phe	Gln	Gly	Lys	Ile	Ile	Ser	Asn	Tyr	Val	Ser	Glu	Lys	Leu	Asn	Ala		
				165					170					175			
Lys	Lys	Val	Val	Leu	Tyr	Thr	Asp	Asn	Ala	Ser	Asp	Tyr	Ala	Lys	Gly		
			180					185					190				
Ile	Ala	Lys	Ser	Phe	Arg	Glu	Ser	Tyr	Lys	Gly	Glu	Ile	Val	Ala	Asp		
		195					200					205					
Glu	Thr	Phe	Val	Ala	Gly	Asp	Thr	Asp	Phe	Gln	Ala	Ala	Leu	Thr	Lys		
	210					215					220						
Met	Lys	Gly	Lys	Asp	Phe	Asp	Ala	Ile	Val	Val	Pro	Gly	Tyr	Tyr	Asn		
225					230					235					240		
Glu	Ala	Gly	Lys	Ile	Val	Asn	Gln	Ala	Arg	Gly	Met	Gly	Ile	Asp	Lys		
				245				250						255			
Pro	Ile	Val	Gly	Gly	Asp	Gly	Phe	Asn	Gly	Glu	Glu	Phe	Val	Gln	Gln		

260

265

270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
 275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
 305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
 325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
 340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
 355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
 370 375 380

Lys Pro  
 385

<210> 155  
 <211> 386  
 <212> PRT  
 <213> Streptococcus pneumoniae Pj-1255

<400> 155

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
 1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
 20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
 35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
 50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
 65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 156  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1262

<400> 156

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 157  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1279

<400> 157

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Ile Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Val Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp



195

200

205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
 210 215 220

Met Lys Gly Arg Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
 225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Lys Gly Ile Asp Lys  
 245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
 260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
 275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
 305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
 325 330 335

Gly Glu Ile Lys Asn Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
 340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
 355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
 370 375 380

Lys Pro  
 385

<210> 158  
 <211> 386  
 <212> PRT  
 <213> Streptococcus pneumoniae Pj-1283

<400> 158

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
 1 5 10 15

Leu	Leu	Ala	Ala	Cys	Gly	Glu	Val	Lys	Ser	Gly	Ala	Val	Asn	Thr	Ala		
			20					25					30				
Gly	Asn	Ser	Val	Glu	Glu	Lys	Thr	Ile	Lys	Ile	Gly	Phe	Asn	Phe	Glu		
		35					40					45					
Glu	Ser	Gly	Ser	Leu	Ala	Ala	Tyr	Gly	Thr	Ala	Glu	Gln	Lys	Gly	Ala		
	50					55					60						
Gln	Leu	Ala	Val	Asp	Glu	Ile	Asn	Ala	Ala	Gly	Gly	Ile	Asp	Gly	Lys		
65					70					75					80		
Gln	Ile	Glu	Val	Val	Asp	Lys	Asp	Asn	Lys	Ser	Glu	Thr	Ala	Glu	Ala		
				85					90					95			
Ala	Ser	Val	Thr	Thr	Asn	Leu	Val	Thr	Gln	Ser	Lys	Val	Ser	Ala	Val		
			100					105						110			
Val	Gly	Pro	Ala	Thr	Ser	Gly	Ala	Thr	Ala	Ala	Ala	Val	Ala	Asn	Ala		
		115					120					125					
Thr	Lys	Ala	Gly	Val	Pro	Leu	Ile	Ser	Pro	Ser	Ala	Thr	Gln	Asp	Gly		
	130					135					140						
Leu	Thr	Lys	Gly	Gln	Asp	Tyr	Leu	Phe	Ile	Gly	Thr	Phe	Gln	Asp	Ser		
145					150					155					160		
Phe	Gln	Gly	Lys	Ile	Ile	Ser	Asn	Tyr	Val	Ser	Glu	Lys	Leu	Asn	Ala		
				165					170					175			
Lys	Lys	Val	Val	Leu	Tyr	Thr	Asp	Asn	Ala	Ser	Asp	Tyr	Ala	Lys	Gly		
			180					185					190				
Ile	Ala	Lys	Ser	Phe	Arg	Glu	Ser	Tyr	Lys	Gly	Glu	Ile	Val	Ala	Asp		
		195					200					205					
Glu	Thr	Phe	Val	Ala	Gly	Asp	Thr	Asp	Phe	Gln	Ala	Ala	Leu	Thr	Lys		
		210				215					220						
Met	Lys	Gly	Lys	Asp	Phe	Asp	Ala	Ile	Val	Val	Pro	Gly	Tyr	Tyr	Asn		
225					230					235					240		
Glu	Ala	Gly	Lys	Ile	Val	Asn	Gln	Ala	Arg	Gly	Met	Gly	Ile	Asp	Lys		
				245				250						255			

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asn Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp Tyr Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 159  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1284

<400> 159

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 160  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1291  
  
<400> 160

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly

130																	
Leu	Thr	Lys	Gly	Gln	Asp	Tyr	Leu	Phe	Ile	Gly	Thr	Phe	Gln	Asp	Ser		
145					150					155					160		
Phe	Gln	Gly	Lys	Ile	Ile	Ser	Asn	Tyr	Val	Ser	Glu	Lys	Leu	Asn	Ala		
				165					170					175			
Lys	Lys	Val	Val	Leu	Tyr	Thr	Asp	Asn	Ala	Ser	Asp	Tyr	Ala	Lys	Gly		
			180					185					190				
Ile	Ala	Lys	Ser	Phe	Arg	Glu	Ser	Tyr	Lys	Gly	Glu	Ile	Val	Ala	Asp		
		195					200					205					
Glu	Thr	Phe	Val	Ala	Gly	Asp	Thr	Asp	Phe	Gln	Ala	Ala	Leu	Thr	Lys		
	210					215					220						
Met	Lys	Gly	Lys	Asp	Phe	Asp	Ala	Ile	Val	Val	Pro	Gly	Tyr	Tyr	Asn		
225					230					235					240		
Glu	Ala	Gly	Lys	Ile	Val	Asn	Gln	Ala	Arg	Gly	Met	Gly	Ile	Asp	Lys		
				245					250					255			
Pro	Ile	Val	Gly	Gly	Asp	Gly	Phe	Asn	Gly	Glu	Glu	Phe	Val	Gln	Gln		
			260					265						270			
Ala	Thr	Ala	Glu	Lys	Ala	Ser	Asn	Ile	Tyr	Phe	Ile	Ser	Gly	Phe	Ser		
		275					280					285					
Thr	Thr	Val	Glu	Val	Ser	Ala	Lys	Ala	Lys	Ala	Phe	Leu	Asp	Ala	Tyr		
	290					295					300						
Arg	Ala	Lys	Tyr	Asn	Glu	Glu	Pro	Ser	Thr	Phe	Ala	Ala	Leu	Ala	Tyr		
305				310						315					320		
Asp	Ser	Val	His	Leu	Val	Ala	Asn	Ala	Ala	Lys	Gly	Ala	Lys	Asn	Ser		
				325				330						335			
Gly	Glu	Ile	Lys	Asp	Asn	Leu	Ala	Lys	Thr	Lys	Asp	Phe	Glu	Gly	Val		
			340					345					350				
Thr	Gly	Gln	Thr	Ser	Phe	Asp	Ala	Asp	His	Asn	Thr	Val	Lys	Thr	Ala		
		355					360					365					
Tyr	Met	Met	Thr	Met	Asn	Asn	Gly	Lys	Val	Glu	Ala	Ala	Glu	Val	Val		
	370					375					380						

Lys Pro  
385

<210> 161  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1297  
  
<400> 161

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 162  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1298  
  
<400> 162

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15



Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Gly Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asn Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 163  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1300

<400> 163

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys

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

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asp Ser Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 164  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1322

<400> 164

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asn Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val

370

375

380

Lys Ser  
385

<210> 165  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1330

<400> 165

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 166  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1345

<400> 166

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala

1		5		10		15													
Leu	Leu	Ala	Ala	Cys	Gly	Glu	Val	Lys	Ser	Gly	Ala	Val	Asn	Thr	Ala				
		20						25					30						
Gly	Asn	Ser	Val	Glu	Glu	Lys	Thr	Ile	Lys	Ile	Gly	Phe	Asn	Phe	Glu				
		35					40					45							
Glu	Ser	Gly	Ser	Leu	Ala	Ala	Tyr	Gly	Thr	Ala	Glu	Gln	Lys	Gly	Ala				
	50					55					60								
Gln	Leu	Ala	Val	Asp	Glu	Ile	Asn	Ala	Ala	Gly	Gly	Ile	Asp	Gly	Lys				
65					70					75					80				
Gln	Ile	Glu	Val	Val	Asp	Lys	Asp	Asn	Lys	Ser	Glu	Thr	Ala	Glu	Ala				
				85					90					95					
Ala	Ser	Val	Thr	Thr	Asn	Leu	Val	Thr	Gln	Ser	Lys	Val	Ser	Ala	Val				
			100					105						110					
Val	Gly	Pro	Ala	Thr	Ser	Gly	Ala	Thr	Ala	Ala	Ala	Val	Ala	Asn	Ala				
		115					120					125							
Thr	Lys	Ala	Gly	Val	Pro	Leu	Ile	Ser	Pro	Ser	Ala	Thr	Gln	Asp	Gly				
	130					135					140								
Leu	Thr	Lys	Gly	Gln	Asp	Tyr	Leu	Phe	Ile	Gly	Thr	Phe	Gln	Asp	Ser				
145					150					155					160				
Phe	Gln	Gly	Lys	Ile	Ile	Ser	Asn	Tyr	Val	Ser	Glu	Lys	Leu	Asn	Ala				
				165					170					175					
Lys	Lys	Val	Val	Leu	Tyr	Thr	Asp	Asn	Ala	Ser	Asp	Tyr	Ala	Lys	Gly				
			180					185					190						
Ile	Ala	Lys	Ser	Phe	Arg	Glu	Ser	Tyr	Lys	Gly	Glu	Ile	Val	Ala	Asp				
		195					200					205							
Glu	Thr	Phe	Val	Ala	Gly	Asp	Thr	Asp	Phe	Gln	Ala	Ala	Leu	Thr	Lys				
	210					215					220								
Met	Lys	Gly	Lys	Asp	Phe	Asp	Ala	Ile	Val	Val	Pro	Gly	Tyr	Tyr	Asn				
225					230					235					240				
Glu	Ala	Gly	Lys	Ile	Val	Asn	Gln	Ala	Arg	Gly	Met	Gly	Ile	Asp	Lys				
				245					250					255					



Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 167  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1347  
  
<400> 167

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr



Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 169  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae PBI-71

<400> 169

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asp Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 170  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1291\_Andersson  
  
<400> 170

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

				245						250						255			
Pro	Ile	Val	Gly	Gly	Asp	Gly	Phe	Asn	Gly	Glu	Glu	Phe	Val	Gln	Gln				
			260					265					270						
Ala	Thr	Ala	Glu	Lys	Ala	Ser	Asn	Ile	Tyr	Phe	Ile	Ser	Gly	Phe	Ser				
		275					280					285							
Thr	Thr	Val	Glu	Val	Ser	Ala	Lys	Ala	Lys	Ala	Phe	Leu	Asp	Ala	Tyr				
	290					295					300								
Arg	Ala	Lys	Tyr	Asn	Glu	Glu	Pro	Ser	Thr	Phe	Ala	Ala	Leu	Ala	Tyr				
305					310					315					320				
Asp	Ser	Val	His	Leu	Val	Ala	Asn	Ala	Ala	Lys	Gly	Ala	Lys	Asn	Ser				
			325					330						335					
Gly	Glu	Ile	Lys	Asp	Asn	Leu	Ala	Lys	Thr	Lys	Asp	Phe	Glu	Gly	Val				
			340					345					350						
Thr	Gly	Gln	Thr	Ser	Phe	Asp	Ala	Asp	His	Asn	Thr	Val	Lys	Thr	Ala				
	355						360					365							
Tyr	Met	Met	Thr	Met	Asn	Asn	Gly	Lys	Val	Glu	Ala	Ala	Glu	Val	Val				
	370					375					380								

Lys Pro  
385

<210> 171  
 <211> 386  
 <212> PRT  
 <213> Streptococcus pneumoniae TIGR4\_DB

<400> 171

Met	Lys	Lys	Lys	Phe	Ala	Leu	Ser	Phe	Val	Ala	Leu	Ala	Ser	Val	Ala				
1				5					10					15					
Leu	Leu	Ala	Ala	Cys	Gly	Glu	Val	Lys	Ser	Gly	Ala	Val	Asn	Thr	Ala				
		20						25					30						
Gly	Asn	Ser	Val	Glu	Glu	Lys	Thr	Ile	Lys	Ile	Gly	Phe	Asn	Phe	Glu				
	35						40					45							
Glu	Ser	Gly	Ser	Leu	Ala	Ala	Tyr	Gly	Thr	Ala	Glu	Gln	Lys	Gly	Ala				
	50					55					60								



Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asn Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 172  
<211> 386  
<212> PRT  
<213> Streptococcus pneumoniae TIGR4\_IC

<400> 172

Met Lys Lys Lys Phe Ala Leu Ser Phe Val Ala Leu Ala Ser Val Ala  
1 5 10 15

Leu Leu Ala Ala Cys Gly Glu Val Lys Ser Gly Ala Val Asn Thr Ala  
20 25 30

Gly Asn Ser Val Glu Glu Lys Thr Ile Lys Ile Gly Phe Asn Phe Glu  
35 40 45

Glu Ser Gly Ser Leu Ala Ala Tyr Gly Thr Ala Glu Gln Lys Gly Ala  
50 55 60

Gln Leu Ala Val Asp Glu Ile Asn Ala Ala Gly Gly Ile Asp Gly Lys  
65 70 75 80

Gln Ile Glu Val Val Asp Lys Asp Asn Lys Ser Glu Thr Ala Glu Ala  
85 90 95

Ala Ser Val Thr Thr Asn Leu Val Thr Gln Ser Lys Val Ser Ala Val  
100 105 110

Val Gly Pro Ala Thr Ser Gly Ala Thr Ala Ala Ala Val Ala Asn Ala  
115 120 125

Thr Lys Ala Gly Val Pro Leu Ile Ser Pro Ser Ala Thr Gln Asp Gly  
130 135 140

Leu Thr Lys Gly Gln Asp Tyr Leu Phe Ile Gly Thr Phe Gln Asp Ser  
145 150 155 160

Phe Gln Gly Lys Ile Ile Ser Asn Tyr Val Ser Glu Lys Leu Asn Ala  
165 170 175

Lys Lys Val Val Leu Tyr Thr Asp Asn Ala Ser Asp Tyr Ala Lys Gly  
180 185 190

Ile Ala Lys Ser Phe Arg Glu Ser Tyr Lys Gly Glu Ile Val Ala Asp  
195 200 205

Glu Thr Phe Val Ala Gly Asp Thr Asp Phe Gln Ala Ala Leu Thr Lys  
210 215 220

Met Lys Gly Lys Asp Phe Asp Ala Ile Val Val Pro Gly Tyr Tyr Asn  
225 230 235 240

Glu Ala Gly Lys Ile Val Asn Gln Ala Arg Gly Met Gly Ile Asp Lys  
245 250 255

Pro Ile Val Gly Gly Asp Gly Phe Asn Gly Glu Glu Phe Val Gln Gln  
260 265 270

Ala Thr Ala Glu Lys Ala Ser Asn Ile Tyr Phe Ile Ser Gly Phe Ser  
275 280 285

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

Arg Ala Lys Tyr Asn Glu Glu Pro Ser Thr Phe Ala Ala Leu Ala Tyr  
305 310 315 320

Asp Ser Val His Leu Val Ala Asn Ala Ala Lys Gly Ala Lys Asn Ser  
325 330 335

Gly Glu Ile Lys Asn Asn Leu Ala Lys Thr Lys Asp Phe Glu Gly Val  
340 345 350

Thr Gly Gln Thr Ser Phe Asp Ala Asp His Asn Thr Val Lys Thr Ala  
355 360 365

Tyr Met Met Thr Met Asn Asn Gly Lys Val Glu Ala Ala Glu Val Val  
370 375 380

Lys Pro  
385

<210> 173  
<211> 136  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-148

<400> 173

Val Glu Asn Leu Thr Asn Phe Tyr Glu Lys Tyr Arg Val Tyr Leu Thr  
1 5 10 15

Arg Pro Arg Leu Glu Leu Leu Ala Val Val Thr Ile Val Phe Cys Ala  
20 25 30

Val Leu Val Phe Phe Leu Asn Ile Pro Gly Lys Gly Val Leu Lys Leu  
35 40 45

Asp Asn Gly Thr Ile Val Tyr Asp Gly Ser Leu Val Arg Gly Lys Met  
50 55 60

Asn Gly Gln Gly Thr Ile Thr Phe Gln Asn Gly Asp Gln Tyr Thr Gly  
65 70 75 80

Gly Phe Asn Asn Gly Ser Phe Asn Gly Lys Gly Thr Phe Gln Ser Lys  
85 90 95

Glu Gly Trp Thr Tyr Glu Gly Asp Phe Val Asn Gly Gln Ala Glu Gly  
100 105 110

Lys Gly Lys Leu Thr Thr Glu Gln Glu Val Val Tyr Glu Gly Thr Phe  
115 120 125

Lys Gln Gly Val Phe Gln Gln Lys  
130 135

<210> 174  
<211> 136  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-161

<400> 174

Val Glu Asn Leu Thr Asn Phe Tyr Glu Lys Tyr Arg Val Tyr Leu Thr  
1 5 10 15

Arg Pro Arg Leu Glu Ile Leu Ala Val Val Thr Ile Val Phe Cys Ala  
20 25 30

Val Leu Val Phe Phe Leu Asn Ile Pro Gly Lys Gly Val Leu Lys Leu  
35 40 45

Asp Asn Gly Thr Ile Val Tyr Asp Gly Ser Leu Val Arg Gly Lys Met  
50 55 60

Asn Gly Gln Gly Thr Ile Thr Phe Gln Asn Gly Asp Gln Tyr Thr Gly  
65 70 75 80

Gly Phe Asn Asn Gly Ala Phe Asn Gly Lys Gly Thr Phe Gln Ser Lys  
85 90 95

Glu Gly Trp Thr Tyr Glu Gly Asp Phe Val Asn Gly Gln Ala Glu Gly  
100 105 110

Lys Gly Lys Leu Thr Thr Glu Gln Glu Val Val Tyr Glu Gly Thr Phe  
115 120 125

Lys Gln Gly Val Phe Gln Gln Lys  
130 135

<210> 175  
<211> 136  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1364

<400> 175

Val Glu Asn Leu Thr Asn Phe Tyr Glu Lys Tyr Arg Val Tyr Leu Thr  
1 5 10 15

Arg Pro Arg Leu Glu Ile Leu Thr Val Val Thr Ile Val Phe Cys Ala  
20 25 30

Val Leu Val Phe Phe Leu Asn Ile Pro Gly Lys Gly Val Leu Lys Leu  
35 40 45

Asp Asn Gly Thr Ile Val Tyr Asp Gly Ser Leu Val Arg Gly Lys Met  
50 55 60

Asn Gly Gln Gly Thr Ile Thr Phe Gln Asn Gly Asp Gln Tyr Thr Gly  
65 70 75 80

Gly Phe Asn Asn Gly Ala Phe Asn Gly Lys Gly Thr Phe Gln Ser Lys  
85 90 95

Glu Gly Trp Thr Tyr Glu Gly Asp Phe Val Asn Gly Gln Ala Glu Gly  
100 105 110

Lys Gly Lys Leu Thr Thr Glu Gln Glu Val Val Tyr Glu Gly Thr Phe  
115 120 125

Lys Gln Gly Val Phe Gln Gln Lys  
130 135

<210> 176  
<211> 136  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1484

<400> 176

Val Glu Asn Leu Thr Asn Phe Tyr Glu Lys Tyr Arg Val Tyr Leu Thr  
1 5 10 15

Arg Pro Arg Leu Glu Ile Leu Thr Val Val Thr Ile Val Phe Cys Ala  
20 25 30

Val Leu Val Phe Phe Leu Asn Ile Pro Gly Lys Gly Val Leu Lys Leu  
35 40 45

Asp Asn Gly Thr Ile Val Tyr Asp Gly Ser Leu Val Arg Gly Lys Met  
50 55 60

Asn Gly Gln Gly Thr Ile Thr Phe Gln Asn Gly Asp Gln Tyr Thr Gly  
65 70 75 80

Gly Phe Asn Asn Gly Ala Phe Asn Gly Lys Gly Thr Phe Gln Ser Lys  
85 90 95

Glu Gly Trp Thr Tyr Glu Gly Asp Phe Val Asn Gly Gln Ala Glu Gly  
100 105 110

Lys Gly Lys Leu Thr Thr Glu Gln Glu Val Val Tyr Glu Gly Thr Phe  
115 120 125

Lys Gln Gly Val Phe Gln Gln Lys  
130 135

<210> 177  
<211> 136

<212> PRT  
<213> Streptococcus pneumoniae Pj-1231

<400> 177

Val Glu Asn Pro Thr Asn Phe Tyr Glu Lys Tyr Arg Val Tyr Leu Thr  
1 5 10 15

Arg Pro Arg Leu Glu Leu Leu Ala Val Val Thr Ile Val Phe Cys Ala  
20 25 30

Val Leu Val Phe Phe Leu Asn Ile Pro Gly Lys Gly Val Leu Lys Leu  
35 40 45

Asp Asn Gly Thr Ile Val Tyr Asp Gly Ser Leu Val Arg Gly Lys Met  
50 55 60

Asn Gly Gln Gly Thr Ile Thr Phe Gln Asn Gly Asp Gln Tyr Thr Gly  
65 70 75 80

Gly Phe Asn Asn Gly Ala Phe Asn Gly Lys Gly Thr Phe Gln Ser Lys  
85 90 95

Glu Gly Trp Thr Tyr Glu Gly Asp Phe Val Asn Gly Gln Ala Glu Gly  
100 105 110

Lys Gly Lys Leu Thr Thr Glu Gln Glu Val Val Tyr Glu Gly Thr Phe  
115 120 125

Lys Gln Gly Val Phe Gln Gln Lys  
130 135

<210> 178  
<211> 136  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1234

<400> 178

Val Glu Asn Leu Thr Asn Phe Tyr Glu Lys Tyr Arg Val Tyr Leu Thr  
1 5 10 15

Arg Pro Arg Leu Glu Ile Leu Thr Val Val Thr Ile Val Phe Cys Ala  
20 25 30

Val Leu Val Phe Phe Leu Asn Ile Pro Gly Lys Gly Val Leu Lys Leu  
35 40 45

Asp Asn Gly Thr Ile Val Tyr Asp Gly Ser Leu Val Arg Gly Lys Met

50

55

60

Asn Gly Gln Gly Thr Ile Thr Phe Gln Asn Gly Asp Gln Tyr Thr Gly  
65 70 75 80

Gly Phe Asn Asn Gly Ala Phe Asn Gly Lys Gly Thr Phe Gln Ser Lys  
85 90 95

Glu Gly Trp Thr Tyr Glu Gly Asp Phe Val Asn Gly Gln Ala Glu Gly  
100 105 110

Lys Gly Lys Leu Thr Thr Glu Gln Glu Val Val Tyr Glu Gly Thr Phe  
115 120 125

Lys Gln Gly Val Phe Gln Gln Lys  
130 135

<210> 179  
<211> 136  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1255

<400> 179

Val Glu Asn Leu Thr Asn Phe Tyr Glu Lys Tyr Arg Val Tyr Leu Thr  
1 5 10 15

Arg Pro Arg Leu Glu Ile Leu Ala Val Val Thr Ile Val Phe Cys Ala  
20 25 30

Val Leu Val Phe Phe Leu Asn Ile Pro Gly Lys Gly Val Leu Lys Leu  
35 40 45

Asp Asn Gly Thr Ile Val Tyr Asp Gly Ser Leu Val Arg Gly Lys Met  
50 55 60

Asn Gly Gln Gly Thr Ile Thr Phe Gln Asn Gly Asp Gln Tyr Thr Gly  
65 70 75 80

Gly Phe Asn Asn Gly Ala Phe Asn Gly Lys Gly Thr Phe Gln Ser Lys  
85 90 95

Glu Gly Trp Thr Tyr Glu Gly Asp Phe Val Asn Gly Gln Ala Glu Gly  
100 105 110

Lys Gly Lys Leu Thr Thr Glu Gln Glu Val Val Tyr Glu Gly Thr Phe  
115 120 125



Lys Gln Gly Val Phe Gln Gln Lys  
130 135

<210> 180  
<211> 136  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1284

<400> 180

Val Glu Asn Leu Thr Asn Phe Tyr Glu Lys Tyr Arg Val Tyr Leu Thr  
1 5 10 15

Arg Pro Arg Leu Glu Ile Leu Thr Val Val Thr Ile Val Phe Cys Ala  
20 25 30

Val Leu Val Phe Phe Leu Asn Ile Pro Gly Lys Gly Val Leu Lys Leu  
35 40 45

Asp Asn Gly Thr Ile Val Tyr Asp Gly Ser Leu Val Arg Gly Lys Met  
50 55 60

Asn Gly Gln Gly Thr Ile Thr Phe Gln Asn Gly Asp Gln Tyr Thr Gly  
65 70 75 80

Gly Phe Asn Asn Gly Ala Phe Asn Gly Lys Gly Thr Phe Gln Ser Lys  
85 90 95

Glu Gly Trp Thr Tyr Glu Gly Asp Phe Val Asn Gly Gln Ala Glu Gly  
100 105 110

Lys Gly Lys Leu Thr Thr Glu Gln Glu Val Val Tyr Glu Gly Thr Phe  
115 120 125

Lys Gln Gly Val Phe Gln Gln Lys  
130 135

<210> 181  
<211> 136  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1298

<400> 181

Val Glu Asn Pro Thr Asn Phe Tyr Glu Lys Tyr Arg Val Tyr Leu Thr  
1 5 10 15

Arg Pro Arg Leu Glu Leu Leu Ala Val Val Thr Ile Val Phe Cys Ala  
20 25 30

Val Leu Val Phe Phe Leu Asn Ile Pro Gly Lys Gly Val Leu Lys Leu  
35 40 45

Asp Asn Gly Thr Ile Val Tyr Asp Gly Ser Leu Val Arg Gly Lys Met  
50 55 60

Asn Gly Gln Gly Thr Ile Thr Phe Gln Asn Gly Asp Gln Tyr Thr Gly  
65 70 75 80

Gly Phe Asn Asn Gly Ala Phe Asn Gly Lys Gly Thr Phe Gln Ser Lys  
85 90 95

Glu Gly Trp Thr Tyr Glu Gly Asp Phe Val Asn Gly Gln Ala Glu Gly  
100 105 110

Lys Gly Lys Leu Thr Thr Glu Gln Glu Val Val Tyr Glu Gly Thr Phe  
115 120 125

Lys Gln Gly Val Phe Gln Gln Lys  
130 135

<210> 182  
<211> 136  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1300

<400> 182

Val Glu Asn Leu Thr Asn Phe Tyr Glu Lys Tyr Arg Val Tyr Leu Thr  
1 5 10 15

Arg Pro Arg Leu Glu Ile Leu Ala Val Val Thr Ile Val Phe Cys Ala  
20 25 30

Val Leu Val Phe Phe Leu Asn Ile Pro Gly Lys Gly Val Leu Lys Leu  
35 40 45

Asp Asn Gly Thr Ile Val Tyr Asp Gly Ser Leu Val Arg Gly Lys Met  
50 55 60

Asn Gly Gln Gly Thr Ile Thr Phe Gln Asn Gly Asp Gln Tyr Thr Gly  
65 70 75 80

Gly Phe Asn Asn Gly Ala Phe Asn Gly Lys Gly Thr Phe Gln Ser Lys  
85 90 95

Glu Gly Trp Thr Tyr Glu Gly Asp Phe Val Asn Gly Gln Ala Glu Gly  
100 105 110

Lys Gly Lys Leu Thr Thr Glu Gln Glu Val Val Tyr Glu Gly Thr Phe  
115 120 125

Lys Gln Gly Val Phe Gln Gln Lys  
130 135

<210> 183  
<211> 136  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1322

<400> 183

Val Glu Asn Pro Thr Asn Phe Tyr Glu Lys Tyr Arg Val Tyr Leu Thr  
1 5 10 15

Arg Pro Arg Leu Glu Leu Leu Ala Val Val Thr Ile Val Phe Cys Ala  
20 25 30

Val Leu Val Phe Phe Leu Asn Ile Pro Gly Lys Gly Val Leu Lys Leu  
35 40 45

Asp Asn Gly Thr Ile Val Tyr Asp Gly Ser Leu Val Arg Gly Lys Met  
50 55 60

Asn Gly Gln Gly Thr Ile Thr Phe Gln Asn Gly Asp Gln Tyr Thr Gly  
65 70 75 80

Gly Phe Asn Asn Gly Ala Phe Asn Gly Lys Gly Thr Phe Gln Ser Lys  
85 90 95

Glu Gly Trp Thr Tyr Glu Gly Asp Phe Val Asn Gly Gln Ala Glu Gly  
100 105 110

Lys Gly Lys Leu Thr Thr Glu Gln Glu Val Val Tyr Glu Gly Thr Phe  
115 120 125

Lys Gln Gly Val Phe Gln Gln Lys  
130 135

<210> 184  
<211> 136  
<212> PRT  
<213> Streptococcus pneumoniae I-33\_Andersson

<400> 184

Met Glu Asn Leu Lys Asn Phe Tyr Glu Lys Tyr Arg Val Tyr Leu Thr  
1 5 10 15

Arg Gln Arg Leu Glu Leu Leu Ala Val Val Thr Ile Val Phe Cys Ala  
20 25 30

Val Leu Val Phe Phe Leu Asn Ile Pro Gly Lys Gly Val Leu Lys Leu  
35 40 45

Asp Asn Gly Thr Ile Val Tyr Asp Gly Ser Leu Val Arg Gly Lys Met  
50 55 60

Asn Gly Gln Gly Thr Ile Thr Phe Gln Asn Gly Asp Gln Tyr Thr Gly  
65 70 75 80

Gly Phe Asn Asn Gly Ala Phe Asn Gly Lys Gly Thr Phe Gln Ser Lys  
85 90 95

Glu Gly Trp Thr Tyr Glu Gly Asp Phe Val Asn Gly Gln Ala Glu Gly  
100 105 110

Lys Gly Lys Leu Thr Thr Glu Gln Glu Val Val Tyr Glu Gly Thr Phe  
115 120 125

Lys Gln Gly Val Phe Gln Gln Lys  
130 135

<210> 185  
<211> 136  
<212> PRT  
<213> Streptococcus pneumoniae TIGR4\_DB

<400> 185

Val Glu Asn Leu Thr Asn Phe Tyr Glu Lys Tyr Arg Val Tyr Leu Thr  
1 5 10 15

Arg Pro Arg Leu Glu Leu Leu Ala Val Val Thr Ile Val Phe Cys Ala  
20 25 30

Val Leu Val Phe Phe Leu Asn Ile Pro Gly Lys Gly Val Leu Lys Leu  
35 40 45

Asp Asn Gly Thr Ile Val Tyr Asp Gly Ser Leu Val Arg Gly Lys Met  
50 55 60

Asn Gly Gln Gly Thr Ile Thr Phe Gln Asn Gly Asp Gln Tyr Thr Gly

65	70							75							80						
Gly	Phe	Asn	Asn	Gly	Ala	Phe	Asn	Gly	Lys	Gly	Thr	Phe	Gln	Ser	Lys						
				85					90					95							
Glu	Gly	Trp	Thr	Tyr	Glu	Gly	Asp	Phe	Val	Asn	Gly	Gln	Ala	Glu	Gly						
				100					105					110							
Lys	Gly	Lys	Leu	Thr	Thr	Glu	Gln	Glu	Val	Val	Tyr	Glu	Gly	Thr	Phe						
				115					120					125							
Lys	Gln	Gly	Val	Phe	Gln	Gln	Lys														
				130					135												
<210> 186																					
<211> 136																					
<212> PRT																					
<213> Streptococcus pneumoniae TIGR4_IC																					
<400> 186																					
Val	Glu	Asn	Leu	Thr	Asn	Phe	Tyr	Glu	Lys	Tyr	Arg	Val	Tyr	Leu	Thr						
1					5					10					15						
Arg	Pro	Arg	Leu	Glu	Leu	Leu	Ala	Val	Val	Thr	Ile	Val	Phe	Cys	Ala						
				20					25					30							
Val	Leu	Val	Phe	Phe	Leu	Asn	Ile	Pro	Gly	Lys	Gly	Val	Leu	Lys	Leu						
				35					40					45							
Asp	Asn	Gly	Thr	Ile	Val	Tyr	Asp	Gly	Ser	Leu	Val	Arg	Gly	Lys	Met						
				50					55					60							
Asn	Gly	Gln	Gly	Thr	Ile	Thr	Phe	Gln	Asn	Gly	Asp	Gln	Tyr	Thr	Gly						
65					70					75					80						
Gly	Phe	Asn	Asn	Gly	Ala	Phe	Asn	Gly	Lys	Gly	Thr	Phe	Gln	Ser	Lys						
				85					90					95							
Glu	Gly	Trp	Thr	Tyr	Glu	Gly	Asp	Phe	Val	Asn	Gly	Gln	Ala	Glu	Gly						
				100					105					110							
Lys	Gly	Lys	Leu	Thr	Thr	Glu	Gln	Glu	Val	Val	Tyr	Glu	Gly	Thr	Phe						
				115					120					125							
Lys	Gln	Gly	Val	Phe	Gln	Gln	Lys														
				130					135												

<210> 187  
<211> 810  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-70

<400> 187

Met Asn Tyr Ser Lys Ala Leu Asn Glu Cys Ile Glu Ser Ala Tyr Met  
1 5 10 15

Val Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu  
20 25 30

Ile Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn  
35 40 45

Asp Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu  
50 55 60

Thr Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe  
65 70 75 80

Ser Arg Arg Leu Gln Val Leu Phe Asp Glu Ala Glu Tyr Val Ala Ser  
85 90 95

Val Val His Ala Lys Val Leu Gly Thr Glu His Val Leu Tyr Ala Ile  
100 105 110

Leu His Asp Ser Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly  
115 120 125

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

Arg Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala  
145 150 155 160

Leu Arg Gln Arg His Arg Thr Val Ala Asp Lys Gln Asn Ser Met Ala  
165 170 175

Asn Met Met Gly Met Pro Gln Thr Pro Ser Gly Gly Leu Glu Asp Tyr  
180 185 190

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

Ile Gly Arg Asp Lys Glu Ile Ser Arg Met Ile Gln Ile Leu Ser Arg

210					215					220					
Lys	Thr	Lys	Asn	Asn	Pro	Val	Leu	Val	Gly	Asp	Ala	Gly	Val	Gly	Lys
225					230					235					240
Thr	Ala	Leu	Ala	Leu	Gly	Leu	Ala	Gln	Arg	Ile	Ala	Ser	Gly	Asp	Val
				245					250					255	
Pro	Ala	Glu	Met	Ala	Lys	Met	Arg	Val	Leu	Glu	Leu	Asp	Leu	Met	Asn
			260					265					270		
Val	Val	Ala	Gly	Thr	Arg	Phe	Arg	Gly	Asp	Phe	Glu	Glu	Arg	Met	Asn
		275					280					285			
Asn	Ile	Ile	Lys	Asp	Ile	Glu	Glu	Asp	Gly	Gln	Val	Ile	Leu	Phe	Ile
290						295					300				
Asp	Glu	Leu	His	Thr	Ile	Met	Gly	Ser	Gly	Ser	Gly	Ile	Asp	Ser	Thr
305					310					315					320
Leu	Asp	Ala	Ala	Asn	Ile	Leu	Lys	Pro	Ala	Leu	Ala	Arg	Gly	Thr	Leu
				325					330					335	
Arg	Thr	Val	Gly	Ala	Thr	Thr	Gln	Glu	Glu	Tyr	Gln	Lys	His	Ile	Glu
			340					345					350		
Lys	Asp	Ala	Ala	Leu	Ser	Arg	Arg	Phe	Ala	Lys	Val	Thr	Ile	Glu	Glu
		355					360					365			
Pro	Ser	Val	Ala	Asp	Ser	Met	Thr	Ile	Leu	Gln	Gly	Leu	Lys	Ala	Thr
	370					375					380				
Tyr	Glu	Lys	His	His	Arg	Val	Gln	Ile	Thr	Asp	Glu	Ala	Val	Glu	Thr
385					390					395					400
Ala	Val	Lys	Met	Ala	His	Arg	Tyr	Leu	Thr	Ser	Arg	His	Leu	Pro	Asp
			405						410					415	
Ser	Ala	Ile	Asp	Leu	Leu	Asp	Glu	Ala	Ala	Ala	Thr	Val	Gln	Asn	Lys
			420					425					430		
Ala	Lys	His	Val	Lys	Ala	Asp	Asp	Ser	Asp	Leu	Ser	Pro	Ala	Asp	Lys
		435					440					445			
Ala	Leu	Met	Asp	Gly	Lys	Trp	Lys	Gln	Ala	Ala	Gln	Leu	Ile	Ala	Lys
450						455					460				

Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile  
465 470 475 480

Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr  
485 490 495

Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys  
500 505 510

Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile  
515 520 525

Arg Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser  
530 535 540

Phe Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys  
545 550 555 560

Ala Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe  
565 570 575

Asp Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly  
580 585 590

Ala Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu  
595 600 605

Lys Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu  
610 615 620

Lys Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp  
625 630 635 640

Gly Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr  
645 650 655

Ile Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp  
660 665 670

Lys Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn  
675 680 685

Met Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu  
690 695 700



Phe Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser  
705 710 715 720

Asp His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala  
725 730 735

Ser Leu Ala Glu Lys Gly Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu  
740 745 750

Lys Leu Leu Ala Asn Gln Gly Tyr Asp Pro Glu Met Gly Ala Arg Pro  
755 760 765

Leu Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu  
770 775 780

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

Lys Ala Gly Gln Leu Lys Phe Asp Ile Ala  
805 810

<210> 188  
<211> 810  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-93  
  
<400> 188

Met Asn Tyr Ser Lys Ala Leu Asn Glu Cys Ile Glu Ser Ala Tyr Met  
1 5 10 15

Val Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu  
20 25 30

Ile Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn  
35 40 45

Asp Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu  
50 55 60

Thr Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe  
65 70 75 80

Ser Arg Arg Leu Gln Val Leu Phe Asp Glu Ala Glu Tyr Val Ala Ser  
85 90 95

Val Val His Ala Lys Val Leu Gly Thr Glu His Val Leu Tyr Ala Ile

100					105					110					
Leu	His	Asp	Ser	Asn	Ala	Leu	Ala	Thr	Arg	Ile	Leu	Glu	Arg	Ala	Gly
		115					120					125			
Phe	Ser	Tyr	Glu	Asp	Lys	Lys	Asp	Gln	Val	Lys	Ile	Ala	Ala	Leu	Arg
	130					135					140				
Arg	Asn	Leu	Glu	Glu	Arg	Ala	Gly	Trp	Thr	Arg	Glu	Asp	Leu	Lys	Ala
145					150					155					160
Leu	Arg	Gln	Arg	His	Arg	Thr	Val	Ala	Asp	Lys	Gln	Asn	Ser	Met	Ala
				165					170					175	
Asn	Met	Met	Gly	Met	Pro	Gln	Thr	Pro	Ser	Gly	Gly	Leu	Glu	Asp	Tyr
			180					185					190		
Thr	His	Asp	Leu	Thr	Glu	Gln	Ala	Arg	Ser	Gly	Lys	Leu	Glu	Pro	Val
		195					200					205			
Ile	Gly	Arg	Asp	Lys	Glu	Ile	Ser	Arg	Met	Ile	Gln	Ile	Leu	Ser	Arg
	210					215					220				
Lys	Thr	Lys	Asn	Asn	Pro	Val	Leu	Val	Gly	Asp	Ala	Gly	Val	Gly	Lys
225					230					235					240
Thr	Ala	Leu	Ala	Leu	Gly	Leu	Ala	Gln	Arg	Ile	Ala	Ser	Gly	Asp	Val
				245					250					255	
Pro	Ala	Glu	Met	Ala	Lys	Met	Arg	Val	Leu	Glu	Leu	Asp	Leu	Met	Asn
			260					265					270		
Val	Val	Ala	Gly	Thr	Arg	Phe	Arg	Gly	Asp	Phe	Glu	Glu	Arg	Met	Asn
		275					280					285			
Asn	Ile	Ile	Lys	Asp	Ile	Glu	Glu	Asp	Gly	Gln	Val	Ile	Leu	Phe	Ile
	290					295					300				
Asp	Glu	Leu	His	Thr	Ile	Met	Gly	Ser	Gly	Ser	Gly	Ile	Asp	Ser	Thr
305					310					315					320
Leu	Asp	Ala	Ala	Asn	Ile	Leu	Lys	Pro	Ala	Leu	Ala	Arg	Gly	Thr	Leu
				325					330					335	
Arg	Thr	Val	Gly	Ala	Thr	Thr	Gln	Glu	Glu	Tyr	Gln	Lys	His	Ile	Glu
			340					345					350		

Lys Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu  
355 360 365

Pro Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr  
370 375 380

Tyr Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr  
385 390 395 400

Ala Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp  
405 410 415

Ser Ala Ile Asp Leu Leu Asp Glu Ala Ala Ala Thr Val Gln Asn Lys  
420 425 430

Ala Lys Tyr Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys  
435 440 445

Ala Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys  
450 455 460

Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile  
465 470 475 480

Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr  
485 490 495

Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys  
500 505 510

Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile  
515 520 525

Arg Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser  
530 535 540

Phe Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys  
545 550 555 560

Ala Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe  
565 570 575

Asp Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly  
580 585 590

Ala Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu  
595 600 605

Lys Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu  
610 615 620

Lys Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp  
625 630 635 640

Gly Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr  
645 650 655

Ile Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp  
660 665 670

Lys Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn  
675 680 685

Met Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu  
690 695 700

Phe Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser  
705 710 715 720

Asp His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala  
725 730 735

Ser Leu Ala Glu Lys Gly Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu  
740 745 750

Lys Leu Leu Ala Asn Gln Gly Tyr Asp Pro Glu Met Gly Ala Arg Pro  
755 760 765

Leu Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu  
770 775 780

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

Lys Ala Gly Gln Leu Lys Phe Asp Ile Ala  
805 810

<210> 189  
<211> 810  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-161

<400> 189

Met Asn Tyr Ser Lys Ala Leu Asn Glu Cys Ile Glu Ser Ala Tyr Met  
1 5 10 15

Val Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu  
20 25 30

Ile Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn  
35 40 45

Asp Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu  
50 55 60

Thr Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe  
65 70 75 80

Ser Arg Arg Leu Gln Val Leu Phe Asp Glu Ala Glu Tyr Val Ala Ser  
85 90 95

Val Val His Ala Lys Val Leu Gly Thr Glu His Val Leu Tyr Ala Ile  
100 105 110

Leu His Asp Ser Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly  
115 120 125

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

Arg Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala  
145 150 155 160

Leu Arg Gln Arg His Arg Thr Val Ala Asp Lys Gln Asn Ser Met Ala  
165 170 175

Asn Met Met Gly Met Pro Gln Thr Pro Ser Gly Gly Leu Glu Asp Tyr  
180 185 190

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

Ile Gly Arg Asp Lys Glu Ile Ser Arg Met Ile Gln Ile Leu Ser Arg  
210 215 220

Lys Thr Lys Asn Asn Pro Val Leu Val Gly Asp Ala Gly Val Gly Lys  
225 230 235 240

Thr Ala Leu Ala Leu Gly Leu Ala Gln Arg Ile Ala Ser Gly Asp Val  
245 250 255

Pro Ala Glu Met Ala Lys Met Arg Val Leu Glu Leu Asp Leu Met Asn  
260 265 270

Val Val Ala Gly Thr Arg Phe Arg Gly Asp Phe Glu Glu Arg Met Asn  
275 280 285

Asn Ile Ile Lys Asp Ile Glu Glu Asp Gly Gln Val Ile Leu Phe Ile  
290 295 300

Asp Glu Leu His Thr Ile Met Gly Ser Gly Ser Gly Ile Asp Ser Thr  
305 310 315 320

Leu Asp Ala Ala Asn Ile Leu Lys Pro Ala Leu Ala Arg Gly Thr Leu  
325 330 335

Arg Thr Val Gly Ala Thr Thr Gln Glu Glu Tyr Gln Lys His Ile Glu  
340 345 350

Lys Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu  
355 360 365

Pro Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr  
370 375 380

Tyr Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr  
385 390 395 400

Ala Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp  
405 410 415

Ser Ala Ile Asp Leu Leu Asp Glu Ala Ala Ala Thr Val Gln Asn Lys  
420 425 430

Ala Lys His Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys  
435 440 445

Ala Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys  
450 455 460

Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile  
465 470 475 480

Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr  
485 490 495

Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys  
500 505 510

Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile  
515 520 525

Arg Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser  
530 535 540

Phe Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys  
545 550 555 560

Ala Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe  
565 570 575

Asp Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly  
580 585 590

Ala Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu  
595 600 605

Lys Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu  
610 615 620

Lys Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp  
625 630 635 640

Gly Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr  
645 650 655

Ile Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp  
660 665 670

Lys Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn  
675 680 685

Met Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu  
690 695 700

Phe Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser  
705 710 715 720

Asp His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala  
725 730 735

Ser Leu Ala Glu Lys Gly Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu  
740 745 750

Lys Leu Leu Ala Asn Gln Gly Tyr Asp Pro Glu Met Gly Ala Arg Pro  
755 760 765

Leu Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu  
770 775 780

Leu Leu Lys Gly Asp Leu Val Ala Gly Asn Thr Leu Lys Ile Gly Val  
785 790 795 800

Lys Ala Gly Gln Leu Lys Phe Asp Ile Ala  
805 810

<210> 190  
<211> 810  
<212> PRT  
<213> Streptococcus pneumoniae Pj-102-228

<400> 190

Met Asn Tyr Ser Lys Ala Leu Asn Glu Cys Ile Glu Ser Ala Tyr Met  
1 5 10 15

Val Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu  
20 25 30

Ile Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn  
35 40 45

Asp Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu  
50 55 60

Thr Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe  
65 70 75 80

Ser Arg Arg Leu Gln Val Leu Phe Asp Glu Ala Glu Tyr Val Ala Ser  
85 90 95

Val Val His Ala Lys Val Leu Gly Thr Glu His Val Leu Tyr Ala Ile  
100 105 110

Leu His Asp Gly Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly  
115 120 125



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

Arg Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala  
145 150 155 160

Leu Arg Gln Arg His Arg Thr Val Ala Asp Lys Gln Asn Ser Met Ala  
165 170 175

Asn Met Met Gly Met Pro Gln Thr Pro Ser Gly Gly Leu Glu Asp Tyr  
180 185 190

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

Ile Gly Arg Asp Lys Glu Ile Ser Arg Met Ile Gln Ile Leu Ser Arg  
210 215 220

Lys Thr Lys Asn Asn Pro Val Leu Val Gly Asp Ala Gly Val Gly Lys  
225 230 235 240

Thr Ala Leu Ala Leu Gly Leu Ala Gln Arg Ile Ala Ser Gly Asp Val  
245 250 255

Pro Ala Glu Met Ala Lys Met Arg Val Leu Glu Leu Asp Leu Met Asn  
260 265 270

Val Val Ala Gly Thr Arg Phe Arg Gly Asp Phe Glu Glu Arg Met Asn  
275 280 285

Asn Ile Ile Lys Asp Ile Glu Glu Asp Gly Gln Val Ile Leu Phe Ile  
290 295 300

Asp Glu Leu His Thr Ile Met Gly Ser Gly Ser Gly Ile Asp Ser Thr  
305 310 315 320

Leu Asp Ala Ala Asn Ile Leu Lys Pro Ala Leu Ala Arg Gly Thr Leu  
325 330 335

Arg Thr Val Gly Ala Thr Thr Gln Glu Glu Tyr Gln Lys His Ile Glu  
340 345 350

Lys Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu  
355 360 365

Pro Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr  
370 375 380

Tyr Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr  
385 390 395 400

Ala Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp  
405 410 415

Ser Ala Ile Asp Leu Leu Asp Glu Ala Ala Ala Thr Val Gln Asn Lys  
420 425 430

Ser Lys His Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys  
435 440 445

Ala Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys  
450 455 460

Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile  
465 470 475 480

Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr  
485 490 495

Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys  
500 505 510

Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile  
515 520 525

Arg Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser  
530 535 540

Phe Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys  
545 550 555 560

Ala Leu Ala Glu Ala Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe  
565 570 575

Asp Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly  
580 585 590

Ala Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu  
595 600 605

Lys Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu  
610 615 620

Lys Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp  
625 630 635 640

Gly Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr  
645 650 655

Ile Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp  
660 665 670

Lys Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn  
675 680 685

Met Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu  
690 695 700

Phe Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser  
705 710 715 720

Asp His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala  
725 730 735

Ser Leu Ala Glu Lys Gly Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu  
740 745 750

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

Leu Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu  
770 775 780

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

Lys Ala Gly Gln Leu Lys Phe Asp Ile Ala  
805 810

<210> 191  
<211> 810  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1364

<400> 191

Met Asn Tyr Ser Lys Ala Leu Asn Glu Cys Ile Glu Ser Ala Tyr Met  
1 5 10 15

Val Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu  
20 25 30

Ile Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn  
35 40 45

Asp Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu  
50 55 60

Thr Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe  
65 70 75 80

Ser Arg Arg Leu Gln Val Leu Phe Asp Glu Ala Glu Tyr Val Ala Ser  
85 90 95

Val Val His Ala Lys Val Leu Gly Thr Glu His Val Leu Tyr Ala Ile  
100 105 110

Leu His Asp Gly Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly  
115 120 125

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

Arg Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala  
145 150 155 160

Leu Arg Gln Arg His Arg Thr Val Ala Asp Lys Gln Asn Ser Met Ala  
165 170 175

Asn Met Met Gly Met Pro Gln Thr Pro Ser Gly Gly Leu Glu Asp Tyr  
180 185 190

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

Ile Gly Arg Asp Lys Glu Ile Ser Arg Met Ile Gln Ile Leu Ser Arg  
210 215 220

Lys Thr Lys Asn Asn Pro Val Leu Val Gly Asp Ala Gly Val Gly Lys  
225 230 235 240

Thr Ala Leu Ala Leu Gly Leu Ala Gln Arg Ile Ala Ser Gly Asp Val  
245 250 255

Pro Ala Glu Met Ala Lys Met Arg Val Leu Glu Leu Asp Leu Met Asn  
260 265 270

Val Val Ala Gly Thr Arg Phe Arg Gly Asp Phe Glu Glu Arg Met Asn  
275 280 285

Asn Ile Ile Lys Asp Ile Glu Glu Asp Gly Gln Val Ile Leu Phe Ile  
290 295 300

Asp Glu Leu His Thr Ile Met Gly Ser Gly Ser Gly Ile Asp Ser Thr  
305 310 315 320

Leu Asp Ala Ala Asn Ile Leu Lys Pro Ala Leu Ala Arg Gly Thr Leu  
325 330 335

Arg Thr Val Gly Ala Thr Thr Gln Glu Glu Tyr Gln Lys His Ile Glu  
340 345 350

Lys Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu  
355 360 365

Pro Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr  
370 375 380

Tyr Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr  
385 390 395 400

Ala Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp  
405 410 415

Ser Ala Ile Asp Leu Leu Asp Glu Ala Ala Ala Thr Val Gln Asn Lys  
420 425 430

Ala Lys His Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys  
435 440 445

Ala Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys  
450 455 460

Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile  
465 470 475 480

Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr  
485 490 495

Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys  
500 505 510

Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile  
515 520 525

Arg Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser  
530 535 540

Phe Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys  
545 550 555 560

Ala Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe  
565 570 575

Asp Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly  
580 585 590

Ala Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu  
595 600 605

Lys Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu  
610 615 620

Lys Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp  
625 630 635 640

Gly Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr  
645 650 655

Ile Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp  
660 665 670

Lys Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn  
675 680 685

Met Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu  
690 695 700

Phe Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser  
705 710 715 720

Asp His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala  
725 730 735

Ser Leu Ala Glu Lys Gly Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu

740

745

750

Lys Leu Leu Ala Asn Gln Gly Tyr Asp Pro Glu Met Gly Ala Arg Pro  
 755 760 765

Leu Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu  
 770 775 780

Leu Leu Lys Gly Asp Leu Val Ala Gly Asn Thr Leu Lys Ile Gly Val  
 785 790 795 800

Lys Ala Gly Gln Leu Lys Phe Asp Ile Ala  
 805 810

<210> 192

<211> 810

<212> PRT

<213> Streptococcus pneumoniae Pj-1484

<400> 192

Met Asn Tyr Ser Lys Ala Leu Asn Glu Cys Ile Glu Ser Ala Tyr Met  
 1 5 10 15

Val Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu  
 20 25 30

Ile Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn  
 35 40 45

Asp Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu  
 50 55 60

Thr Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe  
 65 70 75 80

Ser Arg Arg Leu Gln Val Leu Phe Asp Glu Ala Glu Tyr Val Ala Ser  
 85 90 95

Val Val His Ala Lys Val Leu Gly Thr Glu His Val Leu Tyr Ala Ile  
 100 105 110

Leu His Asp Ser Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly  
 115 120 125

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

Arg Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala  
145 150 155 160

Leu Arg Gln Arg His Arg Thr Val Ala Asp Lys Gln Asn Ser Met Ala  
165 170 175

Asn Met Met Gly Met Pro Gln Thr Pro Ser Gly Gly Leu Glu Asp Tyr  
180 185 190

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

Ile Gly Arg Asp Lys Glu Ile Ser Arg Met Ile Gln Ile Leu Ser Arg  
210 215 220

Lys Thr Lys Asn Asn Pro Val Leu Val Gly Asp Ala Gly Val Gly Lys  
225 230 235 240

Thr Ala Leu Ala Leu Gly Leu Ala Gln Arg Ile Ala Ser Gly Asp Val  
245 250 255

Pro Ala Glu Met Ala Lys Met Arg Val Leu Glu Leu Asp Leu Met Asn  
260 265 270

Val Val Ala Gly Thr Arg Phe Arg Gly Asp Phe Glu Glu Arg Met Asn  
275 280 285

Asn Ile Ile Lys Asp Ile Glu Glu Asp Gly Gln Val Ile Leu Phe Ile  
290 295 300

Asp Glu Leu His Thr Ile Met Gly Ser Gly Ser Gly Ile Asp Ser Thr  
305 310 315 320

Leu Asp Ala Ala Asn Ile Leu Lys Pro Ala Leu Ala Arg Gly Thr Leu  
325 330 335

Arg Thr Val Gly Ala Thr Thr Gln Glu Glu Tyr Gln Lys His Ile Glu  
340 345 350

Lys Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu  
355 360 365

Pro Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr  
370 375 380



Tyr Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr  
385 390 395 400

Ala Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp  
405 410 415

Ser Ala Ile Asp Leu Leu Asp Glu Ala Ala Ala Thr Val Gln Asn Lys  
420 425 430

Ala Lys His Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys  
435 440 445

Ala Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys  
450 455 460

Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile  
465 470 475 480

Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr  
485 490 495

Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys  
500 505 510

Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile  
515 520 525

Arg Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser  
530 535 540

Phe Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys  
545 550 555 560

Ala Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe  
565 570 575

Asp Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly  
580 585 590

Ala Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu  
595 600 605

Lys Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu  
610 615 620

Lys Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp

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

<210> 193  
 <211> 810  
 <212> PRT  
 <213> Streptococcus pneumoniae Pj-1230

<400> 193

Met Asn Tyr Ser Lys Ala Leu Asn Glu Cys Ile Glu Ser Ala Tyr Met
1 5 10 15
Val Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu
20 25 30

Ile Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn  
35 40 45

Asp Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu  
50 55 60

Thr Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe  
65 70 75 80

Ser Arg Arg Leu Gln Val Leu Phe Asp Glu Ala Glu Tyr Val Ala Ser  
85 90 95

Val Val His Ala Lys Val Leu Gly Thr Glu His Val Leu Tyr Ala Ile  
100 105 110

Leu His Asp Gly Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly  
115 120 125

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

Arg Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala  
145 150 155 160

Leu Arg Gln Arg His Arg Thr Val Ala Asp Lys Gln Asn Ser Met Ala  
165 170 175

Asn Met Met Gly Met Pro Gln Thr Pro Ser Gly Gly Leu Glu Asp Tyr  
180 185 190

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

Ile Gly Arg Asp Lys Glu Ile Ser Arg Met Ile Gln Ile Leu Ser Arg  
210 215 220

Lys Thr Lys Asn Asn Pro Val Leu Val Gly Asp Ala Gly Val Gly Lys  
225 230 235 240

Thr Ala Leu Ala Leu Gly Leu Ala Gln Arg Ile Ala Ser Gly Asp Val  
245 250 255

Pro Ala Glu Met Ala Lys Met Arg Val Leu Glu Leu Asp Leu Met Asn  
260 265 270

Val Val Ala Gly Thr Arg Phe Arg Gly Asp Phe Glu Glu Arg Met Asn  
275 280 285

Asn Ile Ile Lys Asp Ile Glu Glu Asp Gly Gln Val Ile Leu Phe Ile  
290 295 300

Asp Glu Leu His Thr Ile Met Gly Ser Gly Ser Gly Ile Asp Ser Thr  
305 310 315 320

Leu Asp Ala Ala Asn Ile Leu Lys Pro Ala Leu Ala Arg Gly Thr Leu  
325 330 335

Arg Thr Val Gly Ala Thr Thr Gln Glu Glu Tyr Gln Lys His Ile Glu  
340 345 350

Lys Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu  
355 360 365

Pro Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr  
370 375 380

Tyr Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr  
385 390 395 400

Ala Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp  
405 410 415

Ser Ala Ile Asp Leu Leu Asp Glu Ala Ala Ala Thr Val Gln Asn Lys  
420 425 430

Ser Lys His Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys  
435 440 445

Ala Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys  
450 455 460

Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile  
465 470 475 480

Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr  
485 490 495

Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys  
500 505 510

Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile

515					520					525					
Arg	Arg	Asn	Gln	Ser	Gly	Ile	Arg	Ser	His	Lys	Arg	Pro	Ile	Gly	Ser
530						535					540				
Phe	Met	Phe	Leu	Gly	Pro	Thr	Gly	Val	Gly	Lys	Thr	Glu	Leu	Ala	Lys
545					550					555					560
Ala	Leu	Ala	Glu	Val	Leu	Phe	Asp	Asp	Glu	Ser	Ala	Leu	Ile	Arg	Phe
			565						570					575	
Asp	Met	Ser	Glu	Tyr	Met	Glu	Lys	Phe	Ala	Ala	Ser	Arg	Leu	Asn	Gly
			580					585					590		
Ala	Pro	Pro	Gly	Tyr	Val	Gly	Tyr	Glu	Glu	Gly	Gly	Glu	Leu	Thr	Glu
		595					600					605			
Lys	Val	Arg	Asn	Lys	Pro	Tyr	Ser	Val	Leu	Leu	Phe	Asp	Glu	Val	Glu
	610					615					620				
Lys	Ala	His	Pro	Asp	Ile	Phe	Asn	Val	Leu	Leu	Gln	Val	Leu	Asp	Asp
625					630					635					640
Gly	Val	Leu	Thr	Asp	Ser	Lys	Gly	Arg	Lys	Val	Asp	Phe	Ser	Asn	Thr
				645					650					655	
Ile	Ile	Ile	Met	Thr	Ser	Asn	Leu	Gly	Ala	Thr	Ala	Leu	Arg	Asp	Asp
			660					665					670		
Lys	Thr	Val	Gly	Phe	Gly	Ala	Lys	Asp	Ile	Arg	Phe	Asp	Gln	Glu	Asn
		675					680					685			
Met	Glu	Lys	Arg	Met	Phe	Glu	Glu	Leu	Lys	Lys	Ala	Tyr	Arg	Pro	Glu
	690					695					700				
Phe	Ile	Asn	Arg	Ile	Asp	Glu	Lys	Val	Val	Phe	His	Ser	Leu	Ser	Ser
705					710					715					720
Asp	His	Met	Gln	Glu	Val	Val	Lys	Ile	Met	Val	Lys	Pro	Leu	Val	Ala
			725						730					735	
Ser	Leu	Ala	Glu	Lys	Gly	Ile	Asp	Leu	Lys	Leu	Gln	Ala	Ser	Ala	Leu
			740					745					750		
Lys	Leu	Leu	Ala	Asn	Gln	Gly	Tyr	Asp	Leu	Glu	Met	Gly	Ala	Arg	Pro
		755					760					765			

Leu Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu  
770 775 780

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

Lys Ala Gly Gln Leu Lys Phe Asp Ile Ala  
805 810

<210> 194  
<211> 810  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1231

<400> 194

Met Asn Tyr Ser Lys Ala Leu Asn Glu Cys Ile Glu Ser Ala Tyr Met  
1 5 10 15

Val Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu  
20 25 30

Ile Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn  
35 40 45

Asp Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu  
50 55 60

Thr Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe  
65 70 75 80

Ser Arg Arg Leu Gln Val Leu Phe Asp Glu Ala Glu Tyr Val Ala Ser  
85 90 95

Val Val His Ala Lys Val Leu Gly Thr Glu His Val Leu Tyr Ala Ile  
100 105 110

Leu His Asp Gly Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly  
115 120 125

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

Arg Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala  
145 150 155 160

Leu Arg Gln Arg His Arg Thr Val Ala Asp Lys Gln Asn Ser Met Ala  
165 170 175

Asn Met Met Gly Met Pro Gln Thr Pro Ser Gly Gly Leu Glu Asp Tyr  
180 185 190

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

Ile Gly Arg Asp Lys Glu Ile Ser Arg Met Ile Gln Ile Leu Ser Arg  
210 215 220

Lys Thr Lys Asn Asn Pro Val Leu Val Gly Asp Ala Gly Val Gly Lys  
225 230 235 240

Thr Ala Leu Ala Leu Gly Leu Ala Gln Arg Ile Ala Ser Gly Asp Val  
245 250 255

Pro Ala Glu Met Ala Lys Met Arg Val Leu Glu Leu Asp Leu Met Asn  
260 265 270

Val Val Ala Gly Thr Arg Phe Arg Gly Asp Phe Glu Glu Arg Met Asn  
275 280 285

Asn Ile Ile Lys Asp Ile Glu Glu Asp Gly Gln Val Ile Leu Phe Ile  
290 295 300

Asp Glu Leu His Thr Ile Met Gly Ser Gly Ser Gly Ile Asp Ser Thr  
305 310 315 320

Leu Asp Ala Ala Asn Ile Leu Lys Pro Ala Leu Ala Arg Gly Thr Leu  
325 330 335

Arg Thr Val Gly Ala Thr Thr Gln Glu Glu Tyr Gln Lys His Ile Glu  
340 345 350

Lys Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu  
355 360 365

Pro Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr  
370 375 380

Tyr Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr  
385 390 395 400

Ala Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp

				405						410						415
Ser	Ala	Ile	Asp	Leu	Leu	Asp	Glu	Ala	Ala	Ala	Thr	Val	Gln	Asn	Lys	
			420					425					430			
Ala	Lys	His	Val	Lys	Ala	Asp	Asp	Ser	Asp	Leu	Ser	Pro	Ala	Asp	Lys	
		435					440					445				
Ala	Leu	Met	Asp	Gly	Lys	Trp	Lys	Gln	Ala	Ala	Gln	Leu	Ile	Ala	Lys	
	450					455					460					
Glu	Glu	Glu	Val	Pro	Val	Tyr	Lys	Asp	Leu	Val	Thr	Glu	Ser	Asp	Ile	
465					470					475					480	
Leu	Thr	Thr	Leu	Ser	Arg	Leu	Ser	Gly	Ile	Pro	Val	Gln	Lys	Leu	Thr	
			485						490					495		
Gln	Thr	Asp	Ala	Lys	Lys	Tyr	Leu	Asn	Leu	Glu	Ala	Glu	Leu	His	Lys	
			500					505					510			
Arg	Val	Ile	Gly	Gln	Asp	Gln	Ala	Val	Ser	Ser	Ile	Ser	Arg	Ala	Ile	
		515					520					525				
Arg	Arg	Asn	Gln	Ser	Gly	Ile	Arg	Ser	His	Lys	Arg	Pro	Ile	Gly	Ser	
	530					535					540					
Phe	Met	Phe	Leu	Gly	Pro	Thr	Gly	Val	Gly	Lys	Thr	Glu	Leu	Ala	Lys	
545					550					555					560	
Ala	Leu	Ala	Glu	Val	Leu	Phe	Asp	Asp	Glu	Ser	Ala	Leu	Ile	Arg	Phe	
			565						570					575		
Asp	Met	Ser	Glu	Tyr	Met	Glu	Lys	Phe	Ala	Ala	Ser	Arg	Leu	Asn	Gly	
			580					585					590			
Ala	Pro	Pro	Gly	Tyr	Val	Gly	Tyr	Glu	Glu	Gly	Gly	Glu	Leu	Thr	Glu	
		595					600					605				
Lys	Val	Arg	Asn	Lys	Pro	Tyr	Ser	Val	Leu	Leu	Phe	Asp	Glu	Val	Glu	
	610					615					620					
Lys	Ala	His	Pro	Asp	Ile	Phe	Asn	Val	Leu	Leu	Gln	Val	Leu	Asp	Asp	
625					630					635					640	
Gly	Val	Leu	Thr	Asp	Ser	Lys	Gly	Arg	Lys	Val	Asp	Phe	Ser	Asn	Thr	
			645						650					655		



Ile Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp  
660 665 670

Lys Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn  
675 680 685

Met Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu  
690 695 700

Phe Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser  
705 710 715 720

Asp His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala  
725 730 735

Ser Leu Ala Glu Lys Gly Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu  
740 745 750

Lys Leu Leu Ala Asn Gln Gly Tyr Asp Pro Glu Met Gly Ala Arg Pro  
755 760 765

Leu Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu  
770 775 780

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

Lys Ala Gly Gln Leu Lys Phe Asp Ile Ala  
805 810

<210> 195  
<211> 810  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1232

<400> 195

Met Asn Tyr Ser Lys Ala Leu Asn Glu Cys Ile Glu Ser Ala Tyr Met  
1 5 10 15

Val Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu  
20 25 30

Ile Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn  
35 40 45

Asp Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu  
50 55 60

Thr Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe  
65 70 75 80

Ser Arg Arg Leu Gln Val Leu Phe Asp Glu Ala Glu Tyr Val Ala Ser  
85 90 95

Val Val His Ala Lys Val Leu Gly Thr Glu His Val Leu Tyr Ala Ile  
100 105 110

Leu His Asp Ser Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly  
115 120 125

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

Arg Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala  
145 150 155 160

Leu Arg Gln Arg His Arg Thr Val Ala Asp Lys Gln Asn Ser Met Ala  
165 170 175

Asn Met Met Gly Met Pro Gln Thr Pro Ser Gly Gly Leu Glu Asp Tyr  
180 185 190

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

Ile Gly Arg Asp Lys Glu Ile Ser Arg Met Ile Gln Ile Leu Ser Arg  
210 215 220

Lys Thr Lys Asn Asn Pro Val Leu Val Gly Asp Ala Gly Val Gly Lys  
225 230 235 240

Thr Ala Leu Ala Leu Gly Leu Ala Gln Arg Ile Ala Ser Gly Asp Val  
245 250 255

Pro Ala Glu Met Ala Lys Met Arg Val Leu Glu Leu Asp Leu Met Asn  
260 265 270

Val Val Ala Gly Thr Arg Phe Arg Gly Asp Phe Glu Glu Arg Met Asn  
275 280 285

Asn Ile Ile Lys Asp Ile Glu Glu Asp Gly Gln Val Ile Leu Phe Ile

290

295

300

Asp Glu Leu His Thr Ile Met Gly Ser Gly Ser Gly Ile Asp Ser Thr  
 305 310 315 320

Leu Asp Ala Ala Asn Ile Leu Lys Pro Ala Leu Ala Arg Gly Thr Leu  
 325 330 335

Arg Thr Val Gly Ala Thr Thr Gln Glu Glu Tyr Gln Lys His Ile Glu  
 340 345 350

Lys Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu  
 355 360 365

Pro Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr  
 370 375 380

Tyr Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr  
 385 390 395 400

Ala Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp  
 405 410 415

Ser Ala Ile Asp Leu Leu Asp Glu Ala Ala Ala Thr Val Gln Asn Lys  
 420 425 430

Ala Lys His Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys  
 435 440 445

Ala Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys  
 450 455 460

Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile  
 465 470 475 480

Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr  
 485 490 495

Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys  
 500 505 510

Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile  
 515 520 525

Arg Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser  
 530 535 540

Phe Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys  
545 550 555 560

Ala Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe  
565 570 575

Asp Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly  
580 585 590

Ala Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu  
595 600 605

Lys Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu  
610 615 620

Lys Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp  
625 630 635 640

Gly Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr  
645 650 655

Ile Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp  
660 665 670

Lys Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn  
675 680 685

Met Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu  
690 695 700

Phe Ile Asn Arg Ile Asp Glu Lys Val Ala Phe His Ser Leu Ser Ser  
705 710 715 720

Asp His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala  
725 730 735

Ser Leu Ala Glu Lys Gly Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu  
740 745 750

Lys Leu Leu Ala Asn Gln Gly Tyr Asp Pro Glu Met Gly Ala Arg Pro  
755 760 765

Leu Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu  
770 775 780

Leu Leu Lys Gly Asp Leu Val Ala Gly Asn Thr Leu Lys Ile Gly Val  
785 790 795 800

Lys Ala Gly Gln Leu Lys Phe Asp Ile Ala  
805 810

<210> 196  
<211> 810  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1234

<400> 196

Met Asn Tyr Leu Lys Ala Leu Asn Glu Cys Ile Glu Ser Ala Tyr Met  
1 5 10 15

Val Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu  
20 25 30

Ile Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn  
35 40 45

Asp Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu  
50 55 60

Thr Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe  
65 70 75 80

Ser Arg Arg Leu Gln Val Leu Phe Asp Glu Ala Glu Tyr Val Ala Ser  
85 90 95

Val Val His Ala Lys Val Leu Gly Thr Glu His Val Leu Tyr Ala Ile  
100 105 110

Leu His Asp Gly Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly  
115 120 125

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

Arg Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala  
145 150 155 160

Leu Arg Gln Arg His Arg Thr Val Ala Asp Lys Gln Asn Ser Met Ala  
165 170 175

Asn Met Met Gly Met Pro Gln Thr Pro Ser Gly Gly Leu Glu Asp Tyr

			180					185					190			
Thr	His	Asp 195	Leu	Thr	Glu	Gln	Ala 200	Arg	Ser	Gly	Lys	Leu 205	Glu	Pro	Val	
Ile	Gly 210	Arg	Asp	Lys	Glu	Ile 215	Ser	Arg	Met	Ile	Gln 220	Ile	Leu	Ser	Arg	
Lys 225	Thr	Lys	Asn	Asn	Pro 230	Val	Leu	Val	Gly	Asp 235	Ala	Gly	Val	Gly	Lys 240	
Thr	Ala	Leu	Ala	Leu 245	Gly	Leu	Ala	Gln	Arg 250	Ile	Ala	Ser	Gly	Asp 255	Val	
Pro	Ala	Glu	Met 260	Ala	Lys	Met	Arg	Val 265	Leu	Glu	Leu	Asp	Leu 270	Met	Asn	
Val	Val	Ala 275	Gly	Thr	Arg	Phe	Arg 280	Gly	Asp	Phe	Glu	Glu 285	Arg	Met	Asn	
Asn	Ile 290	Ile	Lys	Asp	Ile	Glu 295	Glu	Asp	Gly	Gln	Val 300	Ile	Leu	Phe	Ile	
Asp 305	Glu	Leu	His	Thr	Ile 310	Met	Gly	Ser	Gly	Ser 315	Gly	Ile	Asp	Ser	Thr 320	
Leu	Asp	Ala	Ala	Asn 325	Ile	Leu	Lys	Pro	Ala 330	Leu	Ala	Arg	Gly	Thr 335	Leu	
Arg	Thr	Val	Gly 340	Ala	Thr	Thr	Gln	Glu 345	Glu	Tyr	Gln	Lys	His 350	Ile	Glu	
Lys	Asp	Ala 355	Ala	Leu	Ser	Arg	Arg 360	Phe	Ala	Lys	Val	Thr 365	Ile	Glu	Glu	
Pro	Ser 370	Val	Ala	Asp	Ser	Met 375	Thr	Ile	Leu	Gln	Gly 380	Leu	Lys	Ala	Thr	
Tyr 385	Glu	Lys	His	His	Arg 390	Val	Gln	Ile	Thr	Asp 395	Glu	Ala	Val	Glu	Thr 400	
Ala	Val	Lys	Met	Ala 405	His	Arg	Tyr	Leu	Thr 410	Ser	Arg	His	Leu	Pro 415	Asp	
Ser	Ala	Ile	Asp 420	Leu	Leu	Asp	Glu	Ala 425	Ala	Ala	Thr	Val	Gln 430	Asn	Lys	

Ala Lys His Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys  
435 440 445

Ala Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys  
450 455 460

Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile  
465 470 475 480

Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr  
485 490 495

Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys  
500 505 510

Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile  
515 520 525

Arg Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser  
530 535 540

Phe Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys  
545 550 555 560

Ala Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe  
565 570 575

Asp Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly  
580 585 590

Ala Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu  
595 600 605

Lys Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu  
610 615 620

Lys Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp  
625 630 635 640

Gly Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr  
645 650 655

Ile Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp  
660 665 670

Lys Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn  
675 680 685

Met Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu  
690 695 700

Phe Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser  
705 710 715 720

Asp His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala  
725 730 735

Ser Leu Ala Glu Lys Gly Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu  
740 745 750

Lys Leu Leu Ala Asn Gln Gly Tyr Asp Pro Glu Met Gly Ala Arg Pro  
755 760 765

Leu Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu  
770 775 780

Leu Leu Lys Gly Asp Leu Val Ala Gly Asn Thr Leu Lys Ile Gly Val  
785 790 795 800

Lys Ala Gly Gln Leu Lys Phe Asp Ile Ala  
805 810

<210> 197  
<211> 810  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1236

<400> 197

Met Asn Tyr Ser Lys Ala Leu Asn Glu Cys Ile Glu Ser Ala Tyr Met  
1 5 10 15

Val Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu  
20 25 30

Ile Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn  
35 40 45

Asp Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu  
50 55 60

Thr Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe



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

Leu Asp Ala Ala Asn Ile Leu Lys Pro Ala Leu Ala Arg Gly Thr Leu  
325 330 335

Arg Thr Val Gly Ala Thr Thr Gln Glu Glu Tyr Gln Lys His Ile Glu  
340 345 350

Lys Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu  
355 360 365

Pro Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr  
370 375 380

Tyr Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr  
385 390 395 400

Ala Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp  
405 410 415

Ser Ala Ile Asp Leu Leu Asp Glu Ala Ala Ala Thr Val Gln Asn Lys  
420 425 430

Ser Lys His Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys  
435 440 445

Ala Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys  
450 455 460

Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile  
465 470 475 480

Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr  
485 490 495

Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys  
500 505 510

Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile  
515 520 525

Arg Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser  
530 535 540

Phe Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys  
545 550 555 560

Ala Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe  
565 570 575

Asp Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly  
580 585 590

Ala Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu  
595 600 605

Lys Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu  
610 615 620

Lys Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp  
625 630 635 640

Gly Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr  
645 650 655

Ile Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp  
660 665 670

Lys Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn  
675 680 685

Met Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu  
690 695 700

Phe Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser  
705 710 715 720

Asp His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala  
725 730 735

Ser Leu Ala Glu Lys Gly Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu  
740 745 750

Lys Leu Leu Ala Asn Gln Gly Tyr Asp Pro Glu Met Gly Ala Arg Pro  
755 760 765

Leu Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu  
770 775 780

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

Lys Ala Gly Gln Leu Lys Phe Asp Ile Ala  
805 810

<210> 198  
<211> 810  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1237

<400> 198

Met Asn Tyr Ser Lys Ala Leu Asn Glu Cys Ile Glu Ser Ala Tyr Met  
1 5 10 15

Val Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu  
20 25 30

Ile Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn  
35 40 45

Asp Tyr Pro Tyr Glu Leu Asp Arg Leu Glu Glu Val Ala Leu Glu Leu  
50 55 60

Thr Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe  
65 70 75 80

Ser Arg Arg Leu Gln Ile Leu Phe Asp Glu Ser Glu Tyr Val Ala Ser  
85 90 95

Val Val His Ala Lys Val Leu Gly Thr Glu His Val Leu Tyr Ala Ile  
100 105 110

Leu His Asp Gly Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly  
115 120 125

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

Arg Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala  
145 150 155 160

Leu Arg Gln Arg His Arg Thr Val Ala Asp Lys Gln Asn Ser Met Ala  
165 170 175

Asn Met Met Gly Met Pro Gln Thr Pro Ser Gly Gly Leu Glu Asp Tyr  
180 185 190

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

Ile Gly Arg Asp Lys Glu Ile Ser Arg Met Ile Gln Ile Leu Ser Arg  
210 215 220

Lys Thr Lys Asn Asn Pro Val Leu Val Gly Asp Ala Gly Val Gly Lys  
225 230 235 240

Thr Ala Leu Ala Leu Gly Leu Ala Gln Arg Ile Ala Ser Gly Asp Val  
245 250 255

Pro Ala Glu Met Ala Lys Met Arg Val Leu Glu Leu Asp Leu Met Asn  
260 265 270

Val Val Ala Gly Thr Arg Phe Arg Gly Asp Phe Glu Glu Arg Met Asn  
275 280 285

Asn Ile Ile Lys Asp Ile Glu Glu Asp Gly Gln Val Ile Leu Phe Ile  
290 295 300

Asp Glu Leu His Thr Ile Met Gly Ser Gly Ser Gly Ile Asp Ser Thr  
305 310 315 320

Leu Asp Ala Ala Asn Ile Leu Lys Pro Ala Leu Ala Arg Gly Thr Leu  
325 330 335

Arg Thr Val Gly Ala Thr Thr Gln Glu Glu Tyr Gln Lys His Ile Glu  
340 345 350

Lys Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu  
355 360 365

Pro Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr  
370 375 380

Tyr Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr  
385 390 395 400

Ala Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp  
405 410 415

Ser Ala Ile Asp Leu Leu Asp Glu Ala Ala Ala Thr Val Gln Asn Lys  
420 425 430

Ala Lys His Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys  
435 440 445

Ala Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys  
450 455 460

Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile  
465 470 475 480

Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr  
485 490 495

Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys  
500 505 510

Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile  
515 520 525

Arg Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser  
530 535 540

Phe Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys  
545 550 555 560

Ala Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe  
565 570 575

Asp Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly  
580 585 590

Ala Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu  
595 600 605

Lys Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu  
610 615 620

Lys Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp  
625 630 635 640

Gly Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr  
645 650 655

Ile Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp  
660 665 670

Lys Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn  
675 680 685

Met Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu  
690 695 700

Phe Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser  
705 710 715 720

Asp His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala  
725 730 735

Ser Leu Ala Glu Lys Cys Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu  
740 745 750

Lys Leu Leu Ala Asn Gln Gly Tyr Asp Pro Glu Met Gly Ala Arg Pro  
755 760 765

Leu Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu  
770 775 780

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

Lys Ala Gly Gln Leu Lys Phe Asp Ile Ala  
805 810

<210> 199  
<211> 810  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1241

<400> 199

Met Asn Tyr Ser Lys Ala Leu Asn Glu Cys Ile Glu Ser Ala Tyr Met  
1 5 10 15

Val Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu  
20 25 30

Ile Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn  
35 40 45

Asp Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu  
50 55 60

Thr Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe  
65 70 75 80

Ser Arg Arg Leu Gln Val Leu Phe Asp Glu Ala Glu Tyr Val Ala Ser  
85 90 95

Val Val His Ala Lys Val Leu Gly Thr Glu His Val Leu Tyr Ala Ile  
100 105 110

Leu His Asp Gly Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly  
115 120 125

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

Arg Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala  
145 150 155 160

Leu Arg Gln Arg His Arg Thr Val Ala Asp Lys Gln Asn Ser Met Ala  
165 170 175

Asn Met Met Gly Met Pro Gln Thr Pro Ser Gly Gly Leu Glu Asp Tyr  
180 185 190

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

Ile Gly Arg Asp Lys Glu Ile Ser Arg Met Ile Gln Ile Leu Ser Arg  
210 215 220

Lys Thr Lys Asn Asn Pro Val Leu Val Gly Asp Ala Gly Val Gly Lys  
225 230 235 240

Thr Ala Leu Ala Leu Gly Leu Ala Gln Arg Ile Ala Ser Gly Asp Val  
245 250 255

Ser Ala Glu Met Ala Lys Met Arg Val Leu Glu Leu Asp Leu Met Asn  
260 265 270

Val Val Ala Gly Thr Arg Phe Arg Gly Asp Phe Glu Glu Arg Met Asn  
275 280 285

Asn Ile Ile Lys Asp Ile Glu Glu Asp Gly Gln Val Ile Leu Phe Ile  
290 295 300

Asp Glu Leu His Thr Ile Met Gly Ser Gly Ser Gly Ile Asp Ser Thr  
305 310 315 320

Leu Asp Ala Ala Asn Ile Leu Lys Pro Ala Leu Ala Arg Gly Thr Leu  
325 330 335



Arg Thr Val Gly Ala Thr Thr Gln Glu Glu Tyr Gln Lys His Ile Glu  
340 345 350

Lys Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu  
355 360 365

Pro Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr  
370 375 380

Tyr Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr  
385 390 395 400

Ala Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp  
405 410 415

Ser Ala Ile Asp Leu Leu Asp Glu Ala Ala Ala Thr Val Gln Asn Lys  
420 425 430

Ala Lys His Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys  
435 440 445

Ala Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys  
450 455 460

Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile  
465 470 475 480

Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr  
485 490 495

Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys  
500 505 510

Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile  
515 520 525

Arg Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser  
530 535 540

Phe Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys  
545 550 555 560

Ala Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe  
565 570 575

Asp Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly  
580 585 590

Ala Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu  
595 600 605

Lys Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu  
610 615 620

Lys Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp  
625 630 635 640

Gly Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr  
645 650 655

Ile Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp  
660 665 670

Lys Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn  
675 680 685

Met Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu  
690 695 700

Phe Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser  
705 710 715 720

Asp His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala  
725 730 735

Ser Leu Ala Glu Lys Gly Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu  
740 745 750

Lys Leu Leu Ala Asn Gln Gly Tyr Asp Pro Glu Met Gly Ala Arg Pro  
755 760 765

Leu Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu  
770 775 780

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

Lys Ala Gly Gln Leu Lys Phe Asp Ile Ala  
805 810

<210> 200

<211> 810  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1250

<400> 200

Met Asn Tyr Ser Lys Ala Leu Asn Glu Cys Ile Glu Ser Ala Tyr Met  
1 5 10 15

Val Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu  
20 25 30

Ile Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn  
35 40 45

Asp Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu  
50 55 60

Thr Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe  
65 70 75 80

Ser Arg Arg Leu Gln Val Leu Phe Asp Glu Ala Glu Tyr Val Ala Ser  
85 90 95

Val Val His Ala Lys Val Leu Gly Thr Glu His Val Phe Tyr Ala Ile  
100 105 110

Leu His Asp Gly Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly  
115 120 125

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

Arg Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala  
145 150 155 160

Leu Arg Gln Arg His Arg Thr Val Ala Asp Lys Gln Asn Ser Met Ala  
165 170 175

Asn Met Met Gly Met Pro Gln Thr Pro Ser Gly Gly Leu Glu Asp Tyr  
180 185 190

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

Ile Gly Arg Asp Lys Glu Ile Ser Arg Met Ile Gln Ile Leu Ser Arg  
210 215 220

Lys Thr Lys Asn Asn Pro Val Leu Val Gly Asp Ala Gly Val Gly Lys  
225 230 235 240

Thr Ala Leu Ala Leu Gly Leu Ala Gln Arg Ile Ala Ser Gly Asp Val  
245 250 255

Pro Ala Glu Met Ala Asn Met Arg Val Leu Glu Leu Asp Leu Met Asn  
260 265 270

Val Val Ala Gly Thr Arg Phe Arg Gly Asp Phe Glu Glu Arg Met Asn  
275 280 285

Asn Ile Ile Lys Asp Ile Glu Glu Asp Gly Gln Val Ile Leu Phe Ile  
290 295 300

Asp Glu Leu His Thr Ile Met Gly Ser Gly Ser Gly Ile Asp Ser Thr  
305 310 315 320

Leu Asp Ala Ala Asn Ile Leu Lys Pro Ala Leu Ala Arg Gly Thr Leu  
325 330 335

Arg Thr Val Gly Ala Thr Thr Gln Glu Glu Tyr Gln Lys His Ile Glu  
340 345 350

Lys Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu  
355 360 365

Pro Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr  
370 375 380

Tyr Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr  
385 390 395 400

Ala Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp  
405 410 415

Ser Ala Ile Asp Leu Leu Asp Glu Ala Ala Ala Thr Val Gln Asn Lys  
420 425 430

Ala Lys Tyr Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys  
435 440 445

Ala Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys  
450 455 460

Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile  
465 470 475 480

Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr  
485 490 495

Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys  
500 505 510

Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile  
515 520 525

Arg Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser  
530 535 540

Phe Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys  
545 550 555 560

Ala Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe  
565 570 575

Asp Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly  
580 585 590

Ala Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu  
595 600 605

Lys Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu  
610 615 620

Lys Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp  
625 630 635 640

Gly Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr  
645 650 655

Ile Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp  
660 665 670

Lys Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn  
675 680 685

Met Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu  
690 695 700

Phe Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser

705		710		715		720									
Asp	His	Met	Gln	Glu	Val	Val	Lys	Ile	Met	Val	Lys	Pro	Leu	Val	Ala
			725						730					735	
Ser	Leu	Ala	Glu	Lys	Gly	Ile	Asp	Leu	Lys	Leu	Gln	Ala	Ser	Ala	Leu
			740					745					750		
Lys	Leu	Leu	Ala	Asn	Gln	Gly	Tyr	Asp	Pro	Glu	Met	Gly	Ala	Arg	Pro
		755					760					765			
Leu	Arg	Arg	Thr	Leu	Gln	Thr	Glu	Val	Glu	Asp	Lys	Leu	Ala	Glu	Leu
	770					775					780				
Leu	Leu	Lys	Gly	Asp	Leu	Val	Ala	Gly	Ser	Thr	Leu	Lys	Ile	Gly	Val
785					790					795					800
Lys	Ala	Gly	Gln	Leu	Lys	Phe	Asp	Ile	Ala						
			805						810						
<210> 201															
<211> 810															
<212> PRT															
<213> Streptococcus pneumoniae Pj-1262															
<400> 201															
Met	Asn	Tyr	Ser	Lys	Ala	Leu	Asn	Glu	Cys	Ile	Glu	Ser	Ala	Tyr	Met
1				5					10					15	
Val	Ala	Gly	His	Phe	Gly	Ala	Arg	Tyr	Leu	Glu	Ser	Trp	His	Leu	Leu
			20					25					30		
Ile	Ala	Met	Ser	Asn	His	Ser	Tyr	Ser	Val	Ala	Gly	Ala	Thr	Leu	Asn
		35					40					45			
Asp	Tyr	Pro	Tyr	Glu	Met	Asp	Arg	Leu	Glu	Glu	Val	Ala	Leu	Glu	Leu
	50					55					60				
Thr	Glu	Thr	Asp	Tyr	Ser	Gln	Asp	Glu	Thr	Phe	Thr	Glu	Leu	Pro	Phe
65					70					75					80
Ser	Arg	Arg	Leu	Gln	Val	Leu	Phe	Asp	Glu	Ala	Glu	Tyr	Val	Ala	Ser
			85						90					95	
Val	Val	His	Ala	Lys	Val	Leu	Gly	Thr	Glu	His	Val	Leu	Tyr	Ala	Ile
		100						105					110		

Leu His Asp Gly Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly  
115 120 125

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

Arg Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala  
145 150 155 160

Leu Arg Gln Arg His Arg Thr Val Ala Asp Lys Gln Asn Ser Met Ala  
165 170 175

Asn Met Met Gly Met Pro Gln Thr Pro Ser Gly Gly Leu Glu Asp Tyr  
180 185 190

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

Ile Gly Arg Asp Lys Glu Ile Ser Arg Met Ile Gln Ile Leu Ser Arg  
210 215 220

Lys Thr Lys Asn Asn Pro Val Leu Val Gly Asp Ala Gly Val Gly Lys  
225 230 235 240

Thr Ala Leu Ala Leu Gly Leu Ala Gln Arg Ile Ala Ser Gly Asp Val  
245 250 255

Pro Ala Glu Met Ala Lys Met Arg Val Leu Glu Leu Asp Leu Met Asn  
260 265 270

Val Val Ala Gly Thr Arg Phe Arg Gly Asp Phe Glu Glu Arg Met Asn  
275 280 285

Asn Ile Ile Lys Asp Ile Glu Glu Asp Gly Gln Val Ile Leu Phe Ile  
290 295 300

Asp Glu Leu His Thr Ile Met Gly Ser Gly Ser Gly Ile Asp Ser Thr  
305 310 315 320

Leu Asp Ala Ala Asn Ile Leu Lys Pro Ala Leu Ala Arg Gly Thr Leu  
325 330 335

Arg Thr Val Gly Ala Thr Thr Gln Glu Glu Tyr Gln Lys His Ile Glu  
340 345 350

Lys Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu  
355 360 365

Pro Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr  
370 375 380

Tyr Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr  
385 390 395 400

Ala Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp  
405 410 415

Ser Ala Ile Asp Leu Leu Asp Glu Ala Ala Ala Thr Val Gln Asn Lys  
420 425 430

Ser Lys His Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys  
435 440 445

Ala Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys  
450 455 460

Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile  
465 470 475 480

Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr  
485 490 495

Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys  
500 505 510

Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile  
515 520 525

Arg Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser  
530 535 540

Phe Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys  
545 550 555 560

Ala Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe  
565 570 575

Asp Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly  
580 585 590

Ala Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu



595

600

605

Lys Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu  
610 615 620

Lys Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp  
625 630 635 640

Gly Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr  
645 650 655

Ile Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp  
660 665 670

Lys Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn  
675 680 685

Met Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu  
690 695 700

Phe Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser  
705 710 715 720

Asp His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala  
725 730 735

Ser Leu Ala Glu Lys Gly Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu  
740 745 750

Lys Leu Leu Ala Asn Gln Gly Tyr Asp Pro Glu Met Gly Ala Arg Pro  
755 760 765

Leu Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu  
770 775 780

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

Lys Ala Gly Gln Leu Lys Phe Asp Ile Ala  
805 810

<210> 202

<211> 810

<212> PRT

<213> Streptococcus pneumoniae Pj-1283

<400> 202

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

Thr Ala Leu Ala Leu Gly Leu Ala Gln Arg Ile Ala Ser Gly Asp Val  
245 250 255

Pro Ala Glu Met Ala Lys Met Arg Val Leu Glu Leu Asp Leu Met Asn  
260 265 270

Val Val Ala Gly Thr Arg Phe Arg Gly Asp Phe Glu Glu Arg Met Asn  
275 280 285

Asn Ile Ile Lys Asp Ile Glu Glu Asp Gly Gln Val Ile Leu Phe Ile  
290 295 300

Asp Glu Leu His Thr Ile Met Gly Ser Gly Ser Gly Ile Asp Ser Thr  
305 310 315 320

Leu Asp Ala Ala Asn Ile Leu Lys Pro Ala Leu Ala Arg Gly Thr Leu  
325 330 335

Arg Thr Val Gly Ala Thr Thr Gln Glu Glu Tyr Gln Lys His Ile Glu  
340 345 350

Lys Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu  
355 360 365

Pro Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr  
370 375 380

Tyr Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr  
385 390 395 400

Ala Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp  
405 410 415

Ser Ala Ile Asp Leu Leu Asp Glu Ala Ala Ala Thr Val Gln Asn Lys  
420 425 430

Ala Lys His Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys  
435 440 445

Ala Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys  
450 455 460

Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile  
465 470 475 480

Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr

485

490

495

Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys  
500 505 510

Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile  
515 520 525

Arg Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser  
530 535 540

Phe Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys  
545 550 555 560

Ala Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe  
565 570 575

Asp Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly  
580 585 590

Ala Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu  
595 600 605

Lys Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu  
610 615 620

Lys Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp  
625 630 635 640

Gly Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr  
645 650 655

Ile Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp  
660 665 670

Lys Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn  
675 680 685

Met Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu  
690 695 700

Phe Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser  
705 710 715 720

Asp His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala  
725 730 735

Ser Leu Ala Glu Lys Gly Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu  
740 745 750

Lys Leu Leu Ala Asn Gln Gly Tyr Asp Pro Glu Met Gly Ala Arg Pro  
755 760 765

Leu Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu  
770 775 780

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

Lys Ala Gly Gln Leu Lys Phe Asp Ile Ala  
805 810

<210> 203  
<211> 810  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1284

<400> 203

Met Asn Tyr Ser Lys Ala Leu Asn Glu Cys Ile Glu Ser Ala Tyr Met  
1 5 10 15

Val Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu  
20 25 30

Ile Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn  
35 40 45

Asp Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu  
50 55 60

Thr Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe  
65 70 75 80

Ser Arg Arg Leu Gln Val Leu Phe Asp Glu Ala Glu Tyr Val Ala Ser  
85 90 95

Val Val His Ala Lys Val Leu Gly Thr Glu His Val Phe Tyr Ala Ile  
100 105 110

Leu His Asp Gly Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly  
115 120 125

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

Arg Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala  
145 150 155 160

Leu Arg Gln Arg His Arg Thr Val Ala Asp Lys Gln Asn Ser Met Ala  
165 170 175

Asn Met Met Gly Met Pro Gln Thr Pro Ser Gly Gly Leu Glu Asp Tyr  
180 185 190

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

Ile Gly Arg Asp Lys Glu Ile Ser Arg Met Ile Gln Ile Leu Ser Arg  
210 215 220

Lys Thr Lys Asn Asn Pro Val Leu Val Gly Asp Ala Gly Val Gly Lys  
225 230 235 240

Thr Ala Leu Ala Leu Gly Leu Ala Gln Arg Ile Ala Ser Gly Asp Val  
245 250 255

Pro Ala Glu Met Ala Lys Met Arg Val Leu Glu Leu Asp Leu Met Asn  
260 265 270

Val Val Ala Gly Thr Arg Phe Arg Gly Asp Phe Glu Glu Arg Met Asn  
275 280 285

Asn Ile Ile Lys Asp Ile Glu Glu Asp Gly Gln Val Ile Leu Phe Ile  
290 295 300

Asp Glu Leu His Thr Ile Met Gly Ser Gly Ser Gly Ile Asp Ser Thr  
305 310 315 320

Leu Asp Ala Ala Asn Ile Leu Lys Pro Ala Leu Ala Arg Gly Thr Leu  
325 330 335

Arg Thr Val Gly Ala Thr Thr Gln Glu Glu Tyr Gln Lys His Ile Glu  
340 345 350

Lys Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu  
355 360 365

Pro Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr

370

375

380

Tyr Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr  
 385 390 395 400

Ala Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp  
 405 410 415

Ser Ala Ile Asp Leu Leu Asp Glu Ala Ala Ala Thr Val Gln Asn Lys  
 420 425 430

Ala Lys His Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys  
 435 440 445

Ala Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys  
 450 455 460

Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile  
 465 470 475 480

Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr  
 485 490 495

Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys  
 500 505 510

Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile  
 515 520 525

Arg Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser  
 530 535 540

Phe Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys  
 545 550 555 560

Ala Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe  
 565 570 575

Asp Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly  
 580 585 590

Ala Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu  
 595 600 605

Lys Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu  
 610 615 620

Lys Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp  
625 630 635 640

Gly Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr  
645 650 655

Ile Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp  
660 665 670

Lys Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn  
675 680 685

Met Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu  
690 695 700

Phe Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser  
705 710 715 720

Asp His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala  
725 730 735

Ser Leu Ala Glu Lys Gly Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu  
740 745 750

Lys Leu Leu Ala Asn Gln Gly Tyr Asp Pro Glu Met Gly Ala Arg Pro  
755 760 765

Leu Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu  
770 775 780

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

Lys Ala Gly Gln Leu Lys Phe Asp Ile Ala  
805 810

<210> 204  
<211> 810  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1291

<400> 204

Met Asn Tyr Ser Lys Ala Leu Asn Glu Cys Ile Glu Ser Ala Tyr Met  
1 5 10 15



Val Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu  
20 25 30

Ile Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn  
35 40 45

Asp Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu  
50 55 60

Thr Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe  
65 70 75 80

Ser Arg Arg Leu Gln Val Leu Phe Asp Glu Ala Glu Tyr Val Ala Ser  
85 90 95

Val Val His Ala Lys Val Leu Gly Thr Glu His Val Leu Tyr Ala Ile  
100 105 110

Leu His Asp Gly Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly  
115 120 125

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

Arg Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala  
145 150 155 160

Leu Arg Gln Arg His Arg Thr Val Ala Asp Lys Gln Asn Ser Met Ala  
165 170 175

Asn Met Met Gly Met Pro Gln Thr Pro Ser Gly Gly Leu Glu Asp Tyr  
180 185 190

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

Ile Gly Arg Asp Lys Glu Ile Ser Arg Met Ile Gln Ile Leu Ser Arg  
210 215 220

Lys Thr Lys Asn Asn Pro Val Leu Val Gly Asp Ala Gly Val Gly Lys  
225 230 235 240

Thr Ala Leu Ala Leu Gly Leu Ala Gln Arg Ile Ala Ser Gly Asp Val  
245 250 255

Pro Ala Glu Met Ala Lys Met Arg Val Leu Glu Leu Asp Leu Met Asn

260	265	270
Val Val Ala Gly Thr Arg Phe Arg Gly Asp Phe Glu Glu Arg Met Asn		
275	280	285
Asn Ile Ile Lys Asp Ile Glu Glu Asp Gly Gln Val Ile Leu Phe Ile		
290	295	300
Asp Glu Leu His Thr Ile Met Gly Ser Gly Ser Gly Ile Asp Ser Thr		
305	310	315
Leu Asp Ala Ala Asn Ile Leu Lys Pro Ala Leu Ala Arg Gly Thr Leu		
325	330	335
Arg Thr Val Gly Ala Thr Thr Gln Glu Glu Tyr Gln Lys His Ile Glu		
340	345	350
Lys Asp Ala Ala Leu Ser Arg Arg Phe Ala Lys Val Thr Ile Glu Glu		
355	360	365
Pro Ser Val Ala Asp Ser Met Thr Ile Leu Gln Gly Leu Lys Ala Thr		
370	375	380
Tyr Glu Lys His His Arg Val Gln Ile Thr Asp Glu Ala Val Glu Thr		
385	390	395
Ala Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp		
405	410	415
Ser Ala Ile Asp Leu Leu Asp Glu Ala Ala Ala Thr Val Gln Asn Lys		
420	425	430
Ala Lys His Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys		
435	440	445
Ala Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys		
450	455	460
Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile		
465	470	475
Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr		
485	490	495
Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys		
500	505	510

Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile  
515 520 525

Arg Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser  
530 535 540

Phe Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys  
545 550 555 560

Ala Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe  
565 570 575

Asp Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly  
580 585 590

Ala Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu  
595 600 605

Lys Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu  
610 615 620

Lys Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp  
625 630 635 640

Gly Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr  
645 650 655

Ile Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp  
660 665 670

Lys Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn  
675 680 685

Met Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu  
690 695 700

Phe Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser  
705 710 715 720

Asp His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala  
725 730 735

Ser Leu Ala Glu Lys Gly Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu  
740 745 750

Lys Leu Leu Ala Asn Gln Gly Tyr Asp Pro Glu Met Gly Ala Arg Pro  
755 760 765

Leu Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu  
770 775 780

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

Lys Ala Gly Gln Leu Lys Phe Asp Ile Ala  
805 810

<210> 205  
<211> 810  
<212> PRT  
<213> Streptococcus pneumoniae TIGR4\_IC

<400> 205

Met Asn Tyr Ser Lys Ala Leu Asn Glu Cys Ile Glu Ser Ala Tyr Met  
1 5 10 15

Val Ala Gly His Phe Gly Ala Arg Tyr Leu Glu Ser Trp His Leu Leu  
20 25 30

Ile Ala Met Ser Asn His Ser Tyr Ser Val Ala Gly Ala Thr Leu Asn  
35 40 45

Asp Tyr Pro Tyr Glu Met Asp Arg Leu Glu Glu Val Ala Leu Glu Leu  
50 55 60

Thr Glu Thr Asp Tyr Ser Gln Asp Glu Thr Phe Thr Glu Leu Pro Phe  
65 70 75 80

Ser Arg Arg Leu Gln Val Leu Phe Asp Glu Ala Glu Tyr Val Ala Ser  
85 90 95

Val Val His Ala Lys Val Leu Gly Thr Glu His Val Leu Tyr Ala Ile  
100 105 110

Leu His Asp Ser Asn Ala Leu Ala Thr Arg Ile Leu Glu Arg Ala Gly  
115 120 125

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

Arg Asn Leu Glu Glu Arg Ala Gly Trp Thr Arg Glu Asp Leu Lys Ala

145					150					155					160
Leu	Arg	Gln	Arg	His	Arg	Thr	Val	Ala	Asp	Lys	Gln	Asn	Ser	Met	Ala
				165					170					175	
Asn	Met	Met	Gly	Met	Pro	Gln	Thr	Pro	Ser	Gly	Gly	Leu	Glu	Asp	Tyr
			180					185					190		
Thr	His	Asp	Leu	Thr	Glu	Gln	Ala	Arg	Ser	Gly	Lys	Leu	Glu	Pro	Val
		195					200					205			
Ile	Gly	Arg	Asp	Lys	Glu	Ile	Ser	Arg	Met	Ile	Gln	Ile	Leu	Ser	Arg
	210					215					220				
Lys	Thr	Lys	Asn	Asn	Pro	Val	Leu	Val	Gly	Asp	Ala	Gly	Val	Gly	Lys
225					230					235					240
Thr	Ala	Leu	Ala	Leu	Gly	Leu	Ala	Gln	Arg	Ile	Ala	Ser	Gly	Asp	Val
				245					250					255	
Pro	Ala	Glu	Met	Ala	Lys	Met	Arg	Val	Leu	Glu	Leu	Asp	Leu	Met	Asn
			260					265					270		
Val	Val	Ala	Gly	Thr	Arg	Phe	Arg	Gly	Asp	Phe	Glu	Glu	Arg	Met	Asn
		275					280					285			
Asn	Ile	Ile	Lys	Asp	Ile	Glu	Glu	Asp	Gly	Gln	Val	Ile	Leu	Phe	Ile
	290					295					300				
Asp	Glu	Leu	His	Thr	Ile	Met	Gly	Ser	Gly	Ser	Gly	Ile	Asp	Ser	Thr
305					310					315					320
Leu	Asp	Ala	Ala	Asn	Ile	Leu	Lys	Pro	Ala	Leu	Ala	Arg	Gly	Thr	Leu
				325					330					335	
Arg	Thr	Val	Gly	Ala	Thr	Thr	Gln	Glu	Glu	Tyr	Gln	Lys	His	Ile	Glu
			340					345					350		
Lys	Asp	Ala	Ala	Leu	Ser	Arg	Arg	Phe	Ala	Lys	Val	Thr	Ile	Glu	Glu
		355					360					365			
Pro	Ser	Val	Ala	Asp	Ser	Met	Thr	Ile	Leu	Gln	Gly	Leu	Lys	Ala	Thr
	370					375					380				
Tyr	Glu	Lys	His	His	Arg	Val	Gln	Ile	Thr	Asp	Glu	Ala	Val	Glu	Thr
385					390					395					400

Ala Val Lys Met Ala His Arg Tyr Leu Thr Ser Arg His Leu Pro Asp  
405 410 415

Ser Ala Ile Asp Leu Leu Asp Glu Ala Ala Ala Thr Val Gln Asn Lys  
420 425 430

Ala Lys His Val Lys Ala Asp Asp Ser Asp Leu Ser Pro Ala Asp Lys  
435 440 445

Ala Leu Met Asp Gly Lys Trp Lys Gln Ala Ala Gln Leu Ile Ala Lys  
450 455 460

Glu Glu Glu Val Pro Val Tyr Lys Asp Leu Val Thr Glu Ser Asp Ile  
465 470 475 480

Leu Thr Thr Leu Ser Arg Leu Ser Gly Ile Pro Val Gln Lys Leu Thr  
485 490 495

Gln Thr Asp Ala Lys Lys Tyr Leu Asn Leu Glu Ala Glu Leu His Lys  
500 505 510

Arg Val Ile Gly Gln Asp Gln Ala Val Ser Ser Ile Ser Arg Ala Ile  
515 520 525

Arg Arg Asn Gln Ser Gly Ile Arg Ser His Lys Arg Pro Ile Gly Ser  
530 535 540

Phe Met Phe Leu Gly Pro Thr Gly Val Gly Lys Thr Glu Leu Ala Lys  
545 550 555 560

Ala Leu Ala Glu Val Leu Phe Asp Asp Glu Ser Ala Leu Ile Arg Phe  
565 570 575

Asp Met Ser Glu Tyr Met Glu Lys Phe Ala Ala Ser Arg Leu Asn Gly  
580 585 590

Ala Pro Pro Gly Tyr Val Gly Tyr Glu Glu Gly Gly Glu Leu Thr Glu  
595 600 605

Lys Val Arg Asn Lys Pro Tyr Ser Val Leu Leu Phe Asp Glu Val Glu  
610 615 620

Lys Ala His Pro Asp Ile Phe Asn Val Leu Leu Gln Val Leu Asp Asp  
625 630 635 640

Gly Val Leu Thr Asp Ser Lys Gly Arg Lys Val Asp Phe Ser Asn Thr  
645 650 655

Ile Ile Ile Met Thr Ser Asn Leu Gly Ala Thr Ala Leu Arg Asp Asp  
660 665 670

Lys Thr Val Gly Phe Gly Ala Lys Asp Ile Arg Phe Asp Gln Glu Asn  
675 680 685

Met Glu Lys Arg Met Phe Glu Glu Leu Lys Lys Ala Tyr Arg Pro Glu  
690 695 700

Phe Ile Asn Arg Ile Asp Glu Lys Val Val Phe His Ser Leu Ser Ser  
705 710 715 720

Asp His Met Gln Glu Val Val Lys Ile Met Val Lys Pro Leu Val Ala  
725 730 735

Ser Leu Thr Glu Lys Gly Ile Asp Leu Lys Leu Gln Ala Ser Ala Leu  
740 745 750

Lys Leu Leu Ala Asn Gln Gly Tyr Asp Pro Glu Met Gly Ala Arg Pro  
755 760 765

Leu Arg Arg Thr Leu Gln Thr Glu Val Glu Asp Lys Leu Ala Glu Leu  
770 775 780

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

Lys Ala Gly Gln Leu Lys Phe Asp Ile Ala  
805 810

<210> 206  
<211> 392  
<212> PRT  
<213> Streptococcus pneumoniae CDC 3

<400> 206

Met Lys Lys Lys Ile Leu Ala Ser Leu Leu Leu Ser Thr Val Met Val  
1 5 10 15

Ser Gln Val Ala Val Leu Thr Thr Ala His Ala Glu Thr Thr Asp Asp  
20 25 30

Lys Ile Ala Ala Gln Asp Asn Lys Ile Ser Asn Leu Thr Ala Gln Gln

35

40

45

Gln Glu Ala Gln Lys Gln Val Asp Gln Ile Gln Glu Gln Val Ser Ala  
50 55 60

Ile Gln Ala Glu Gln Ser Asn Leu Gln Ala Glu Asn Asp Arg Leu Gln  
65 70 75 80

Ala Glu Ser Lys Lys Leu Glu Gly Glu Ile Thr Glu Leu Ser Lys Asn  
85 90 95

Ile Val Ser Arg Asn Gln Ser Leu Glu Lys Gln Ala Arg Ser Ala Gln  
100 105 110

Thr Asn Gly Ala Val Thr Ser Tyr Ile Asn Thr Ile Val Asn Ser Lys  
115 120 125

Ser Ile Thr Glu Ala Ile Ser Arg Val Ala Ala Met Ser Glu Ile Val  
130 135 140

Ser Ala Asn Asn Lys Met Leu Glu Gln Gln Lys Ala Asp Lys Lys Ala  
145 150 155 160

Ile Ser Glu Lys Gln Val Ala Asn Asn Asn Ala Ile Asn Thr Val Ile  
165 170 175

Ala Asn Gln Gln Lys Leu Ala Asp Asp Ala Gln Ala Leu Thr Thr Lys  
180 185 190

Gln Ala Glu Leu Lys Ala Ala Glu Leu Ser Leu Ala Ala Glu Lys Ala  
195 200 205

Thr Ala Glu Gly Glu Lys Ala Ser Leu Leu Glu Gln Lys Ala Ala Ala  
210 215 220

Glu Ala Glu Ala Arg Ala Ala Ala Val Ala Glu Ala Ala Tyr Lys Glu  
225 230 235 240

Lys Arg Ala Ser Gln Gln Gln Ser Val Leu Ala Ser Ala Asn Thr Asn  
245 250 255

Leu Thr Ala Gln Val Gln Ala Val Ser Glu Ser Ala Ala Ala Pro Val  
260 265 270

Arg Ala Lys Val Arg Pro Thr Tyr Ser Thr Asn Ala Ser Ser Tyr Pro  
275 280 285



Ile Gly Glu Cys Thr Trp Gly Val Lys Thr Leu Ala Pro Trp Ala Gly  
290 295 300

Asp Tyr Trp Gly Asn Gly Ala Gln Trp Ala Thr Ser Ala Ala Ala Ala  
305 310 315 320

Gly Phe Arg Thr Gly Ser Thr Pro Gln Val Gly Ala Ile Ala Cys Trp  
325 330 335

Asn Asp Gly Gly Tyr Gly His Val Ala Val Val Thr Ala Val Glu Ser  
340 345 350

Thr Thr Arg Ile Gln Val Ser Glu Ser Asn Tyr Ala Gly Asn Arg Thr  
355 360 365

Ile Gly Asn His Arg Gly Trp Phe Asn Pro Thr Thr Thr Ser Glu Gly  
370 375 380

Phe Val Thr Tyr Ile Tyr Ala Asp  
385 390

<210> 207  
<211> 392  
<212> PRT  
<213> Streptococcus pneumoniae CDC 11

<400> 207

Met Lys Lys Lys Ile Leu Ala Ser Leu Leu Leu Ser Thr Val Met Val  
1 5 10 15

Ser Gln Val Ala Val Leu Thr Thr Ala His Ala Glu Thr Thr Asp Asp  
20 25 30

Lys Ile Ala Ala Gln Asp Asn Lys Ile Ser Asn Leu Thr Ala Gln Gln  
35 40 45

Gln Glu Ala Gln Lys Gln Val Asp Gln Ile Gln Glu Gln Val Ser Ala  
50 55 60

Ile Gln Ala Glu Gln Ser Asn Leu Gln Ala Glu Asn Asp Arg Leu Gln  
65 70 75 80

Ala Glu Ser Lys Lys Leu Glu Gly Glu Ile Thr Glu Leu Ser Lys Asn  
85 90 95

Ile Val Ser Arg Asn Gln Ser Leu Glu Lys Gln Ala Arg Ser Ala Gln  
100 105 110

Thr Asn Gly Ala Val Thr Ser Tyr Ile Asn Thr Ile Val Asn Ser Lys  
115 120 125

Ser Ile Thr Glu Ala Ile Ser Arg Val Ala Ala Met Ser Glu Ile Val  
130 135 140

Ser Ala Asn Asn Lys Met Leu Glu Gln Gln Lys Ala Asp Lys Lys Ala  
145 150 155 160

Ile Ser Glu Lys Gln Val Ala Asn Asn Asp Ala Ile Asn Thr Val Ile  
165 170 175

Ala Asn Gln Gln Lys Leu Ala Asp Asp Ala Gln Ala Leu Thr Thr Lys  
180 185 190

Gln Ala Glu Leu Lys Ala Ala Glu Leu Ser Leu Ala Ala Glu Lys Ala  
195 200 205

Thr Ala Glu Gly Glu Lys Ala Ser Leu Leu Glu Gln Lys Ala Ala Ala  
210 215 220

Glu Ala Glu Ala Arg Ala Ala Ala Val Ala Glu Ala Ala Tyr Lys Glu  
225 230 235 240

Lys Arg Ala Ser Gln Gln Gln Ser Val Leu Ala Ser Ala Asn Thr Asn  
245 250 255

Leu Thr Ala Gln Val Gln Ala Val Tyr Glu Ser Ala Ala Ala Pro Val  
260 265 270

Arg Ala Lys Val Arg Pro Thr Tyr Ser Thr Asn Ala Ser Ser Tyr Pro  
275 280 285

Ile Gly Glu Cys Thr Trp Gly Val Lys Thr Leu Ala Pro Trp Ala Gly  
290 295 300

Asp Tyr Trp Gly Asn Gly Ala Gln Trp Ala Thr Ser Ala Ala Ala Ala  
305 310 315 320

Gly Phe Arg Thr Gly Ser Thr Pro Gln Val Gly Ala Ile Ala Cys Trp  
325 330 335

Asn Asp Gly Gly Tyr Gly His Val Ala Val Val Thr Ala Val Glu Ser

340

345

350

Thr Thr Arg Ile Gln Val Ser Glu Ser Asn Tyr Ala Gly Asn Arg Thr  
 355 360 365

Ile Gly Asn His Arg Gly Trp Phe Asn Pro Thr Thr Thr Ser Glu Gly  
 370 375 380

Phe Val Thr Tyr Ile Tyr Ala Asp  
 385 390

&lt;210&gt; 208

&lt;211&gt; 392

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae CDC 24

&lt;400&gt; 208

Met Lys Lys Lys Ile Leu Ala Ser Leu Leu Leu Ser Thr Val Met Val  
 1 5 10 15

Ser Gln Val Ala Val Leu Thr Thr Ala His Ala Glu Thr Thr Asp Asp  
 20 25 30

Lys Ile Ala Ala Gln Asp Asn Lys Ile Ser Asn Leu Thr Ala Gln Gln  
 35 40 45

Gln Glu Ala Gln Lys Gln Val Asp Gln Ile Gln Glu Gln Val Ser Ala  
 50 55 60

Ile Gln Ala Glu Gln Ser Asn Leu Gln Ala Glu Asn Asp Arg Leu Gln  
 65 70 75 80

Ala Glu Ser Lys Lys Leu Glu Ser Glu Ile Thr Glu Leu Ser Lys Asn  
 85 90 95

Ile Val Ser Arg Asn Gln Ser Leu Glu Lys Gln Ala Arg Ser Ala Gln  
 100 105 110

Thr Asn Gly Ala Val Thr Ser Tyr Ile Asn Thr Ile Val Asn Ser Lys  
 115 120 125

Ser Ile Thr Glu Ala Ile Ser Arg Val Ala Ala Met Ser Glu Ile Val  
 130 135 140

Ser Ala Asn Asn Lys Met Leu Glu Gln Gln Lys Ala Asp Lys Lys Ala  
 145 150 155 160

Ile Ser Glu Lys Gln Val Ala Asn Asn Asp Ala Ile Asn Thr Val Ile  
165 170 175

Ala Asn Gln Gln Lys Leu Ala Asp Asp Ala Gln Ala Leu Thr Thr Lys  
180 185 190

Gln Ala Glu Leu Lys Ala Ala Glu Leu Ser Leu Ala Ala Glu Lys Ala  
195 200 205

Thr Ala Glu Gly Glu Lys Ala Ser Leu Leu Glu Gln Lys Ala Ala Ala  
210 215 220

Glu Ala Glu Ala Arg Ala Ala Ala Val Ala Glu Ala Ala Tyr Lys Glu  
225 230 235 240

Lys Arg Ala Ser Gln Gln Gln Ser Val Leu Ala Ser Ala Asn Thr Asn  
245 250 255

Leu Thr Ala Gln Val Gln Ala Val Ser Glu Ser Ala Ala Ala Pro Val  
260 265 270

Arg Ala Lys Val Arg Pro Thr Tyr Ser Thr Asn Ala Ser Ser Tyr Pro  
275 280 285

Ile Gly Glu Cys Thr Trp Gly Val Lys Thr Leu Ala Pro Trp Ala Gly  
290 295 300

Asp Tyr Trp Gly Asn Gly Ala Gln Trp Ala Thr Ser Ala Ala Ala Ala  
305 310 315 320

Gly Phe Arg Thr Gly Ser Thr Pro Gln Val Gly Ala Ile Ala Cys Trp  
325 330 335

Asn Asp Gly Gly Tyr Gly His Val Ala Val Val Thr Ala Val Glu Ser  
340 345 350

Thr Thr Arg Ile Gln Val Ser Glu Ser Asn Tyr Ala Gly Asn Arg Thr  
355 360 365

Ile Gly Asn His Arg Gly Trp Phe Asn Pro Thr Thr Thr Ser Glu Gly  
370 375 380

Phe Val Thr Tyr Ile Tyr Ala Asp  
385 390

<210> 209  
<211> 392  
<212> PRT  
<213> Streptococcus pneumoniae CDC 25

<400> 209

Met Lys Lys Lys Ile Leu Ala Ser Leu Leu Leu Ser Thr Val Met Val  
1 5 10 15

Ser Gln Val Ala Val Leu Thr Thr Ala His Ala Glu Thr Thr Asp Asp  
20 25 30

Lys Ile Ala Ala Gln Asp Asn Lys Ile Ser Asn Leu Thr Ala Gln Gln  
35 40 45

Gln Glu Ala Gln Lys Gln Val Asp Gln Ile Gln Glu Gln Val Ser Ala  
50 55 60

Ile Gln Ala Glu Gln Ser Asn Leu Gln Ala Glu Asn Asp Arg Leu Gln  
65 70 75 80

Ala Glu Ser Lys Lys Leu Glu Gly Glu Ile Thr Glu Leu Ser Lys Asn  
85 90 95

Ile Val Ser Arg Asn Gln Ser Leu Glu Lys Gln Ala Arg Ser Ala Gln  
100 105 110

Thr Asn Gly Ala Val Thr Ser Tyr Ile Asn Thr Ile Val Asn Ser Lys  
115 120 125

Ser Ile Thr Glu Val Ile Ser Arg Val Ala Ala Met Ser Glu Ile Val  
130 135 140

Ser Ala Asn Asn Lys Met Leu Glu Gln Gln Lys Ala Asp Lys Lys Ala  
145 150 155 160

Ile Ser Glu Lys Gln Val Ala Asn Asn Asp Ala Ile Asn Thr Val Ile  
165 170 175

Ala Asn Gln Gln Lys Leu Ala Asp Asp Ala Gln Ala Leu Thr Thr Lys  
180 185 190

Gln Ala Glu Leu Lys Ala Ala Glu Leu Ser Leu Ala Ala Glu Lys Ala  
195 200 205

Thr Ala Glu Gly Glu Lys Ala Ser Leu Leu Glu Gln Lys Ala Ala Ala  
210 215 220

Glu Ala Glu Ala Arg Ala Ala Ala Val Ala Glu Ala Ala Tyr Lys Glu  
225 230 235 240

Lys Arg Ala Ser Gln Gln Gln Ser Val Leu Ala Ser Ala Asn Thr Asn  
245 250 255

Leu Thr Ala Gln Val Gln Ala Val Ser Glu Ser Ala Ala Ala Pro Val  
260 265 270

Arg Ala Lys Val Arg Pro Thr Tyr Ser Thr Asn Ala Ser Ser Tyr Pro  
275 280 285

Ile Gly Glu Cys Thr Trp Gly Val Lys Thr Leu Ala Pro Trp Ala Gly  
290 295 300

Asp Tyr Trp Gly Asn Gly Ala Gln Trp Ala Thr Ser Ala Ala Ala Ala  
305 310 315 320

Gly Phe Arg Thr Gly Ser Thr Pro Gln Val Gly Ala Ile Ala Cys Trp  
325 330 335

Asn Asp Gly Gly Tyr Gly His Val Ala Val Val Thr Ala Val Glu Ser  
340 345 350

Thr Thr Arg Ile Gln Val Ser Glu Ser Asn Tyr Ala Gly Asn Arg Thr  
355 360 365

Ile Gly Asn His Arg Gly Trp Phe Asn Pro Thr Thr Thr Ser Glu Gly  
370 375 380

Phe Val Thr Tyr Ile Tyr Ala Asp  
385 390

<210> 210  
<211> 392  
<212> PRT  
<213> Streptococcus pneumoniae CDC 27

<400> 210

Met Lys Lys Lys Ile Leu Ala Ser Leu Leu Leu Ser Thr Val Met Val  
1 5 10 15

Ser Gln Val Ala Val Leu Thr Thr Ala His Ala Glu Thr Thr Asp Asp  
20 25 30

Lys Ile Ala Ala Gln Asp Asn Lys Ile Ser Asn Leu Thr Ala Gln Gln  
35 40 45

Gln Glu Ala Gln Lys Gln Val Asp Gln Ile Gln Glu Gln Val Ser Ala  
50 55 60

Ile Gln Ala Glu Gln Ser Asn Leu Gln Ala Glu Asn Asp Arg Leu Gln  
65 70 75 80

Ala Glu Ser Lys Lys Leu Glu Ser Glu Ile Thr Glu Leu Ser Lys Asn  
85 90 95

Ile Val Ser Arg Asn Gln Ser Leu Glu Lys Gln Ala Arg Ser Ala Gln  
100 105 110

Thr Asn Gly Ala Val Thr Ser Tyr Ile Asn Thr Ile Val Asn Ser Lys  
115 120 125

Ser Ile Thr Glu Ala Ile Ser Arg Val Ala Ala Met Ser Glu Ile Val  
130 135 140

Ser Ala Asn Asn Lys Met Leu Glu Gln Gln Lys Ala Asp Lys Lys Ala  
145 150 155 160

Ile Ser Glu Lys Gln Val Ala Asn Asn Asp Ala Ile Asn Thr Val Ile  
165 170 175

Ala Asn Gln Gln Lys Leu Ala Asp Asp Ala Gln Ala Leu Thr Thr Lys  
180 185 190

Gln Ala Glu Leu Lys Ala Ala Glu Leu Ser Leu Ala Ala Glu Lys Ala  
195 200 205

Thr Ala Glu Gly Glu Lys Ala Ser Leu Leu Glu Gln Lys Ala Ala Ala  
210 215 220

Glu Ala Glu Ala Arg Ala Ala Ala Val Ala Glu Ala Ala Tyr Lys Glu  
225 230 235 240

Lys Arg Ala Ser Gln Gln Gln Ser Val Leu Ala Ser Ala Asn Thr Asn  
245 250 255

Leu Thr Ala Gln Val Gln Ala Val Ser Glu Ser Ala Ala Ala Pro Val  
260 265 270

Arg Ala Lys Val Arg Pro Thr Tyr Ser Thr Asn Ala Ser Ser Tyr Pro

275

280

285

Ile Gly Glu Cys Thr Trp Gly Val Lys Thr Leu Ala Pro Trp Ala Gly  
 290 295 300

Asp Tyr Trp Gly Asn Gly Ala Gln Trp Ala Thr Ser Ala Ala Ala Ala  
 305 310 315 320

Gly Phe Arg Thr Gly Ser Thr Pro Gln Val Gly Ala Ile Ala Cys Trp  
 325 330 335

Asn Asp Gly Gly Tyr Gly His Val Ala Val Val Thr Ala Val Glu Ser  
 340 345 350

Thr Thr Arg Ile Gln Val Ser Glu Ser Asn Tyr Ala Gly Asn Arg Thr  
 355 360 365

Ile Gly Asn His Arg Gly Trp Phe Asn Pro Thr Thr Thr Ser Glu Gly  
 370 375 380

Phe Val Thr Tyr Ile Tyr Ala Asp  
 385 390

<210> 211  
 <211> 392  
 <212> PRT  
 <213> Streptococcus pneumoniae CDC 49

<400> 211

Met Lys Lys Lys Ile Leu Ala Ser Leu Leu Leu Ser Thr Val Met Val  
 1 5 10 15

Ser Gln Val Ala Val Leu Thr Thr Ala His Ala Glu Thr Thr Asp Asp  
 20 25 30

Lys Ile Ala Ala Gln Asp Asn Lys Ile Ser Asn Leu Thr Ala Gln Gln  
 35 40 45

Gln Glu Ala Gln Lys Gln Val Asp Gln Ile Gln Glu Gln Val Ser Ala  
 50 55 60

Ile Gln Ala Glu Gln Ser Asn Leu Gln Ala Glu Asn Asp Arg Leu Gln  
 65 70 75 80

Ala Glu Ser Lys Lys Leu Glu Gly Glu Ile Thr Glu Leu Ser Lys Asn  
 85 90 95



Ile Val Ser Arg Asn Gln Ser Leu Glu Lys Gln Ala Arg Ser Ala Gln  
100 105 110

Thr Asn Gly Ala Val Thr Ser Tyr Ile Asn Thr Ile Val Asn Ser Lys  
115 120 125

Ser Ile Thr Glu Ala Ile Ser Arg Val Ala Ala Met Ser Glu Ile Val  
130 135 140

Ser Ala Asn Asn Lys Met Leu Glu Gln Gln Lys Ala Asp Lys Lys Ala  
145 150 155 160

Ile Ser Glu Lys Gln Val Ala Asn Asn Asp Ala Ile Asn Thr Val Ile  
165 170 175

Ala Asn Gln Gln Lys Leu Ala Asp Asp Ala Gln Ala Leu Thr Thr Lys  
180 185 190

Gln Ala Glu Leu Lys Ala Ala Glu Leu Ser Leu Ala Ala Glu Arg Ala  
195 200 205

Thr Ala Glu Gly Glu Lys Ala Ser Leu Leu Glu Gln Lys Ala Ala Ala  
210 215 220

Glu Ala Glu Ala Arg Ala Ala Ala Val Ala Glu Ala Ala Tyr Lys Glu  
225 230 235 240

Lys Arg Ala Ser Gln Gln Gln Ser Val Leu Ala Ser Ala Asn Thr Asn  
245 250 255

Leu Thr Ala Gln Val Gln Ala Val Ser Glu Ser Ala Ala Ala Pro Val  
260 265 270

Arg Ala Lys Val Arg Pro Thr Tyr Ser Thr Asn Ala Ser Ser Tyr Pro  
275 280 285

Ile Gly Glu Cys Thr Trp Gly Val Lys Thr Leu Ala Pro Trp Ala Gly  
290 295 300

Asp Tyr Trp Gly Asn Gly Ala Gln Trp Ala Thr Ser Ala Ala Ala Ala  
305 310 315 320

Gly Phe Arg Thr Gly Ser Thr Pro Gln Val Gly Ala Ile Ala Cys Trp  
325 330 335

Asn Asp Gly Gly Tyr Gly His Val Ala Val Val Thr Ala Val Glu Ser  
340 345 350

Thr Thr Arg Ile Gln Val Ser Glu Ser Asn Tyr Ala Gly Asn Arg Thr  
355 360 365

Ile Gly Asn His Arg Gly Trp Phe Asn Pro Thr Thr Thr Ser Glu Gly  
370 375 380

Phe Val Thr Tyr Ile Tyr Ala Asp  
385 390

<210> 212  
<211> 392  
<212> PRT  
<213> Streptococcus pneumoniae CDC 56

<400> 212

Met Lys Lys Lys Ile Leu Ala Ser Leu Leu Leu Ser Thr Val Met Val  
1 5 10 15

Ser Gln Val Ala Val Leu Thr Thr Ala His Ala Glu Thr Thr Asp Asp  
20 25 30

Lys Ile Ala Ala Gln Asp Asn Lys Ile Ser Asn Leu Thr Ala Gln Gln  
35 40 45

Gln Glu Ala Gln Lys Gln Val Asp Gln Ile Gln Glu Gln Val Ser Ala  
50 55 60

Ile Gln Ala Glu Gln Ser Asn Leu Gln Ala Glu Asn Asp Arg Leu Gln  
65 70 75 80

Ala Glu Ser Lys Lys Leu Glu Gly Glu Ile Thr Glu Leu Ser Lys Asn  
85 90 95

Ile Val Ser Arg Asn Gln Ser Leu Glu Lys Gln Ala Arg Ser Ala Gln  
100 105 110

Thr Asn Gly Ala Val Thr Ser Tyr Ile Asn Thr Ile Val Asn Ser Lys  
115 120 125

Ser Ile Thr Glu Ala Ile Ser Arg Val Ala Ala Met Ser Glu Ile Val  
130 135 140

Ser Ala Asn Asn Lys Met Leu Glu Gln Gln Lys Ala Asp Lys Lys Ala  
145 150 155 160

Ile Ser Glu Lys Gln Val Ala Asn Asn Asp Ala Ile Asn Ile Val Ile  
165 170 175

Ala Asn Gln Gln Lys Leu Ala Asp Asp Ala Gln Ala Leu Thr Thr Lys  
180 185 190

Gln Ala Glu Leu Lys Ala Ala Glu Leu Ser Leu Ala Ala Glu Lys Ala  
195 200 205

Thr Ala Glu Gly Glu Lys Ala Ser Leu Leu Glu Gln Lys Ala Ala Ala  
210 215 220

Glu Ala Glu Ala Arg Ala Ala Ala Val Ala Glu Ala Ala Tyr Lys Glu  
225 230 235 240

Lys Arg Ala Ser Gln Gln Gln Ser Val Leu Ala Ser Ala Asn Thr Asn  
245 250 255

Leu Thr Ala Gln Val Gln Ala Val Ser Glu Ser Ala Ala Ala Pro Val  
260 265 270

Arg Ala Lys Val Arg Pro Thr Tyr Ser Thr Asn Ala Ser Ser Tyr Pro  
275 280 285

Ile Gly Glu Cys Thr Trp Gly Val Lys Thr Leu Ala Pro Trp Ala Gly  
290 295 300

Asp Tyr Trp Gly Asn Gly Ala Gln Trp Ala Thr Ser Ala Ala Ala Ala  
305 310 315 320

Gly Phe Arg Thr Gly Ser Thr Pro Gln Val Gly Ala Ile Ala Cys Trp  
325 330 335

Asn Asp Gly Gly Tyr Gly His Val Ala Val Val Thr Ala Val Glu Ser  
340 345 350

Thr Thr Arg Ile Gln Val Ser Glu Ser Asn Tyr Ala Gly Asn Arg Thr  
355 360 365

Ile Gly Asn His Arg Gly Trp Phe Asn Pro Thr Thr Thr Ser Glu Gly  
370 375 380

Phe Val Thr Tyr Ile Tyr Ala Asp  
385 390

<210> 213  
<211> 392  
<212> PRT  
<213> Streptococcus pneumoniae CDC 61

<400> 213

Met Lys Lys Lys Ile Leu Ala Ser Leu Leu Leu Ser Thr Val Met Val  
1 5 10 15

Ser Gln Val Ala Val Leu Thr Thr Ala His Ala Glu Thr Thr Asp Asp  
20 25 30

Lys Ile Ala Ala Gln Asp Asn Lys Ile Ser Asn Leu Thr Ala Gln Gln  
35 40 45

Gln Glu Ala Gln Lys Gln Val Asp Gln Ile Gln Glu Gln Val Ser Ala  
50 55 60

Ile Gln Ala Glu Gln Ser Asn Leu Gln Ala Glu Asn Asp Arg Leu Gln  
65 70 75 80

Ala Glu Ser Lys Lys Leu Glu Gly Glu Ile Thr Glu Leu Ser Lys Asn  
85 90 95

Ile Val Ser Arg Asn Gln Ser Leu Glu Lys Gln Ala Arg Ser Ala Gln  
100 105 110

Thr Asn Gly Ala Val Thr Ser Tyr Ile Asn Thr Ile Val Asn Ser Lys  
115 120 125

Ser Ile Thr Glu Ala Ile Ser Arg Val Ala Ala Met Ser Glu Ile Val  
130 135 140

Ser Ala Asn Asn Lys Met Leu Glu Gln Gln Lys Ala Asp Lys Lys Ala  
145 150 155 160

Ile Ser Glu Lys Gln Val Ala Asn Asn Asp Ala Ile Asn Thr Val Ile  
165 170 175

Ala Asn Gln Gln Lys Leu Ala Asp Asp Ala Gln Ala Leu Thr Thr Lys  
180 185 190

Gln Ala Glu Leu Lys Ala Ala Glu Leu Ser Leu Ala Ala Glu Lys Ala  
195 200 205

Thr Ala Glu Gly Glu Lys Ala Ser Leu Leu Glu Gln Lys Ala Ala Ala

210

215

220

Glu Ala Glu Ala Arg Ala Ala Ala Val Ala Glu Ala Ala Tyr Lys Glu  
 225 230 235 240

Lys Arg Ala Ser Gln Gln Gln Ser Val Leu Ala Ser Ala Asn Thr Asn  
 245 250 255

Leu Thr Ala Gln Val Gln Ala Val Ser Glu Ser Ala Ala Ala Pro Val  
 260 265 270

Arg Ala Lys Val Arg Pro Thr Tyr Ser Thr Asn Ala Ser Ser Tyr Pro  
 275 280 285

Ile Gly Glu Cys Thr Trp Gly Val Lys Thr Leu Ala Pro Trp Ala Glu  
 290 295 300

Asp Tyr Trp Gly Asn Gly Ala Gln Trp Ala Thr Ser Ala Ala Ala Ala  
 305 310 315 320

Gly Phe Arg Thr Gly Ser Thr Pro Gln Val Gly Ala Ile Ala Cys Trp  
 325 330 335

Asn Asp Gly Gly Tyr Gly His Val Ala Val Val Thr Ala Val Glu Ser  
 340 345 350

Thr Thr Arg Ile Gln Val Ser Glu Ser Asn Tyr Ala Gly Asn Arg Thr  
 355 360 365

Ile Gly Asn His Arg Gly Trp Phe Asn Pro Thr Thr Thr Ser Glu Gly  
 370 375 380

Phe Val Thr Tyr Ile Tyr Ala Asp  
 385 390

&lt;210&gt; 214

&lt;211&gt; 392

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae CDC 97

&lt;400&gt; 214

Met Lys Lys Lys Ile Leu Ala Ser Leu Leu Leu Ser Thr Val Met Val  
 1 5 10 15

Ser Gln Val Ala Val Leu Thr Thr Ala His Ala Glu Thr Thr Asp Asp  
 20 25 30

Lys Ile Ala Ala Gln Asp Asn Lys Ile Ser Asn Leu Thr Ala Gln Gln  
35 40 45

Gln Glu Ala Gln Lys Gln Val Asp Gln Ile Gln Glu Gln Val Ser Ala  
50 55 60

Ile Gln Ala Glu Gln Ser Asn Leu Gln Ala Glu Asn Asp Arg Leu Gln  
65 70 75 80

Ala Glu Ser Lys Lys Leu Glu Gly Glu Ile Thr Glu Leu Ser Lys Asn  
85 90 95

Ile Val Ser Arg Asn Gln Ser Leu Glu Lys Gln Ala Arg Ser Ala Gln  
100 105 110

Thr Asn Gly Ala Val Thr Ser Tyr Ile Asn Thr Ile Val Asn Ser Lys  
115 120 125

Ser Ile Thr Glu Ala Ile Ser Arg Val Ala Ala Met Ser Glu Ile Val  
130 135 140

Ser Ala Asn Asn Lys Met Leu Glu Gln Gln Lys Ala Asp Lys Lys Ala  
145 150 155 160

Ile Ser Glu Lys Gln Val Ala Asn Asn Asp Ala Ile Asn Thr Val Ile  
165 170 175

Ala Asn Gln Gln Lys Leu Ala Asp Asp Ala Gln Ala Leu Thr Thr Lys  
180 185 190

Gln Ala Glu Leu Lys Ala Ala Glu Leu Ser Leu Ala Ala Glu Lys Ala  
195 200 205

Thr Ala Glu Gly Glu Lys Ala Ser Leu Leu Glu Gln Lys Ala Ala Ala  
210 215 220

Glu Ala Glu Ala Arg Ala Ala Ala Val Ala Glu Ala Ala Tyr Lys Glu  
225 230 235 240

Lys Arg Ala Ser Gln Gln Gln Ser Val Leu Ala Ser Ala Asn Thr Asn  
245 250 255

Leu Thr Ala Gln Val Gln Ala Val Ser Glu Ser Ala Ala Ala Pro Val  
260 265 270

Arg Ala Lys Val Arg Pro Thr Tyr Ser Thr Asn Ala Ser Ser Tyr Pro  
275 280 285

Ile Gly Glu Cys Thr Trp Gly Val Lys Thr Leu Ala Pro Trp Ala Gly  
290 295 300

Asp Tyr Trp Gly Asn Gly Gly Gln Trp Ala Thr Ser Ala Ala Ala Ala  
305 310 315 320

Gly Phe Arg Thr Gly Ser Thr Pro Gln Val Gly Ala Ile Ala Cys Trp  
325 330 335

Asn Asp Gly Gly Tyr Gly His Val Ala Val Val Thr Ala Val Glu Ser  
340 345 350

Thr Thr Arg Ile Gln Val Ser Glu Ser Asn Tyr Ala Gly Asn Arg Thr  
355 360 365

Ile Gly Asn His Arg Gly Trp Phe Asn Pro Thr Thr Thr Ser Glu Gly  
370 375 380

Phe Val Thr Tyr Ile Tyr Ala Asp  
385 390

<210> 215  
<211> 391  
<212> PRT  
<213> Streptococcus pneumoniae CDC 103  
  
<400> 215

Met Lys Lys Lys Ile Leu Ala Ser Leu Leu Leu Ser Thr Val Met Val  
1 5 10 15

Ser Gln Val Ala Val Leu Thr Thr Ala His Ala Glu Thr Thr Asp Asp  
20 25 30

Lys Ile Ala Ala Gln Asp Asn Lys Ile Ser Asn Leu Thr Ala Gln Gln  
35 40 45

Gln Glu Ala Gln Lys Gln Val Asp Gln Ile Gln Glu Gln Val Ser Ala  
50 55 60

Ile Gln Ala Glu Gln Ser Asn Leu Gln Ala Glu Asn Asp Arg Leu Gln  
65 70 75 80

Ala Glu Ser Lys Lys Leu Glu Gly Glu Ile Thr Glu Leu Ser Lys Asn  
85 90 95

Ile Val Ser Arg Asn Gln Ser Leu Glu Lys Gln Ala Arg Ser Ala Gln  
100 105 110

Thr Asn Gly Ala Val Thr Ser Tyr Ile Asn Thr Ile Val Asn Ser Lys  
115 120 125

Ser Ile Thr Glu Ala Ile Ser Arg Val Ala Ala Met Ser Glu Ile Val  
130 135 140

Ser Ala Asn Asn Lys Met Leu Glu Gln Gln Lys Ala Asp Lys Lys Ala  
145 150 155 160

Ile Ser Glu Lys Gln Val Ala Asn Asn Asp Ala Ile Asn Thr Val Ile  
165 170 175

Ala Asn Gln Gln Lys Leu Ala Asp Asp Ala Gln Ala Leu Thr Thr Lys  
180 185 190

Gln Ala Glu Leu Lys Ala Ala Glu Ser Leu Ala Ala Glu Lys Ala Thr  
195 200 205

Ala Glu Gly Glu Lys Ala Ser Leu Leu Glu Gln Lys Ala Ala Ala Glu  
210 215 220

Ala Glu Ala Arg Ala Ala Ala Ala Glu Ala Ala Tyr Lys Glu Lys  
225 230 235 240

Gln Ala Ser Gln Gln Gln Ser Val Leu Ala Ser Gly Asn Thr Asn Leu  
245 250 255

Thr Ala Gln Val Gln Ala Val Ser Glu Ser Ala Val Ala Pro Val Gln  
260 265 270

Ala Lys Val Arg Pro Thr Tyr Asn Thr Asp Ala Ser Thr Tyr Pro Ile  
275 280 285

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

Tyr Trp Gly Asn Gly Ala Gln Trp Ala Thr Ser Ala Ala Ala Ala Gly  
305 310 315 320

Phe Arg Thr Gly Ser Thr Pro Gln Val Gly Ala Ile Ala Cys Trp Asn  
325 330 335



Asp Gly Gly Tyr Gly His Val Ala Val Val Thr Ala Val Glu Ser Thr  
340 345 350

Thr Arg Ile Gln Val Ser Glu Ser Asn Tyr Ala Gly Asn Arg Thr Ile  
355 360 365

Gly Asn His Arg Gly Trp Phe Asn Pro Thr Thr Thr Ser Glu Gly Phe  
370 375 380

Val Thr Tyr Ile Tyr Ala Asp  
385 390

<210> 216  
<211> 392  
<212> PRT  
<213> Streptococcus pneumoniae CDC 106

<400> 216

Met Lys Lys Lys Ile Leu Ala Ser Leu Leu Leu Ser Thr Val Met Val  
1 5 10 15

Ser Gln Val Ala Val Leu Thr Thr Ala His Ala Glu Thr Thr Asp Asp  
20 25 30

Lys Ile Ala Ala Gln Asp Asn Lys Ile Ser Asn Leu Thr Ala Gln Gln  
35 40 45

Gln Glu Ala Gln Lys Gln Val Asp Gln Ile Gln Glu Gln Val Ser Ala  
50 55 60

Ile Gln Ala Glu Gln Ser Asn Leu Gln Ala Glu Asn Asp Arg Leu Gln  
65 70 75 80

Ala Glu Ser Lys Lys Leu Glu Gly Glu Ile Thr Glu Leu Ser Lys Asn  
85 90 95

Ile Val Ser Arg Asn Gln Ser Leu Glu Lys Gln Ala Arg Ser Ala Gln  
100 105 110

Thr Asn Gly Ala Val Thr Ser Tyr Ile Asn Thr Ile Val Asn Ser Lys  
115 120 125

Ser Ile Thr Glu Ala Ile Ser Arg Val Ala Ala Met Ser Glu Ile Val  
130 135 140

Ser Ala Asn Asn Lys Met Leu Glu Gln Gln Lys Ala Asp Lys Lys Ala

145				150				155				160			
Ile	Ser	Glu	Lys	Gln 165	Val	Ala	Asn	Asn	Asp 170	Ala	Ile	Asn	Thr	Val 175	Ile
Ala	Asn	Gln	Gln 180	Lys	Leu	Ala	Asp	Asp 185	Ala	Gln	Ala	Leu	Thr 190	Thr	Lys
Gln	Ala	Glu 195	Leu	Lys	Ala	Ala	Glu 200	Leu	Ser	Leu	Ala	Ala 205	Glu	Lys	Ala
Thr	Ala 210	Glu	Gly	Glu	Lys	Ala 215	Ser	Leu	Leu	Glu	Gln 220	Lys	Ala	Ala	Ala
Glu 225	Ala	Glu	Ala	Arg 230	Ala	Ala	Ala	Val	Ala	Glu 235	Ala	Ala	Tyr	Lys	Glu 240
Lys	Arg	Ala	Ser	Gln 245	Gln	Gln	Ser	Val	Leu 250	Ala	Ser	Ala	Asn	Thr 255	Asn
Leu	Thr	Ala	Gln 260	Val	Gln	Ala	Val	Ser 265	Glu	Ser	Ala	Ala	Ala 270	Pro	Val
Arg	Ala	Lys 275	Val	Arg	Pro	Thr	Tyr 280	Ser	Thr	Asn	Ala	Ser 285	Ser	Tyr	Pro
Ile	Gly 290	Glu	Cys	Thr	Trp	Gly 295	Val	Lys	Thr	Leu	Ala 300	Pro	Trp	Ala	Gly
Asp 305	Tyr	Trp	Gly	Asn 310	Gly	Ala	Gln	Trp	Ala	Thr 315	Ser	Ala	Ala	Ala 320	Ala
Gly	Phe	Arg	Thr	Gly 325	Ser	Thr	Pro	Gln	Val 330	Gly	Ala	Ile	Ala	Cys 335	Trp
Asn	Asp	Gly	Gly 340	Tyr	Gly	His	Val	Ala 345	Val	Val	Thr	Ala	Val 350	Glu	Ser
Thr	Thr	Arg 355	Ile	Gln	Val	Ser	Glu 360	Ser	Asn	Tyr	Ser	Gly 365	Asn	Arg	Thr
Ile	Gly 370	Asn	His	Arg	Gly	Trp 375	Phe	Asn	Pro	Thr	Thr 380	Thr	Ser	Glu	Gly
Phe 385	Val	Thr	Tyr	Ile	Tyr 390	Ala	Asp								

<210> 217  
<211> 392  
<212> PRT  
<213> Streptococcus pneumoniae CDC 112

<400> 217

Met Lys Lys Lys Ile Leu Ala Ser Leu Leu Leu Ser Thr Val Met Val  
1 5 10 15

Ser Gln Val Ala Val Leu Thr Thr Ala His Ala Glu Thr Thr Asp Asp  
20 25 30

Lys Ile Ala Ala Gln Asp Asn Lys Ile Ser Asn Leu Thr Ala Gln Gln  
35 40 45

Gln Glu Ala Gln Lys Gln Val Asp Gln Ile Gln Glu Gln Val Ser Ala  
50 55 60

Ile Gln Ala Glu Gln Ser Asn Leu Gln Ala Glu Asn Asp Arg Leu Gln  
65 70 75 80

Ala Glu Ser Lys Lys Leu Glu Gly Glu Ile Thr Glu Leu Ser Lys Asn  
85 90 95

Ile Val Ser Arg Asn Gln Ser Leu Glu Lys Gln Ala Arg Ser Ala Gln  
100 105 110

Thr Asn Gly Ala Val Thr Ser Tyr Ile Asn Thr Ile Val Asn Ser Lys  
115 120 125

Ser Ile Thr Glu Ala Ile Ser Arg Val Ala Ala Met Ser Glu Ile Val  
130 135 140

Ser Ala Asn Asn Lys Met Leu Glu Gln Gln Lys Ala Asp Lys Lys Ala  
145 150 155 160

Ile Ser Glu Lys Gln Val Ala Asn Asn Asp Ala Ile Asn Thr Val Ile  
165 170 175

Ala Asn Gln Gln Lys Leu Ala Asp Asp Ala Gln Ala Leu Thr Thr Lys  
180 185 190

Gln Ala Glu Leu Lys Ala Ala Glu Leu Ser Leu Ala Ala Glu Lys Ala  
195 200 205

Thr Ala Glu Gly Glu Lys Ala Ser Leu Leu Glu Gln Lys Ala Ala Ala  
210 215 220

Glu Ala Glu Ala Arg Ala Ala Ala Val Ala Glu Ala Ala Tyr Lys Glu  
225 230 235 240

Lys Arg Ala Ser Gln Gln Gln Ser Val Leu Ala Ser Ala Asn Thr Asn  
245 250 255

Leu Thr Ala Gln Val Gln Ala Val Tyr Glu Ser Ala Ala Ala Pro Val  
260 265 270

Arg Ala Lys Val Arg Pro Thr Tyr Ser Thr Asn Ala Ser Ser Tyr Pro  
275 280 285

Ile Gly Glu Cys Thr Trp Gly Val Lys Thr Leu Ala Pro Trp Ala Gly  
290 295 300

Asp Tyr Trp Gly Asn Gly Ala Gln Trp Ala Thr Ser Ala Ala Ala Ala  
305 310 315 320

Gly Phe Arg Thr Gly Ser Thr Pro Gln Val Gly Ala Ile Ala Cys Trp  
325 330 335

Asn Asp Gly Gly Tyr Gly His Val Ala Val Val Thr Ala Val Glu Ser  
340 345 350

Thr Thr Arg Ile Gln Val Ser Glu Ser Asn Tyr Ala Gly Asn Arg Thr  
355 360 365

Ile Gly Asn His Arg Gly Trp Phe Asn Pro Thr Thr Thr Ser Glu Gly  
370 375 380

Phe Val Thr Tyr Ile Tyr Ala Asp  
385 390

<210> 218  
<211> 392  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1280

<400> 218

Met Lys Lys Lys Ile Leu Ala Ser Leu Leu Leu Ser Thr Val Met Val  
1 5 10 15

Ser Gln Val Ala Val Leu Thr Thr Ala His Ala Glu Thr Thr Asp Asp  
20 25 30

Lys Ile Ala Ala Gln Asp Asn Lys Ile Ser Asn Leu Thr Ala Gln Gln  
35 40 45

Gln Glu Ala Gln Lys Gln Val Asp Gln Ile Gln Glu Gln Val Ser Ala  
50 55 60

Ile Gln Ala Glu Gln Ser Asn Leu Gln Ala Glu Asn Asp Arg Leu Gln  
65 70 75 80

Ala Glu Ser Lys Lys Leu Glu Gly Glu Ile Thr Glu Leu Ser Lys Asn  
85 90 95

Ile Val Ser Arg Asn Gln Ser Leu Glu Lys Gln Ala Arg Ser Ala Gln  
100 105 110

Thr Asn Gly Ala Val Thr Ser Tyr Ile Asn Thr Ile Val Asn Ser Lys  
115 120 125

Ser Ile Thr Glu Ala Ile Ser Arg Val Ala Ala Met Ser Glu Ile Val  
130 135 140

Ser Ala Asn Asn Lys Met Leu Glu Gln Gln Lys Ala Asp Lys Lys Ala  
145 150 155 160

Ile Ser Glu Lys Gln Val Ala Asn Asn Asp Ala Ile Asn Thr Val Ile  
165 170 175

Ala Asn Gln Gln Lys Leu Ala Asp Asp Ala Gln Ala Leu Thr Thr Lys  
180 185 190

Gln Ala Glu Leu Lys Ala Ala Glu Leu Ser Leu Ala Ala Glu Lys Ala  
195 200 205

Thr Ala Glu Gly Glu Lys Ala Ser Leu Leu Glu Gln Lys Ala Ala Ala  
210 215 220

Glu Ala Glu Ala Arg Ala Ala Ala Val Ala Glu Ala Ala Tyr Lys Glu  
225 230 235 240

Lys Arg Ser Ser Gln Gln Gln Ser Val Leu Ala Ser Ala Asn Thr Asn  
245 250 255

Leu Thr Ala Gln Val Gln Ala Val Ser Glu Ser Ala Ala Ala Pro Val  
260 265 270

Arg Ala Lys Val Arg Pro Thr Tyr Ser Thr Asn Ala Ser Ser Tyr Pro  
275 280 285

Ile Gly Glu Cys Thr Trp Gly Val Lys Thr Leu Ala Pro Trp Ala Gly  
290 295 300

Asp Tyr Trp Gly Asn Gly Ala Gln Trp Ala Thr Ser Ala Ala Ala Ala  
305 310 315 320

Gly Phe Arg Thr Gly Ser Thr Pro Gln Val Gly Ala Ile Ala Cys Trp  
325 330 335

Asn Asp Gly Gly Tyr Gly His Val Ala Val Val Thr Ala Val Glu Ser  
340 345 350

Thr Thr Arg Ile Gln Val Ser Glu Ser Asn Tyr Ala Gly Asn Arg Thr  
355 360 365

Ile Gly Asn His Arg Gly Trp Phe Asn Pro Thr Thr Thr Ser Glu Gly  
370 375 380

Phe Val Thr Tyr Ile Tyr Ala Asp  
385 390

<210> 219  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 1

<400> 219

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu

85

90

95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
 100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
 115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
 130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
 145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
 165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
 180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
 195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
 210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
 225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
 245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
 260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
 290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
 305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
 325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575



Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 220  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 2

<400> 220

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His

115					120					125						
Thr	Arg	Gly	Ile	Val	His	Arg	Asp	Leu	Lys	Pro	Gln	Asn	Ile	Leu	Leu	
130					135					140						
Thr	Pro	Asp	Gly	Thr	Ala	Lys	Val	Thr	Asp	Phe	Gly	Ile	Ala	Val	Ala	
145					150					155					160	
Phe	Ala	Glu	Thr	Ser	Leu	Thr	Gln	Thr	Asn	Ser	Met	Leu	Gly	Ser	Val	
165					170					175						
His	Tyr	Leu	Ser	Pro	Glu	Gln	Ala	Arg	Gly	Ser	Lys	Ala	Thr	Val	Gln	
180					185					190						
Ser	Asp	Ile	Tyr	Ala	Met	Gly	Ile	Ile	Phe	Tyr	Glu	Met	Leu	Thr	Gly	
195					200					205						
His	Ile	Pro	Tyr	Asp	Gly	Asp	Ser	Ala	Val	Thr	Ile	Ala	Leu	Gln	His	
210					215					220						
Phe	Gln	Lys	Pro	Leu	Pro	Ser	Val	Ile	Ala	Glu	Asn	Pro	Ser	Val	Pro	
225					230					235					240	
Gln	Ala	Leu	Glu	Asn	Val	Ile	Ile	Lys	Ala	Thr	Ala	Lys	Lys	Leu	Thr	
245					250					255						
Asn	Arg	Tyr	Arg	Ser	Val	Ser	Glu	Met	Tyr	Val	Asp	Leu	Ser	Ser	Ser	
260					265					270						
Leu	Ser	Tyr	Asn	Arg	Arg	Asn	Glu	Ser	Lys	Leu	Ile	Phe	Asp	Glu	Thr	
275					280					285						
Ser	Lys	Ala	Asp	Thr	Lys	Thr	Leu	Pro	Lys	Val	Ser	Gln	Ser	Thr	Leu	
290					295					300						
Thr	Ser	Ile	Pro	Lys	Val	Gln	Ala	Gln	Thr	Glu	His	Lys	Ser	Ile	Lys	
305					310					315					320	
Asn	Pro	Ser	Gln	Ala	Val	Thr	Glu	Glu	Thr	Tyr	Gln	Pro	Gln	Ala	Pro	
325					330					335						
Lys	Lys	His	Arg	Phe	Lys	Met	Arg	Tyr	Leu	Ile	Leu	Leu	Ala	Ser	Leu	
340					345					350						
Val	Leu	Val	Ala	Ala	Ser	Leu	Ile	Trp	Ile	Leu	Ser	Arg	Thr	Pro	Ala	
355					360					365						

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 221  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 3

<400> 221

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala

145		150		155		160									
Phe	Ala	Glu	Thr	Ser	Leu	Thr	Gln	Thr	Asn	Ser	Met	Leu	Gly	Ser	Val
				165					170					175	
His	Tyr	Leu	Ser	Pro	Glu	Gln	Ala	Arg	Gly	Ser	Lys	Ala	Thr	Val	Gln
			180					185					190		
Ser	Asp	Ile	Tyr	Ala	Met	Gly	Ile	Ile	Phe	Tyr	Glu	Met	Leu	Thr	Gly
		195					200					205			
His	Ile	Pro	Tyr	Asp	Gly	Asp	Ser	Ala	Val	Thr	Ile	Ala	Leu	Gln	His
	210					215					220				
Phe	Gln	Lys	Pro	Leu	Pro	Ser	Val	Ile	Ala	Glu	Asn	Pro	Ser	Val	Pro
225					230					235					240
Gln	Ala	Leu	Glu	Asn	Val	Ile	Ile	Lys	Ala	Thr	Ala	Lys	Lys	Leu	Thr
				245					250					255	
Asn	Arg	Tyr	Arg	Ser	Val	Ser	Glu	Met	Tyr	Val	Asp	Leu	Ser	Ser	Ser
			260					265					270		
Leu	Ser	Tyr	Asn	Arg	Arg	Asn	Glu	Ser	Lys	Leu	Ile	Phe	Asp	Glu	Thr
		275					280					285			
Ser	Lys	Ala	Asp	Thr	Lys	Thr	Leu	Pro	Lys	Val	Ser	Gln	Ser	Thr	Leu
	290					295					300				
Thr	Ser	Ile	Pro	Lys	Val	Gln	Ala	Gln	Thr	Glu	His	Lys	Ser	Ile	Lys
305					310					315					320
Asn	Pro	Ser	Gln	Ala	Val	Thr	Glu	Glu	Thr	Tyr	Gln	Pro	Gln	Ala	Pro
			325						330					335	
Lys	Lys	His	Arg	Phe	Lys	Met	Arg	Tyr	Leu	Ile	Leu	Leu	Ala	Ser	Leu
			340					345					350		
Val	Leu	Val	Ala	Ala	Ser	Leu	Ile	Trp	Ile	Leu	Ser	Arg	Thr	Pro	Ala
		355					360					365			
Thr	Ile	Ala	Ile	Pro	Asp	Val	Ala	Gly	Gln	Thr	Val	Ala	Glu	Ala	Lys
	370					375					380				
Ala	Thr	Leu	Lys	Lys	Ala	Asn	Phe	Glu	Ile	Gly	Glu	Glu	Lys	Thr	Glu
385					390					395					400

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

Ser Asp Val Ile Ser Glu Leu Lys Glu Lys Lys Val Pro Asp Asn Leu  
450 455 460

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 222  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 4  
  
<400> 222

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln

180						185						190					
Ser	Asp	Ile	Tyr	Ala	Met	Gly	Ile	Ile	Phe	Tyr	Glu	Met	Leu	Thr	Gly		
	195						200					205					
His	Ile	Pro	Tyr	Asp	Gly	Asp	Ser	Ala	Val	Thr	Ile	Ala	Leu	Gln	His		
	210					215					220						
Phe	Gln	Lys	Pro	Leu	Pro	Ser	Val	Ile	Ala	Glu	Asn	Pro	Ser	Val	Pro		
225					230					235					240		
Gln	Ala	Leu	Glu	Asn	Val	Ile	Ile	Lys	Ala	Thr	Ala	Lys	Lys	Leu	Thr		
				245					250					255			
Asn	Arg	Tyr	Arg	Ser	Val	Ser	Glu	Met	Tyr	Val	Asp	Leu	Ser	Ser	Ser		
			260					265					270				
Leu	Ser	Tyr	Asn	Arg	Arg	Asn	Glu	Ser	Lys	Leu	Ile	Phe	Asp	Glu	Thr		
		275					280					285					
Ser	Lys	Ala	Asp	Thr	Lys	Thr	Leu	Pro	Lys	Val	Ser	Gln	Ser	Thr	Leu		
	290					295					300						
Thr	Ser	Ile	Pro	Lys	Val	Gln	Ala	Gln	Thr	Glu	His	Lys	Ser	Ile	Lys		
305					310					315					320		
Asn	Pro	Ser	Gln	Ala	Val	Thr	Glu	Glu	Thr	Tyr	Gln	Pro	Gln	Ala	Pro		
				325					330					335			
Lys	Lys	His	Arg	Phe	Lys	Met	Arg	Tyr	Leu	Ile	Leu	Leu	Ala	Ser	Leu		
			340					345					350				
Val	Leu	Val	Ala	Ala	Ser	Leu	Ile	Trp	Ile	Leu	Ser	Arg	Thr	Pro	Ala		
		355					360					365					
Thr	Ile	Ala	Ile	Pro	Asp	Val	Ala	Gly	Gln	Thr	Val	Ala	Glu	Ala	Lys		
	370					375					380						
Ala	Thr	Leu	Lys	Lys	Ala	Asn	Phe	Glu	Ile	Gly	Glu	Glu	Lys	Thr	Glu		
385					390					395					400		
Ala	Ser	Glu	Lys	Val	Glu	Glu	Gly	Arg	Ile	Ile	Arg	Thr	Asp	Pro	Gly		
				405					410					415			
Ala	Gly	Thr	Gly	Arg	Lys	Glu	Gly	Thr	Lys	Ile	Asn	Leu	Val	Val	Ser		
			420					425					430				



Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

Ser Asp Val Ile Ser Glu Leu Lys Glu Lys Lys Val Pro Asp Asn Leu  
450 455 460

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 223  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 5

<400> 223

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His

210	215	220															
Phe 225	Gln	Lys	Pro	Leu	Pro 230	Ser	Val	Ile	Ala	Glu 235	Asn	Pro	Ser	Val	Pro 240		
Gln	Ala	Leu	Glu	Asn 245	Val	Ile	Ile	Lys	Ala 250	Thr	Ala	Lys	Lys	Leu 255	Thr		
Asn	Arg	Tyr	Arg 260	Ser	Val	Ser	Glu	Met 265	Tyr	Val	Asp	Leu	Ser 270	Ser	Ser		
Leu	Ser	Tyr 275	Asn	Arg	Arg	Asn	Glu 280	Ser	Lys	Leu	Ile	Phe 285	Asp	Glu	Thr		
Ser	Lys 290	Ala	Asp	Thr	Lys	Thr 295	Leu	Pro	Lys	Val	Ser 300	Gln	Ser	Thr	Leu		
Thr 305	Ser	Ile	Pro	Lys	Val 310	Gln	Ala	Gln	Thr	Glu 315	His	Lys	Ser	Ile	Lys 320		
Asn	Pro	Ser	Gln	Ala 325	Val	Thr	Glu	Glu	Thr 330	Tyr	Gln	Pro	Gln	Ala 335	Pro		
Lys	Lys	His	Arg 340	Phe	Lys	Met	Arg	Tyr 345	Leu	Ile	Leu	Leu	Ala 350	Ser	Leu		
Val	Leu	Val 355	Ala	Ala	Ser	Leu	Ile 360	Trp	Ile	Leu	Ser	Arg 365	Thr	Pro	Ala		
Thr 370	Ile	Ala	Ile	Pro	Asp 375	Val	Ala	Gly	Gln	Thr	Val 380	Ala	Glu	Ala	Lys		
Ala 385	Thr	Leu	Lys	Lys	Ala 390	Asn	Phe	Glu	Ile	Gly 395	Glu	Glu	Lys	Thr	Glu 400		
Ala	Ser	Glu	Lys	Val 405	Glu	Glu	Gly	Arg	Ile 410	Ile	Arg	Thr	Asp	Pro	Gly 415		
Ala	Gly	Thr	Gly 420	Arg	Lys	Glu	Gly	Thr 425	Lys	Ile	Asn	Leu	Val 430	Val	Ser		
Ser	Gly	Lys 435	Gln	Ser	Phe	Gln	Ile 440	Ser	Asn	Tyr	Val	Gly 445	Arg	Lys	Ser		
Ser	Asp 450	Val	Ile	Ala	Glu	Leu 455	Lys	Glu	Lys	Lys	Val 460	Pro	Asp	Asn	Leu		

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Thr Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 224  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 8  
  
<400> 224

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr

				245						250						255
Asn	Arg	Tyr	Arg	Ser	Val	Ser	Glu	Met	Tyr	Val	Asp	Leu	Ser	Ser	Ser	
			260					265					270			
Leu	Ser	Tyr	Asn	Arg	Arg	Asn	Glu	Ser	Lys	Leu	Ile	Phe	Asp	Glu	Thr	
		275					280					285				
Ser	Lys	Ala	Asp	Thr	Lys	Ile	Leu	Pro	Lys	Val	Ser	Gln	Ser	Thr	Leu	
	290					295					300					
Thr	Ser	Ile	Pro	Lys	Val	Gln	Ala	Gln	Thr	Glu	His	Lys	Ser	Ile	Lys	
305					310					315					320	
Asn	Pro	Ser	Gln	Ala	Val	Thr	Glu	Glu	Thr	Tyr	Gln	Pro	Gln	Ala	Pro	
			325						330					335		
Lys	Lys	His	Arg	Phe	Lys	Met	Arg	Tyr	Leu	Ile	Leu	Leu	Ala	Ser	Leu	
			340					345					350			
Val	Leu	Val	Ala	Ala	Ser	Leu	Ile	Trp	Ile	Leu	Ser	Arg	Thr	Pro	Ala	
		355					360					365				
Thr	Ile	Ala	Ile	Pro	Asp	Val	Ala	Gly	Gln	Thr	Val	Ala	Glu	Ala	Lys	
	370					375					380					
Ala	Thr	Leu	Lys	Lys	Ala	Asn	Phe	Glu	Ile	Gly	Glu	Glu	Lys	Thr	Glu	
385					390					395					400	
Ala	Ser	Glu	Lys	Val	Glu	Glu	Gly	Arg	Ile	Ile	Arg	Thr	Asp	Pro	Gly	
				405					410					415		
Ala	Gly	Thr	Gly	Arg	Lys	Glu	Gly	Thr	Lys	Ile	Asn	Leu	Val	Val	Ser	
			420					425					430			
Ser	Gly	Lys	Gln	Ser	Phe	Gln	Ile	Ser	Asn	Tyr	Val	Gly	Arg	Lys	Ser	
		435					440					445				
Ser	Asp	Val	Ile	Ala	Glu	Leu	Lys	Glu	Lys	Lys	Val	Pro	Asp	Asn	Leu	
	450					455					460					
Ile	Lys	Ile	Glu	Glu	Glu	Glu	Ser	Asn	Glu	Ser	Glu	Ala	Gly	Thr	Val	
465					470					475					480	
Leu	Lys	Gln	Ser	Leu	Pro	Glu	Gly	Thr	Thr	Tyr	Asp	Leu	Ser	Lys	Ala	
				485					490					495		

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 225  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 11

<400> 225

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

Leu Ser Tyr Asn Arg Arg Asn Glu Ser Lys Leu Ile Phe Asp Glu Thr



275		280		285											
Ser	Lys	Ala	Asp	Thr	Lys	Thr	Leu	Pro	Lys	Val	Ser	Gln	Ser	Thr	Leu
290					295						300				
Thr	Ser	Ile	Pro	Lys	Val	Gln	Ala	Gln	Thr	Glu	His	Lys	Ser	Ile	Lys
305				310						315					320
Asn	Pro	Ser	Gln	Ala	Val	Thr	Glu	Glu	Thr	Tyr	Gln	Pro	Gln	Ala	Pro
			325						330					335	
Lys	Lys	His	Arg	Phe	Lys	Met	Arg	Tyr	Leu	Ile	Leu	Leu	Ala	Ser	Leu
			340					345					350		
Val	Leu	Val	Ala	Ala	Ser	Leu	Ile	Trp	Ile	Leu	Ser	Arg	Thr	Pro	Ala
	355						360					365			
Thr	Ile	Ala	Ile	Pro	Asp	Val	Ala	Gly	Gln	Thr	Val	Ala	Glu	Ala	Lys
370						375					380				
Ala	Thr	Leu	Lys	Lys	Ala	Asn	Phe	Glu	Ile	Gly	Glu	Glu	Lys	Thr	Glu
385					390					395					400
Ala	Ser	Glu	Lys	Val	Glu	Glu	Gly	Arg	Ile	Ile	Arg	Thr	Asp	Pro	Gly
			405						410					415	
Ala	Gly	Thr	Gly	Arg	Lys	Glu	Gly	Thr	Lys	Ile	Asn	Leu	Val	Val	Ser
			420					425					430		
Ser	Gly	Lys	Gln	Ser	Phe	Gln	Ile	Ser	Asn	Tyr	Val	Gly	Arg	Lys	Ser
	435						440					445			
Ser	Asp	Val	Ile	Ala	Glu	Leu	Lys	Glu	Lys	Lys	Val	Pro	Asp	Asn	Leu
450						455					460				
Ile	Lys	Ile	Glu	Glu	Glu	Glu	Ser	Asn	Glu	Ser	Glu	Ala	Gly	Thr	Val
465					470					475					480
Leu	Lys	Gln	Ser	Leu	Pro	Glu	Gly	Thr	Thr	Tyr	Asp	Leu	Ser	Lys	Ala
			485						490					495	
Thr	Gln	Ile	Val	Leu	Thr	Val	Ala	Lys	Lys	Ala	Thr	Thr	Ile	Gln	Leu
			500					505						510	
Gly	Asn	Tyr	Ile	Gly	Arg	Asn	Ser	Thr	Glu	Val	Ile	Ser	Glu	Leu	Lys
	515						520					525			

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 226  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 13

<400> 226

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys

305		310		315		320									
Asn	Pro	Ser	Gln	Ala	Val	Thr	Glu	Glu	Thr	Tyr	Gln	Pro	Gln	Ala	Pro
				325					330					335	
Lys	Lys	His	Arg	Phe	Lys	Met	Arg	Tyr	Leu	Ile	Leu	Leu	Ala	Ser	Leu
			340					345					350		
Val	Leu	Val	Ala	Ala	Ser	Leu	Ile	Trp	Ile	Leu	Ser	Arg	Thr	Pro	Ala
		355					360					365			
Thr	Ile	Ala	Ile	Pro	Asp	Val	Ala	Gly	Gln	Thr	Val	Ala	Glu	Ala	Lys
	370					375					380				
Ala	Thr	Leu	Lys	Lys	Ala	Asn	Phe	Glu	Ile	Gly	Glu	Glu	Lys	Thr	Glu
385					390					395					400
Ala	Ser	Glu	Lys	Val	Glu	Glu	Gly	Arg	Ile	Ile	Arg	Thr	Asp	Pro	Gly
				405					410					415	
Ala	Gly	Thr	Gly	Arg	Lys	Glu	Gly	Thr	Lys	Ile	Asn	Leu	Val	Val	Ser
			420					425					430		
Ser	Gly	Lys	Gln	Ser	Phe	Gln	Ile	Ser	Asn	Tyr	Val	Gly	Arg	Lys	Ser
		435					440					445			
Ser	Asp	Val	Ile	Ala	Glu	Leu	Lys	Glu	Lys	Lys	Val	Pro	Asp	Asn	Leu
	450					455					460				
Ile	Lys	Ile	Glu	Glu	Glu	Glu	Ser	Asn	Glu	Ser	Glu	Ala	Gly	Thr	Val
465					470					475					480
Leu	Lys	Gln	Ser	Leu	Pro	Glu	Gly	Thr	Thr	Tyr	Asp	Leu	Ser	Lys	Ala
				485					490					495	
Thr	Gln	Ile	Ile	Leu	Thr	Val	Ala	Lys	Lys	Ala	Thr	Thr	Ile	Gln	Leu
			500					505					510		
Gly	Asn	Tyr	Ile	Gly	Arg	Asn	Ser	Thr	Glu	Val	Ile	Ser	Glu	Leu	Lys
		515					520					525			
Gln	Lys	Lys	Val	Pro	Glu	Asn	Leu	Ile	Lys	Ile	Glu	Glu	Glu	Glu	Ser
	530					535					540				
Ser	Glu	Ser	Glu	Pro	Gly	Thr	Ile	Met	Lys	Gln	Ser	Pro	Gly	Ala	Gly
545					550					555					560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 227  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 16

<400> 227

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu

340

345

350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
 355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
 420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
 435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
 465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
 485 490 495

Thr Gln Ile Ile Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
 500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
 515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
 530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
 545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
 565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
 580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 228  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 17

<400> 228

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125



Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Thr Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

Thr Ile Ala Ile Pro Asp Val Ala Gly Gln Thr Val Ala Glu Ala Lys

370

375

380

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
 420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
 435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
 465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
 485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
 500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
 515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
 530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
 545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Ile Gln Ile Val Leu Thr Val Ala  
 565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
 580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
 595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
 610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 229  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 18

<400> 229

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

Ala Ser Glu Lys Val Glu Glu Gly Arg Ile Ile Arg Thr Asp Pro Gly

			405				410				415				
Ala	Gly	Thr	Gly 420	Arg	Lys	Glu	Gly	Thr 425	Lys	Ile	Asn	Leu	Val 430	Val	Ser
Ser	Gly	Lys 435	Gln	Ser	Phe	Gln	Ile 440	Ser	Asn	Tyr	Val	Gly 445	Arg	Lys	Ser
Ser	Asp 450	Val	Ile	Ala	Glu	Leu 455	Lys	Glu	Lys	Lys	Val 460	Pro	Asp	Asn	Leu
Ile 465	Lys	Ile	Glu	Glu	Glu 470	Glu	Ser	Asn	Glu	Ser 475	Glu	Ala	Gly	Thr	Val 480
Leu	Lys	Gln	Ser	Leu 485	Pro	Glu	Gly	Thr 490	Thr	Tyr	Asp	Leu	Ser	Lys	Ala
Thr	Gln	Ile 500	Val	Leu	Thr	Val	Ala	Lys 505	Lys	Ala	Thr	Thr	Ile 510	Gln	Leu
Gly	Asn 515	Tyr	Ile	Gly	Arg	Asn	Ser 520	Thr	Glu	Val	Ile	Ser 525	Glu	Leu	Lys
Gln	Lys 530	Lys	Val	Pro	Glu	Asn 535	Leu	Ile	Lys	Ile	Glu 540	Glu	Glu	Glu	Ser
Ser 545	Glu	Ser	Glu	Pro	Gly 550	Thr	Ile	Met	Lys	Gln 555	Ser	Pro	Gly	Ala	Gly 560
Thr	Thr	Tyr	Asp	Val 565	Ser	Lys	Pro	Thr	Gln 570	Ile	Val	Leu	Thr	Val 575	Ala
Lys	Lys	Val 580	Thr	Ser	Val	Ala	Met	Pro 585	Ser	Tyr	Ile	Gly 590	Ser	Ser	Leu
Glu	Phe	Thr 595	Lys	Asn	Asn	Leu	Ile 600	Gln	Ile	Val	Gly	Ile 605	Lys	Glu	Ala
Asn 610	Ile	Glu	Val	Val	Glu	Val 615	Thr	Thr	Ala	Pro	Ala 620	Gly	Ser	Ala	Glu
Gly 625	Met	Val	Val	Glu	Gln 630	Ser	Pro	Arg	Ala	Gly 635	Glu	Lys	Val	Asp	Leu 640
Asn	Lys	Thr	Arg 645	Val	Lys	Ile	Ser	Ile 650	Tyr	Lys	Pro	Lys	Thr	Thr 655	Ser

Ala Thr Pro

<210> 230  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 19

<400> 230

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Ala Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Phe Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser

435

440

445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
 465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
 485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
 500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
 515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
 530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
 545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
 565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
 580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
 595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
 610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
 625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
 645 650 655

Ala Thr Pro

<210> 231

<211> 659



<212> PRT

<213> Streptococcus pneumoniae CDC 20

<400> 231

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val

465		470		475		480									
Leu	Lys	Gln	Ser	Leu	Pro	Glu	Gly	Thr	Thr	Tyr	Asp	Leu	Ser	Lys	Ala
				485					490					495	
Thr	Gln	Ile	Val	Leu	Thr	Val	Ala	Lys	Lys	Ala	Thr	Thr	Ile	Gln	Leu
			500					505					510		
Gly	Asn	Tyr	Ile	Gly	Arg	Asn	Ser	Thr	Glu	Val	Ile	Ser	Glu	Leu	Lys
		515					520					525			
Gln	Lys	Lys	Val	Pro	Glu	Asn	Leu	Ile	Lys	Ile	Glu	Glu	Glu	Glu	Ser
	530					535					540				
Ser	Glu	Ser	Glu	Pro	Gly	Thr	Ile	Met	Lys	Gln	Ser	Pro	Gly	Ala	Gly
545					550					555					560
Thr	Thr	Tyr	Asp	Val	Ser	Lys	Pro	Thr	Gln	Ile	Val	Leu	Thr	Val	Ala
				565					570					575	
Lys	Lys	Val	Thr	Ser	Val	Ala	Met	Pro	Ser	Tyr	Ile	Gly	Ser	Ser	Leu
			580					585					590		
Glu	Phe	Thr	Lys	Asn	Asn	Leu	Ile	Gln	Ile	Val	Gly	Ile	Lys	Glu	Ala
		595					600					605			
Asn	Ile	Glu	Val	Val	Glu	Val	Thr	Thr	Ala	Pro	Ala	Gly	Ser	Ala	Glu
	610					615					620				
Gly	Met	Val	Val	Glu	Gln	Ser	Pro	Arg	Ala	Gly	Glu	Lys	Val	Asp	Leu
625					630					635					640
Asn	Lys	Thr	Arg	Val	Lys	Ile	Ser	Ile	Tyr	Lys	Pro	Lys	Thr	Thr	Ser
				645					650					655	
Ala Thr Pro															
<210> 232															
<211> 659															
<212> PRT															
<213> Streptococcus pneumoniae CDC 22															
<400> 232															
Met	Ile	Gln	Ile	Gly	Lys	Ile	Phe	Ala	Gly	Arg	Tyr	Arg	Ile	Val	Lys
1				5					10					15	

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Ser Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu

500

505

510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
 515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
 530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
 545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
 565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
 580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
 595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
 610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
 625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
 645 650 655

Ala Thr Pro

<210> 233

<211> 659

<212> PRT

<213> Streptococcus pneumoniae CDC 23

<400> 233

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
 1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
 20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
 35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser



530

535

540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 234

<211> 659

<212> PRT

<213> Streptococcus pneumoniae CDC 25

<400> 234

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala

565

570

575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 235

<211> 659

<212> PRT

<213> Streptococcus pneumoniae CDC 26

<400> 235

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln His Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Ala Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala

595

600

605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 236

<211> 659

<212> PRT

<213> Streptococcus pneumoniae CDC 28

<400> 236

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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



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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu

625		630		635		640									
Asn	Lys	Thr	Arg	Val	Lys	Ile	Ser	Ile	Tyr	Lys	Pro	Lys	Thr	Thr	Ser
				645					650					655	
Ala Thr Pro															
<210> 237															
<211> 659															
<212> PRT															
<213> Streptococcus pneumoniae CDC 33															
<400> 237															
Met	Ile	Gln	Ile	Gly	Lys	Ile	Phe	Ala	Gly	Arg	Tyr	Arg	Ile	Val	Lys
1				5					10					15	
Gln	Ile	Gly	Arg	Gly	Gly	Met	Ala	Asp	Val	Tyr	Leu	Ala	Lys	Asp	Leu
			20					25					30		
Ile	Leu	Asp	Gly	Glu	Glu	Val	Ala	Val	Lys	Val	Leu	Arg	Thr	Asn	Tyr
		35					40					45			
Gln	Thr	Asp	Pro	Ile	Ala	Val	Ala	Arg	Phe	Gln	Arg	Glu	Ala	Arg	Ala
	50					55					60				
Met	Ala	Asp	Leu	Asp	His	Pro	His	Ile	Val	Arg	Ile	Thr	Asp	Ile	Gly
65					70					75					80
Glu	Glu	Asp	Gly	Gln	Gln	Tyr	Leu	Ala	Met	Glu	Tyr	Val	Ala	Gly	Leu
			85						90					95	
Asp	Leu	Lys	Arg	Tyr	Ile	Lys	Glu	His	Tyr	Pro	Leu	Ser	Asn	Glu	Glu
			100					105					110		
Ala	Val	Arg	Ile	Met	Gly	Gln	Ile	Leu	Leu	Ala	Met	Arg	Leu	Ala	His
			115				120					125			
Thr	Arg	Gly	Ile	Val	His	Arg	Asp	Leu	Lys	Pro	Gln	Asn	Ile	Leu	Leu
	130					135					140				
Thr	Pro	Asp	Gly	Thr	Ala	Lys	Val	Thr	Asp	Phe	Gly	Ile	Ala	Val	Ala
145					150					155					160
Phe	Ala	Glu	Thr	Ser	Leu	Thr	Gln	Thr	Asn	Ser	Met	Leu	Gly	Ser	Val
				165					170					175	

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Leu Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 238  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 34

<400> 238

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 239  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 37

<400> 239

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Ser Ser Val Pro  
225 230 235 240



Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 240  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 38

<400> 240

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 241  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 39

<400> 241

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 242  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 41

<400> 242

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95



Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Ala Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 243  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 42

<400> 243

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 244  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 49

<400> 244

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640



Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 245  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 50

<400> 245

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 246  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 53

<400> 246

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Ile Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 247  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 55

<400> 247

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys

1	5	10	15																
Gln	Ile	Gly	Arg	Gly	Gly	Met	Ala	Asp	Val	Tyr	Leu	Ala	Lys	Asp	Leu				
			20					25					30						
Ile	Leu	Asp	Gly	Glu	Glu	Val	Ala	Val	Lys	Val	Leu	Arg	Thr	Asn	Tyr				
		35					40					45							
Gln	Thr	Asp	Pro	Ile	Ala	Val	Ala	Arg	Phe	Gln	Arg	Glu	Ala	Arg	Ala				
	50					55					60								
Met	Ala	Asp	Leu	Asp	His	Pro	His	Ile	Val	Arg	Ile	Thr	Asp	Ile	Gly				
65					70					75					80				
Glu	Glu	Asp	Gly	Gln	Gln	Tyr	Leu	Ala	Met	Glu	Tyr	Val	Ala	Gly	Leu				
				85					90					95					
Asp	Leu	Lys	Arg	Tyr	Ile	Lys	Glu	His	Tyr	Pro	Leu	Ser	Asn	Glu	Glu				
			100					105					110						
Ala	Val	Arg	Ile	Met	Gly	Gln	Ile	Leu	Leu	Ala	Met	Arg	Leu	Ala	His				
		115					120					125							
Thr	Arg	Gly	Ile	Val	His	Arg	Asp	Leu	Lys	Pro	Gln	Asn	Ile	Leu	Leu				
	130					135					140								
Thr	Pro	Asp	Gly	Thr	Ala	Lys	Val	Thr	Asp	Phe	Gly	Ile	Ala	Val	Ala				
145					150				155						160				
Phe	Ala	Glu	Thr	Ser	Leu	Thr	Gln	Thr	Asn	Ser	Met	Leu	Gly	Ser	Val				
				165					170					175					
His	Tyr	Leu	Ser	Pro	Glu	Gln	Ala	Arg	Gly	Ser	Lys	Ala	Thr	Val	Lys				
			180					185					190						
Ser	Asp	Ile	Tyr	Ala	Met	Gly	Ile	Ile	Phe	Tyr	Glu	Met	Leu	Thr	Gly				
		195					200					205							
His	Ile	Pro	Tyr	Asp	Gly	Asp	Ser	Ala	Val	Thr	Ile	Ala	Leu	Gln	His				
	210					215					220								
Phe	Gln	Lys	Pro	Leu	Pro	Ser	Val	Ile	Ala	Glu	Asn	Ser	Ser	Val	Pro				
225					230					235					240				
Gln	Ala	Leu	Glu	Asn	Val	Ile	Ile	Lys	Ala	Thr	Ala	Lys	Lys	Leu	Thr				
				245					250					255					

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495



Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 248  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 57

<400> 248

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

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

35

40

45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 249  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 58

<400> 249

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly

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

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Ile Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 250  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 60  
  
<400> 250

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu

100					105					110					
Ala	Val	Arg	Ile	Met	Gly	Gln	Ile	Leu	Leu	Ala	Met	Arg	Leu	Ala	His
		115					120					125			
Thr	Arg	Gly	Ile	Val	His	Arg	Asp	Leu	Lys	Pro	Gln	Asn	Ile	Leu	Leu
	130					135					140				
Thr	Pro	Asp	Gly	Thr	Ala	Lys	Val	Thr	Asp	Phe	Gly	Ile	Ala	Val	Ala
145					150					155					160
Phe	Ala	Glu	Thr	Ser	Leu	Thr	Gln	Thr	Asn	Ser	Met	Leu	Gly	Ser	Val
				165					170					175	
His	Tyr	Leu	Ser	Pro	Glu	Gln	Ala	Arg	Gly	Ser	Lys	Ala	Thr	Val	Gln
			180					185						190	
Ser	Asp	Ile	Tyr	Ala	Met	Gly	Ile	Ile	Phe	Tyr	Glu	Met	Leu	Thr	Gly
		195					200					205			
His	Ile	Pro	Tyr	Asp	Gly	Asp	Ser	Ala	Val	Thr	Ile	Ala	Leu	Gln	His
	210					215					220				
Phe	Gln	Lys	Pro	Leu	Pro	Ser	Val	Ile	Ala	Glu	Asn	Pro	Ser	Val	Pro
225					230					235					240
Gln	Ala	Leu	Glu	Asn	Val	Ile	Ile	Lys	Ala	Thr	Ala	Lys	Lys	Leu	Thr
				245					250					255	
Asn	Arg	Tyr	Arg	Ser	Val	Ser	Glu	Met	Tyr	Val	Asp	Leu	Ser	Ser	Ser
			260					265					270		
Leu	Ser	Tyr	Asn	Arg	Arg	Asn	Glu	Ser	Lys	Leu	Asn	Phe	Asp	Glu	Thr
		275					280					285			
Ser	Lys	Ala	Asp	Thr	Lys	Thr	Leu	Pro	Lys	Val	Ser	Gln	Ser	Thr	Leu
	290					295					300				
Thr	Ser	Ile	Pro	Lys	Val	Gln	Ala	Gln	Thr	Glu	His	Lys	Ser	Ile	Lys
305					310					315					320
Asn	Pro	Ser	Gln	Thr	Val	Thr	Glu	Glu	Thr	Tyr	Gln	Pro	Gln	Ala	Pro
				325					330					335	
Lys	Lys	His	Arg	Phe	Lys	Met	Arg	Tyr	Leu	Ile	Leu	Leu	Ala	Asn	Leu
			340					345					350		



Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 251  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 62

<400> 251

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu

130		135		140
Thr 145	Pro	Asp	Gly	Thr 150
	Ala	Lys	Val	Thr 155
				Phe 160
				Gly
				Ile
				Ala
				Val
				Ala
Phe	Ala	Glu	Thr	Ser 165
				Leu
				Thr
				Gln
				Thr
				Asn 170
				Ser
				Met
				Leu
				Gly
				Ser 175
				Val
His	Tyr	Leu	Ser	Pro 180
				Glu
				Gln
				Ala
				Arg
				Gly 185
				Ser
				Lys
				Ala
				Thr
				Val
				Gln
Ser	Asp	Ile	Tyr	Ala 195
				Met
				Gly
				Ile
				Ile
				Phe
				Tyr
				Glu
				Met
				Leu
				Thr
				Gly
His	Ile	Pro	Tyr	Asp 210
				Gly
				Asp
				Ser
				Ala
				Val
				Thr
				Ile
				Ala
				Leu
				Gln
				His
Phe	Gln	Lys	Pro	Leu 225
				Pro
				Ser
				Val
				Ile
				Ala
				Glu
				Asn
				Pro
				Ser
				Val
				Pro
Gln	Ala	Leu	Glu	Asn 245
				Val
				Ile
				Ile
				Lys
				Ala
				Thr
				Ala
				Lys
				Lys
				Leu
				Thr
Asn	Arg	Tyr	Arg	Ser 260
				Val
				Ser
				Glu
				Met
				Tyr
				Val
				Asp
				Leu
				Ser
				Ser
				Ser
Leu	Ser	Tyr	Asn	Arg 275
				Arg
				Asn
				Glu
				Ser
				Lys
				Leu
				Ile
				Phe
				Asp
				Glu
				Thr
Ser	Lys	Ala	Asp	Thr 290
				Lys
				Thr
				Leu
				Pro
				Lys
				Val
				Ser
				Gln
				Ser
				Thr
				Leu
Thr	Ser	Ile	Pro	Lys 305
				Val
				Gln
				Ala
				Gln
				Thr
				Glu
				His
				Lys
				Ser
				Ile
				Lys
Asn	Pro	Ser	Gln	Ala 325
				Val
				Thr
				Glu
				Glu
				Thr
				Tyr
				Gln
				Pro
				Gln
				Ala
				Pro
Lys	Lys	His	Arg	Phe 340
				Lys
				Met
				Arg
				Tyr
				Leu
				Ile
				Leu
				Leu
				Ala
				Ser
				Leu
Val	Leu	Val	Ala	Ala 355
				Ser
				Leu
				Ile
				Trp
				Ile
				Leu
				Ser
				Arg
				Thr
				Pro
				Ala
Thr	Ile	Ala	Ile	Pro 370
				Asp
				Val
				Ala
				Gly
				Gln
				Thr
				Val
				Ala
				Glu
				Ala
				Lys

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 252  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 65

<400> 252

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val

165

170

175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
 180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
 195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
 210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
 225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
 245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
 260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
 290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
 305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
 325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
 340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
 355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 253  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 66

<400> 253

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly



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

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

Ile Lys Ile Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Ala Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 254  
<211> 659  
<212> PRT

<213> Streptococcus pneumoniae CDC 67

<400> 254

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Ser Ser Val Pro

225		230		235		240									
Gln	Ala	Leu	Glu	Asn	Val	Ile	Ile	Lys	Ala	Thr	Ala	Lys	Lys	Leu	Thr
				245					250					255	
Asn	Arg	Tyr	Arg	Ser	Val	Ser	Glu	Met	Tyr	Val	Asp	Leu	Ser	Ser	Ser
			260					265					270		
Leu	Ser	Tyr	Asn	Arg	Arg	Asn	Glu	Ser	Lys	Leu	Ile	Phe	Asp	Glu	Thr
		275					280					285			
Ser	Lys	Ala	Asp	Thr	Lys	Thr	Leu	Pro	Lys	Val	Ser	Gln	Ser	Thr	Leu
	290					295					300				
Thr	Ser	Ile	Pro	Lys	Val	Gln	Ala	Gln	Thr	Glu	His	Lys	Ser	Ile	Lys
305					310					315					320
Asn	Pro	Ser	Gln	Ala	Val	Thr	Glu	Glu	Thr	Tyr	Gln	Pro	Gln	Ala	Pro
			325						330					335	
Lys	Lys	His	Arg	Phe	Lys	Met	Arg	Tyr	Leu	Ile	Leu	Leu	Ala	Ser	Leu
			340					345					350		
Val	Leu	Val	Ala	Ala	Ser	Leu	Ile	Trp	Ile	Leu	Ser	Arg	Thr	Pro	Ala
		355					360					365			
Thr	Ile	Ala	Ile	Pro	Asp	Val	Ala	Gly	Gln	Thr	Val	Ala	Glu	Ala	Lys
	370					375					380				
Ala	Thr	Leu	Lys	Lys	Ala	Asn	Phe	Glu	Ile	Gly	Glu	Glu	Lys	Thr	Glu
385					390					395					400
Ala	Ser	Glu	Lys	Val	Glu	Glu	Gly	Arg	Ile	Ile	Arg	Thr	Asp	Pro	Gly
				405					410					415	
Ala	Gly	Thr	Gly	Arg	Lys	Glu	Gly	Thr	Lys	Ile	Asn	Leu	Val	Val	Ser
			420					425					430		
Ser	Gly	Lys	Gln	Ser	Phe	Gln	Ile	Ser	Asn	Tyr	Val	Gly	Arg	Lys	Ser
		435					440					445			
Ser	Asp	Val	Ile	Ala	Glu	Leu	Lys	Glu	Lys	Lys	Val	Pro	Asp	Asn	Leu
	450					455					460				
Ile	Lys	Ile	Glu	Glu	Glu	Glu	Ser	Asn	Glu	Ser	Glu	Ala	Gly	Thr	Val
465					470					475					480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 255  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 68

<400> 255

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser

260

265

270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
 290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
 305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Ala Tyr Gln Pro Gln Ala Pro  
 325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
 340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
 355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
 420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
 435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
 465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
 485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
 500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Asn Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 256  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 69

<400> 256

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45



Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu

290

295

300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
 305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
 325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
 340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
 355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
 420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
 435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
 465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
 485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
 500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
 515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
 530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Lys Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 257  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 70

<400> 257

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Ser Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro

325

330

335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
 340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
 355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
 420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
 435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
 465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Ala Leu Ser Lys Ala  
 485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
 500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
 515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
 530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
 545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
 565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 258  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 71

<400> 258

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala

355

360

365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
 420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
 435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
 465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
 485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
 500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
 515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
 530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
 545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
 565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
 580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
 595 600 605



Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 259  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 74

<400> 259

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Ala Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

Ala Thr Leu Lys Lys Ala Asn Phe Glu Ile Gly Glu Glu Lys Thr Glu

385		390		395		400
Ala Ser Glu Lys Val Glu Glu Gly Arg Ile Ile Arg Thr Asp Pro Gly						
		405		410		415
Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser						
		420		425		430
Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser						
		435		440		445
Ser Asp Val Ile Ala Glu Leu Lys Glu Lys Lys Val Pro Asp Asn Leu						
		450		455		460
Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val						
		465		470		475
Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala						
		485		490		495
Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu						
		500		505		510
Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys						
		515		520		525
Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser						
		530		535		540
Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly						
		545		550		555
Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala						
		565		570		575
Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu						
		580		585		590
Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala						
		595		600		605
Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu						
		610		615		620
Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu						
		625		630		635
						640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 260  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 76

<400> 260

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Val Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser

420

425

430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
 435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
 465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
 485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
 500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
 515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
 530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
 545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
 565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
 580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
 595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
 610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
 625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
 645 650 655

Ala Thr Pro

<210> 261  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 77

<400> 261

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

Ser Asp Val Ile Ala Glu Leu Lys Glu Lys Lys Val Pro Asp Asn Leu



450

455

460

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
 465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Ala Leu Ser Lys Ala  
 485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
 500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
 515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
 530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
 545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
 565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
 580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
 595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
 610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Ile  
 625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
 645 650 655

Ala Thr Pro

<210> 262

<211> 659

<212> PRT

<213> Streptococcus pneumoniae CDC 78

<400> 262

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

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Ile Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

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

485

490

495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 263

<211> 659

<212> PRT

<213> Streptococcus pneumoniae CDC 80

<400> 263

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Ser Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys

515

520

525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 264  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 81

<400> 264

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300



Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Ala Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Asn Pro Gly Ala Gly

545                      550                      555                      560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
                                  565                                   570                                   575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
                                  580                                   585                                   590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
                                  595                                   600                                   605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
                                  610                                   615                                   620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
                                  625                                   630                                   635                                   640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
                                  645                                   650                                   655

Ala Thr Pro

<210> 265  
 <211> 659  
 <212> PRT  
 <213> Streptococcus pneumoniae CDC 83

<400> 265

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
  1                                   5                                   10                                   15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
                                  20                                   25                                   30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
                                  35                                   40                                   45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
                                  50                                   55                                   60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
  65                                   70                                   75                                   80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
                                  85                                   90                                   95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Ala Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu

580

585

590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
 595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
 610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
 625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
 645 650 655

Ala Thr Pro

<210> 266  
 <211> 659  
 <212> PRT  
 <213> Streptococcus pneumoniae CDC 84

<400> 266

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
 1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
 20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
 35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
 50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
 65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
 85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
 100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
 115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu

610

615

620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
 625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
 645 650 655

Ala Thr Pro

<210> 267  
 <211> 659  
 <212> PRT  
 <213> Streptococcus pneumoniae CDC 86

<400> 267

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
 1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
 20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
 35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
 50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
 65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
 85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
 100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
 115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
 130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
 145 150 155 160



Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ile  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser

645

650

655

Ala Thr Pro

&lt;210&gt; 268

&lt;211&gt; 659

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae CDC 89

&lt;400&gt; 268

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
 1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
 20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
 35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
 50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
 65 70 75 80

Glu Glu Asp Ser Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
 85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
 100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
 115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
 130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
 145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
 165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
 180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Ala Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Asn Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 269

<211> 658  
<212> PRT  
<213> Streptococcus pneumoniae CDC 93

<400> 269

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Leu Gln His Phe  
210 215 220

Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro Gln  
225 230 235 240

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

Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser Leu  
260 265 270

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

Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu Thr  
290 295 300

Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys Asn  
305 310 315 320

Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro Lys  
325 330 335

Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu Val  
340 345 350

Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala Thr  
355 360 365

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

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

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

Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser Ser  
420 425 430

Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser Ser  
435 440 445

Asp Val Ile Ala Glu Leu Lys Glu Lys Lys Val Pro Asp Asn Leu Ile  
450 455 460

Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val Leu  
465 470 475 480

Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala Thr  
485 490 495

Gln Ile Ile Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu Gly  
500 505 510

Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys Gln  
515 520 525

Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser Ser  
530 535 540

Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly Thr  
545 550 555 560

Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala Lys  
565 570 575

Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu Glu  
580 585 590

Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala Asn  
595 600 605

Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu Gly  
610 615 620

Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu Asn  
625 630 635 640

Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser Ala  
645 650 655

Thr Pro

<210> 270  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 95

<400> 270

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15



Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 271  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 100  
  
<400> 271

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 272  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 103

<400> 272

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560



Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 273  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 104  
  
<400> 273

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 274  
<211> 658  
<212> PRT  
<213> Streptococcus pneumoniae CDC 108

<400> 274

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

Asp Val Ile Ala Glu Leu Lys Glu Lys Lys Val Pro Asp Asn Leu Ile  
450 455 460

Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val Leu  
465 470 475 480

Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala Thr  
485 490 495

Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu Gly  
500 505 510

Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys Gln  
515 520 525

Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser Ser  
530 535 540

Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly Thr  
545 550 555 560

Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala Lys  
565 570 575

Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu Glu  
580 585 590

Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala Asn  
595 600 605

Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu Gly  
610 615 620

Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu Asn  
625 630 635 640

Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser Ala  
645 650 655

Thr Pro

<210> 275  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 109  
  
<400> 275

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Ser Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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



Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 276  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 110

<400> 276

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 277  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 111

<400> 277

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Ser Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 278  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 112

<400> 278

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu

20

25

30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
 35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
 50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
 65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
 85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
 100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
 115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
 130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
 145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
 165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
 180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
 195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
 210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
 225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
 245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
 260 265 270



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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 279  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 113

<400> 279

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala

50

55

60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Ile Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 280  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae CDC 115

<400> 280

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu

85

90

95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
 100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
 115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
 130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
 145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
 165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
 180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
 195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
 210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
 225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
 245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
 260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
 290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
 305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
 325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 281  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1293

<400> 281

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His



115					120					125						
Thr	Arg	Gly	Ile	Val	His	Arg	Asp	Leu	Lys	Pro	Gln	Asn	Ile	Leu	Leu	
130					135					140						
Thr	Pro	Asp	Gly	Thr	Ala	Lys	Val	Thr	Asp	Phe	Gly	Ile	Ala	Val	Ala	
145					150					155					160	
Phe	Ala	Glu	Thr	Ser	Leu	Thr	Gln	Thr	Asn	Ser	Met	Leu	Gly	Ser	Val	
165					170					175						
His	Tyr	Leu	Ser	Pro	Glu	Gln	Ala	Arg	Gly	Ser	Lys	Ala	Thr	Val	Gln	
180					185					190						
Ser	Asp	Ile	Tyr	Ala	Met	Gly	Ile	Ile	Phe	Tyr	Glu	Met	Leu	Thr	Gly	
195					200					205						
His	Ile	Pro	Tyr	Asp	Gly	Asp	Ser	Ala	Val	Thr	Ile	Ala	Leu	Gln	His	
210					215					220						
Phe	Gln	Lys	Pro	Leu	Pro	Ser	Val	Ile	Ala	Glu	Asn	Pro	Ser	Val	Pro	
225					230					235					240	
Gln	Ala	Leu	Glu	Asn	Val	Ile	Ile	Lys	Ala	Thr	Ala	Lys	Lys	Leu	Thr	
245					250					255						
Asn	Arg	Tyr	Arg	Ser	Val	Ser	Glu	Met	Tyr	Val	Asp	Leu	Ser	Ser	Ser	
260					265					270						
Leu	Ser	Tyr	Asn	Arg	Arg	Asn	Glu	Ser	Lys	Leu	Ile	Phe	Asp	Glu	Thr	
275					280					285						
Ser	Lys	Ala	Asp	Thr	Lys	Thr	Leu	Pro	Lys	Val	Ser	Gln	Ser	Thr	Leu	
290					295					300						
Thr	Ser	Ile	Pro	Lys	Val	Gln	Ala	Gln	Thr	Glu	His	Lys	Ser	Ile	Lys	
305					310					315					320	
Asn	Pro	Ser	Gln	Ala	Val	Thr	Glu	Glu	Thr	Tyr	Gln	Pro	Gln	Ala	Pro	
325					330					335						
Lys	Lys	His	Arg	Phe	Lys	Met	Arg	Tyr	Leu	Ile	Leu	Leu	Ala	Ser	Leu	
340					345					350						
Val	Leu	Val	Ala	Ala	Ser	Leu	Ile	Trp	Ile	Leu	Ser	Arg	Thr	Pro	Ala	
355					360					365						

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 282  
<211> 644  
<212> PRT  
<213> Streptococcus pneumoniae I-33

<400> 282

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala

145		150		155		160									
Phe	Ala	Glu	Thr	Ser	Leu	Thr	Gln	Thr	Asn	Ser	Met	Leu	Gly	Ser	Val
				165					170					175	
His	Tyr	Leu	Ser	Pro	Glu	Gln	Ala	Arg	Gly	Ser	Lys	Ala	Thr	Phe	Gln
			180					185					190		
Ser	Asp	Ile	Tyr	Ala	Met	Gly	Ile	Ile	Phe	Tyr	Glu	Met	Leu	Thr	Gly
		195					200					205			
His	Ile	Pro	Tyr	Asp	Gly	Asp	Ser	Ala	Val	Thr	Ile	Ala	Leu	Gln	His
	210					215					220				
Phe	Gln	Lys	Pro	Leu	Pro	Ser	Val	Ile	Ala	Glu	Asn	Pro	Ser	Val	Pro
225					230					235					240
Gln	Ala	Leu	Glu	Asn	Val	Val	Ile	Lys	Ala	Thr	Ala	Lys	Lys	Leu	Ser
				245					250					255	
Asp	Arg	Tyr	Gln	Ser	Val	Ser	Glu	Met	Tyr	Val	Asp	Leu	Ser	Thr	Ser
			260					265					270		
Leu	Ser	Tyr	Asn	Arg	Arg	Asn	Glu	Pro	Lys	Leu	Val	Phe	Asp	Asp	Ala
		275					280					285			
Ser	Lys	Ala	Asp	Thr	Lys	Thr	Leu	Pro	Lys	Val	Pro	Gln	Ser	Thr	Leu
	290					295					300				
Thr	Ser	Ile	Pro	Lys	Ala	Pro	Ala	Gln	Glu	Glu	Arg	Pro	Gln	Pro	Lys
305					310					315					320
Lys	Pro	Thr	Gln	Pro	Val	Ala	Glu	Pro	Ala	Pro	Ala	Pro	Lys	Pro	Ala
				325					330					335	
Lys	Lys	Arg	Lys	Phe	Lys	Ala	Arg	Tyr	Met	Ile	Leu	Leu	Ala	Ser	Leu
			340					345					350		
Leu	Leu	Val	Ala	Ala	Ser	Leu	Val	Trp	Ile	Leu	Ser	Arg	Thr	Pro	Ala
		355					360					365			
Thr	Ile	Ala	Ile	Pro	Asp	Val	Ala	Gly	Gln	Thr	Val	Ala	Glu	Ala	Lys
	370					375					380				
Glu	Ala	Leu	Lys	Lys	Ser	Lys	Phe	Glu	Ala	Gly	Glu	Glu	Lys	Ser	Glu
385					390					395					400

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

Ala Gly Ser Gly Arg Lys Glu Gly Thr Lys Val Asn Leu Ile Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Leu Ser Asn Tyr Val Gly Arg Lys Tyr  
435 440 445

Thr Asp Val Val Ala Glu Leu Lys Glu Lys Lys Val Pro Glu Asn Leu  
450 455 460

Ile Lys Met Glu Glu Glu Glu Ser Ser Glu Ser Glu Pro Gly Thr Val  
465 470 475 480

Leu Arg Gln Thr Pro Ala Ser Gly Ser Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Thr Ile Thr Leu Thr Val Ala Lys Lys Val Thr Ser Val Ser Met  
500 505 510

Pro Asn Tyr Ile Gly Ser Ser Leu Glu Phe Thr Lys Asn Asn Leu Thr  
515 520 525

Gln Ile Val Gly Val Lys Glu Ala Asn Ile Glu Val Val Glu Val Ser  
530 535 540

Asn Ala Pro Glu Gly Thr Ala Glu Gly Thr Val Val Ser Gln Thr Pro  
545 550 555 560

Arg Ala Gly Glu Leu Val Asp Leu Ala Ser Thr Arg Ile Lys Leu Ser  
565 570 575

Ile Tyr Lys Pro Lys Thr Pro Pro Ser Thr Ser Ser Ser Asn Pro Ala  
580 585 590

Gln Arg Gly Asn Gln Gly Ser Pro Thr Ser Pro Thr Gln Gly Asn Gln  
595 600 605

Gln Gly Asn Gln Gln Gly Asn Gln Gln Gly Asn Asn Pro Pro Thr Asn  
610 615 620

Gln Pro Val Arg Arg Phe Val Cys Tyr Thr Pro Glu Gln Cys Ser Ala  
625 630 635 640

Arg Asp Met Ser

<210> 283  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1319

<400> 283

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly

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

Ser Asp Val Ile Ser Glu Leu Lys Glu Lys Lys Val Pro Asp Asn Leu  
450 455 460

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 284  
<211> 659  
<212> PRT



<213> Streptococcus pneumoniae Pj-1321

<400> 284

Met Ser Pro Phe Arg Tyr Ile Phe Val Gly Phe Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

His Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala His Leu Asn His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro

225		230		235		240									
Gln	Ala	Leu	Glu	Asn	Val	Ile	Ile	Lys	Ala	Thr	Ala	Lys	Lys	Leu	Thr
				245					250					255	
Asn	Arg	Tyr	Arg	Ser	Val	Ser	Glu	Met	Tyr	Val	Asp	Leu	Ser	Ser	Ser
			260					265					270		
Leu	Ser	Tyr	Asn	Arg	Arg	Asn	Glu	Ser	Lys	Leu	Ile	Phe	Asp	Glu	Thr
		275					280					285			
Ser	Lys	Ala	Asp	Thr	Lys	Thr	Leu	Pro	Lys	Val	Ser	Gln	Ser	Thr	Leu
	290					295					300				
Thr	Ser	Ile	Pro	Lys	Val	Gln	Ala	Gln	Thr	Glu	His	Lys	Ser	Ile	Lys
305					310					315					320
Asn	Pro	Ser	Gln	Ala	Val	Ile	Glu	Glu	Thr	Tyr	Gln	Pro	Gln	Ala	Pro
			325						330					335	
Lys	Lys	His	Arg	Phe	Lys	Met	Arg	Tyr	Leu	Ile	Leu	Leu	Ala	Ser	Leu
			340					345					350		
Val	Leu	Val	Ala	Ala	Ser	Leu	Ile	Trp	Ile	Leu	Ser	Arg	Thr	Pro	Ala
	355						360					365			
Thr	Ile	Ala	Ile	Pro	Asp	Val	Ala	Gly	Gln	Thr	Val	Ala	Glu	Ala	Lys
	370					375					380				
Ala	Thr	Leu	Lys	Lys	Ala	Asn	Phe	Glu	Ile	Gly	Glu	Glu	Lys	Thr	Glu
385					390					395					400
Ala	Ser	Glu	Lys	Val	Glu	Glu	Gly	Arg	Ile	Ile	Arg	Thr	Asp	Pro	Gly
				405					410					415	
Ala	Gly	Thr	Gly	Arg	Lys	Glu	Gly	Thr	Lys	Ile	Asn	Leu	Val	Val	Ser
			420					425					430		
Ser	Gly	Lys	Gln	Ser	Phe	Gln	Ile	Ser	Asn	Tyr	Val	Gly	Arg	Lys	Ser
		435					440					445			
Ser	Asp	Val	Ile	Ala	Glu	Leu	Lys	Glu	Lys	Lys	Val	Pro	Asp	Asn	Leu
	450					455					460				
Ile	Lys	Ile	Glu	Glu	Glu	Glu	Ser	Asn	Glu	Ser	Glu	Ala	Gly	Thr	Val
465					470					475					480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 285  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1241

<400> 285

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser

260

265

270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
 290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
 305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
 325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
 340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
 355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
 420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
 435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
 465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
 485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
 500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Val Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 286  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1296

<400> 286

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Val Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu

290					295					300						
Thr	Ser	Ile	Pro	Lys	Val	Gln	Ala	Gln	Thr	Glu	His	Lys	Ser	Ile	Lys	
305					310					315					320	
Asn	Pro	Ser	Gln	Ala	Val	Thr	Glu	Glu	Thr	Tyr	Gln	Pro	Gln	Ala	Pro	
				325					330					335		
Lys	Lys	His	Arg	Phe	Lys	Met	Arg	Tyr	Leu	Ile	Leu	Leu	Ala	Ser	Leu	
			340					345					350			
Val	Leu	Val	Ala	Ala	Ser	Leu	Ile	Trp	Ile	Leu	Ser	Arg	Thr	Pro	Ala	
		355					360					365				
Thr	Ile	Ala	Ile	Pro	Asp	Val	Ala	Gly	Gln	Thr	Val	Ala	Glu	Ala	Lys	
	370					375					380					
Glu	Thr	Leu	Lys	Lys	Ala	Asn	Phe	Glu	Ile	Gly	Glu	Glu	Lys	Thr	Glu	
385					390					395					400	
Ala	Ser	Glu	Lys	Val	Glu	Glu	Gly	Arg	Ile	Ile	Arg	Thr	Asp	Pro	Gly	
				405					410					415		
Ala	Gly	Thr	Gly	Arg	Lys	Glu	Gly	Thr	Lys	Ile	Asn	Leu	Val	Val	Ser	
			420					425					430			
Ser	Gly	Lys	Gln	Ser	Phe	Gln	Ile	Ser	Asn	Tyr	Val	Gly	Arg	Lys	Ser	
		435					440					445				
Ser	Asp	Val	Ile	Ala	Glu	Leu	Lys	Glu	Lys	Lys	Val	Pro	Asp	Asn	Leu	
	450					455					460					
Ile	Lys	Ile	Glu	Glu	Glu	Glu	Ser	Asn	Glu	Ser	Glu	Ala	Gly	Thr	Val	
465					470					475					480	
Leu	Lys	Gln	Ser	Leu	Pro	Glu	Gly	Thr	Thr	Tyr	Asp	Leu	Ser	Lys	Ala	
				485				490						495		
Thr	Gln	Ile	Val	Leu	Thr	Val	Ala	Lys	Lys	Ala	Thr	Thr	Ile	Gln	Leu	
			500					505					510			
Gly	Asn	Tyr	Ile	Gly	Arg	Asn	Ser	Thr	Glu	Val	Ile	Ser	Glu	Leu	Lys	
		515					520					525				
Gln	Lys	Lys	Val	Pro	Glu	Asn	Leu	Ile	Lys	Ile	Glu	Glu	Glu	Glu	Ser	
	530					535					540					



Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 287  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1466

<400> 287

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Val Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro

				325						330						335
Lys	Lys	His	Arg	Phe	Lys	Met	Arg	Tyr	Leu	Ile	Leu	Leu	Ala	Ser	Leu	
			340					345					350			
Val	Leu	Val	Ala	Ala	Ser	Leu	Ile	Trp	Ile	Leu	Ser	Arg	Thr	Pro	Ala	
		355					360					365				
Thr	Ile	Ala	Ile	Pro	Asp	Val	Ala	Gly	Gln	Thr	Val	Ala	Glu	Ala	Lys	
	370					375					380					
Glu	Thr	Leu	Lys	Lys	Ala	Asn	Phe	Glu	Ile	Gly	Glu	Glu	Lys	Thr	Glu	
385					390					395					400	
Ala	Ser	Glu	Lys	Val	Glu	Glu	Gly	Arg	Ile	Ile	Arg	Thr	Asp	Pro	Gly	
				405					410					415		
Ala	Gly	Thr	Gly	Arg	Lys	Glu	Gly	Thr	Lys	Ile	Asn	Leu	Val	Val	Ser	
			420					425					430			
Ser	Gly	Lys	Gln	Ser	Phe	Gln	Ile	Ser	Asn	Tyr	Val	Gly	Arg	Lys	Ser	
		435					440					445				
Ser	Asp	Val	Ile	Ala	Glu	Leu	Lys	Glu	Lys	Lys	Val	Pro	Asp	Asn	Leu	
	450					455					460					
Ile	Lys	Ile	Glu	Glu	Glu	Glu	Ser	Asn	Glu	Ser	Glu	Ala	Gly	Thr	Val	
465					470					475					480	
Leu	Lys	Gln	Ser	Leu	Pro	Glu	Gly	Thr	Thr	Tyr	Asp	Leu	Ser	Lys	Ala	
				485					490					495		
Thr	Gln	Ile	Val	Leu	Thr	Val	Ala	Lys	Lys	Ala	Thr	Thr	Ile	Gln	Leu	
			500					505					510			
Gly	Asn	Tyr	Ile	Gly	Arg	Asn	Ser	Thr	Glu	Val	Ile	Ser	Glu	Leu	Lys	
		515					520					525				
Gln	Lys	Lys	Val	Pro	Glu	Asn	Leu	Ile	Lys	Ile	Glu	Glu	Glu	Glu	Ser	
	530					535					540					
Ser	Glu	Ser	Glu	Pro	Gly	Thr	Ile	Met	Lys	Gln	Ser	Pro	Gly	Ala	Gly	
545					550					555					560	
Thr	Thr	Tyr	Asp	Val	Ser	Lys	Pro	Thr	Gln	Ile	Val	Leu	Thr	Val	Ala	
				565					570					575		

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 288  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-615

<400> 288

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala

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

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 289  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1255

<400> 289

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

Ala Thr Leu Lys Lys Ala Asn Phe Glu Ile Gly Glu Glu Lys Thr Glu



385		390		395		400
Ala Ser Glu Lys Val Glu Glu Gly Arg Ile Ile Arg Thr Asp Pro Gly						
		405		410		415
Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser						
		420		425		430
Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser						
		435		440		445
Ser Asp Val Ile Ala Glu Leu Lys Glu Lys Lys Val Pro Asp Asn Leu						
		450		455		460
Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val						
		465		470		475
				480		
Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala						
		485		490		495
Thr Gln Ile Ile Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu						
		500		505		510
Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys						
		515		520		525
Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser						
		530		535		540
Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly						
		545		550		555
				560		
Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala						
		565		570		575
Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu						
		580		585		590
Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala						
		595		600		605
Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu						
		610		615		620
Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu						
		625		630		635
				640		

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 290  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1410

<400> 290

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser

420

425

430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
 435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
 465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
 485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
 500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
 515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
 530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
 545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
 565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
 580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
 595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
 610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
 625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
 645 650 655

Ala Thr Pro

<210> 291  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1374

<400> 291

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

Ser Asp Val Ile Ala Glu Leu Lys Glu Lys Lys Val Pro Asp Asn Leu

450

455

460

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
 465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
 485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
 500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
 515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
 530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
 545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
 565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
 580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
 595 600 605

Asn Ile Glu Val Ile Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
 610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
 625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
 645 650 655

Ala Thr Pro

<210> 292

<211> 659

<212> PRT

<213> Streptococcus pneumoniae Pj02-912

<400> 292

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



Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

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

485

490

495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 293

<211> 659

<212> PRT

<213> Streptococcus pneumoniae Pj-1364

<400> 293

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Asp Leu Lys

515

520

525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
 530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
 545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
 565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
 580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
 595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
 610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
 625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
 645 650 655

Ala Thr Pro

<210> 294  
 <211> 659  
 <212> PRT  
 <213> Streptococcus pneumoniae Pj-1445

<400> 294

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
 1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
 20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
 35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
 50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Ala Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly

545                      550                      555                      560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
                                  565                                   570                                   575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
                                  580                                   585                                   590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
                                  595                                   600                                   605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
                                  610                                   615                                   620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
                                  625                                   630                                   635                                   640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
                                  645                                   650                                   655

Ala Thr Pro

<210> 295  
 <211> 659  
 <212> PRT  
 <213> Streptococcus pneumoniae Pj-3

<400> 295

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
  1                                   5                                   10                                   15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
                                  20                                   25                                   30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
                                  35                                   40                                   45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
                                  50                                   55                                   60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
  65                                   70                                   75                                   80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
                                  85                                   90                                   95



Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Ala Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu

580

585

590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 296  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-2449

<400> 296

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu

610

615

620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
 625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
 645 650 655

Ala Thr Pro

<210> 297  
 <211> 659  
 <212> PRT  
 <213> Streptococcus pneumoniae Pj-1874

<400> 297

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
 1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
 20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
 35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
 50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
 65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
 85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
 100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
 115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
 130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
 145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser



645

650

655

Ala Thr Pro

&lt;210&gt; 298

&lt;211&gt; 659

&lt;212&gt; PRT

&lt;213&gt; Streptococcus pneumoniae Pj-2129

&lt;400&gt; 298

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
 1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
 20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
 35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
 50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
 65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
 85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
 100 105 110

Val Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
 115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
 130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
 145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
 165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
 180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 299

<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-2245

<400> 299

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Ile Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 300  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-132

<400> 300

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495



Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 301  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1327  
  
<400> 301

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

Ser Asp Val Ile Ser Glu Leu Lys Glu Lys Lys Val Pro Asp Asn Leu  
450 455 460

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 302  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1498

<400> 302

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 303  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1329

<400> 303

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350



Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 304  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1494

<400> 304

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 305  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae RP-2896  
  
<400> 305

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

Ser Asp Val Ile Ser Glu Leu Lys Glu Lys Lys Val Pro Asp Asn Leu  
450 455 460

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 306  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-362

<400> 306

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205



His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 307  
<211> 633  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1291

<400> 307

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Phe Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Val Ile Lys Ala Thr Ala Lys Lys Leu Ser  
245 250 255

Asp Arg Tyr Gln Ser Val Ser Glu Met Tyr Val Asp Leu Ser Thr Ser  
260 265 270

Leu Ser Tyr Asn Arg Arg Asn Glu Pro Lys Leu Val Phe Asp Asp Ala  
275 280 285

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Pro Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Ala Pro Ala Gln Glu Glu Arg Pro Gln Pro Lys  
305 310 315 320

Lys Pro Thr Gln Pro Val Ala Glu Pro Ala Pro Ala Pro Lys Pro Ala  
325 330 335

Lys Lys Arg Lys Phe Lys Ala Arg Tyr Met Ile Leu Leu Ala Ser Leu  
340 345 350

Leu Leu Val Ala Ala Ser Leu Val Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

Glu Ala Leu Lys Lys Ser Lys Phe Glu Ala Gly Glu Glu Lys Ser Glu  
385 390 395 400

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

Ala Gly Ser Gly Arg Lys Glu Gly Thr Lys Val Asn Leu Ile Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Leu Ser Asn Tyr Val Gly Arg Lys Tyr  
435 440 445

Thr Asp Val Val Ala Glu Leu Lys Glu Lys Lys Val Pro Glu Asn Leu  
450 455 460

Ile Lys Met Glu Glu Glu Glu Ser Asn Glu Ser Glu Pro Gly Ile Val  
465 470 475 480

Leu Arg Gln Thr Pro Ala Ser Gly Ser Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Thr Ile Thr Leu Thr Val Ala Lys Lys Val Thr Ser Val Ser Met  
500 505 510

Pro Asn Tyr Ile Gly Ser Ser Leu Glu Phe Thr Lys Asn Asn Leu Thr  
515 520 525

Gln Ile Val Gly Val Lys Glu Ala Asn Ile Glu Val Val Glu Val Ser  
530 535 540

Thr Ala Pro Glu Gly Thr Ala Glu Gly Thr Val Val Asn Gln Thr Pro  
545 550 555 560

Arg Ala Gly Glu Gln Val Asp Leu Ala Ser Thr Arg Ile Lys Leu Ser  
565 570 575

Ile Tyr Lys Pro Lys Thr Pro Pro Ser Thr Ser Ser Ser Asn Pro Ala  
580 585 590

Gln Arg Gly Asn Gln Gly Ser Pro Thr Ser Pro Asn Gln Gly Asn Gln  
595 600 605

Gln Gly Asn Gln Gln Gly Asn Thr Pro Ser Ser Ser His Pro Ile Ser  
610 615 620

Ile Arg Cys Ala Asn Asn Ala Gly Ala  
625 630

<210> 308  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1248

<400> 308

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala

50

55

60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 309  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-2250

<400> 309

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu



85

90

95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
 100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
 115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
 130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
 145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
 165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
 180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
 195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
 210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
 225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
 245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
 260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
 290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
 305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
 325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Ala Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 310  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae I-59

<400> 310

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His

115					120					125						
Thr	Arg	Gly	Ile	Val	His	Arg	Asp	Leu	Lys	Pro	Gln	Asn	Ile	Leu	Leu	
130					135					140						
Thr	Pro	Asp	Gly	Thr	Ala	Lys	Val	Thr	Asp	Phe	Gly	Ile	Ala	Val	Ala	
145					150					155					160	
Phe	Ala	Glu	Thr	Ser	Leu	Thr	Gln	Thr	Asn	Ser	Met	Leu	Gly	Ser	Val	
165					170					175						
His	Tyr	Leu	Ser	Pro	Glu	Gln	Ala	Arg	Gly	Ser	Lys	Ala	Thr	Val	Gln	
180					185					190						
Ser	Asp	Ile	Tyr	Ala	Met	Gly	Ile	Ile	Phe	Tyr	Glu	Met	Leu	Thr	Gly	
195					200					205						
His	Ile	Pro	Tyr	Asp	Gly	Asp	Ser	Ala	Val	Thr	Ile	Ala	Leu	Gln	His	
210					215					220						
Phe	Gln	Lys	Pro	Leu	Pro	Ser	Val	Ile	Ala	Glu	Asn	Pro	Ser	Val	Pro	
225					230					235					240	
Gln	Ala	Leu	Glu	Asn	Val	Ile	Ile	Lys	Ala	Thr	Ala	Lys	Lys	Leu	Thr	
245					250					255						
Asn	Arg	Tyr	Arg	Ser	Val	Ser	Glu	Met	Tyr	Val	Asp	Leu	Ser	Ser	Ser	
260					265					270						
Leu	Ser	Tyr	Asn	Arg	Arg	Asn	Glu	Ser	Lys	Leu	Ile	Phe	Asp	Glu	Thr	
275					280					285						
Ser	Lys	Ala	Asp	Thr	Lys	Thr	Leu	Pro	Lys	Val	Ser	Gln	Ser	Thr	Leu	
290					295					300						
Thr	Ser	Ile	Pro	Lys	Val	Gln	Ala	Gln	Thr	Glu	His	Lys	Ser	Ile	Lys	
305					310					315					320	
Asn	Pro	Ser	Gln	Ala	Val	Thr	Glu	Glu	Thr	Tyr	Gln	Pro	Gln	Ala	Pro	
325					330					335						
Lys	Lys	His	Arg	Phe	Lys	Met	Arg	Tyr	Leu	Ile	Leu	Leu	Ala	Ser	Leu	
340					345					350						
Val	Leu	Val	Ala	Ala	Ser	Leu	Ile	Trp	Ile	Leu	Ser	Arg	Thr	Pro	Ala	
355					360					365						

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Ile Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 311  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1857

<400> 311

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala

145		150		155		160									
Phe	Ala	Glu	Thr	Ser	Leu	Thr	Gln	Thr	Asn	Ser	Met	Leu	Gly	Ser	Val
				165					170					175	
His	Tyr	Leu	Ser	Pro	Glu	Gln	Ala	Arg	Gly	Ser	Lys	Ala	Thr	Val	Gln
			180					185					190		
Ser	Asp	Ile	Tyr	Ala	Met	Gly	Ile	Ile	Phe	Tyr	Glu	Met	Leu	Thr	Gly
		195					200					205			
His	Ile	Pro	Tyr	Asp	Gly	Asp	Ser	Ala	Val	Thr	Ile	Ala	Leu	Gln	His
	210					215					220				
Phe	Gln	Lys	Pro	Leu	Pro	Ser	Val	Ile	Ala	Glu	Asn	Pro	Ser	Val	Pro
225					230					235					240
Gln	Ala	Leu	Glu	Asn	Val	Ile	Ile	Lys	Ala	Thr	Ala	Lys	Lys	Leu	Thr
				245					250					255	
Asn	Arg	Tyr	Arg	Ser	Val	Ser	Glu	Met	Tyr	Val	Asp	Leu	Ser	Ser	Ser
			260					265					270		
Leu	Ser	Tyr	Asn	Arg	Arg	Asn	Glu	Ser	Lys	Leu	Ile	Phe	Asp	Glu	Thr
		275					280					285			
Ser	Lys	Ala	Asp	Thr	Lys	Thr	Leu	Pro	Lys	Val	Ser	Gln	Ser	Thr	Leu
	290					295					300				
Thr	Ser	Ile	Pro	Lys	Val	Gln	Ala	Gln	Thr	Glu	His	Lys	Ser	Ile	Lys
305					310					315					320
Asn	Pro	Ser	Gln	Ala	Val	Thr	Glu	Glu	Thr	Tyr	Gln	Pro	Gln	Ala	Pro
			325						330					335	
Lys	Lys	His	Arg	Phe	Lys	Met	Arg	Tyr	Leu	Ile	Leu	Leu	Ala	Ser	Leu
			340					345					350		
Val	Leu	Leu	Ala	Ala	Ser	Leu	Ile	Trp	Ile	Leu	Ser	Arg	Thr	Pro	Ala
		355					360					365			
Thr	Ile	Ala	Ile	Pro	Asp	Val	Ala	Gly	Gln	Thr	Val	Ala	Glu	Ala	Lys
	370					375					380				
Ala	Thr	Leu	Lys	Lys	Ala	Asn	Phe	Glu	Ile	Gly	Glu	Glu	Lys	Thr	Glu
385					390					395					400

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640



Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 312  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1287  
  
<400> 312

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln

180

185

190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
 195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
 210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
 225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
 245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
 260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
 290 295 300

Thr Ser Ile Pro Lys Ala Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
 305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
 325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu  
 340 345 350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
 355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
 420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 313  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1283

<400> 313

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His

210						215						220					
Phe	Gln	Lys	Pro	Leu	Pro	Ser	Val	Ile	Ala	Glu	Asn	Ser	Ser	Val	Pro		
225					230					235					240		
Gln	Ala	Leu	Glu	Asn	Val	Ile	Ile	Lys	Ala	Thr	Ala	Lys	Lys	Leu	Thr		
				245					250					255			
Asn	Arg	Tyr	Arg	Ser	Val	Ser	Glu	Met	Tyr	Val	Asp	Leu	Ser	Ser	Ser		
			260					265					270				
Leu	Ser	Tyr	Asn	Arg	Arg	Asn	Glu	Ser	Lys	Leu	Ile	Phe	Asp	Glu	Thr		
		275					280					285					
Ser	Lys	Ala	Asp	Thr	Lys	Thr	Leu	Pro	Lys	Val	Ser	Gln	Ser	Thr	Leu		
	290						295				300						
Thr	Ser	Ile	Pro	Lys	Val	Gln	Ala	Gln	Thr	Glu	His	Lys	Ser	Ile	Lys		
305					310					315					320		
Asn	Pro	Ser	Gln	Ala	Val	Thr	Glu	Glu	Thr	Tyr	Gln	Pro	Gln	Ala	Pro		
			325						330					335			
Lys	Lys	His	Arg	Phe	Lys	Met	Arg	Tyr	Leu	Ile	Leu	Leu	Ala	Ser	Leu		
			340					345					350				
Val	Leu	Val	Ala	Ala	Ser	Leu	Ile	Trp	Ile	Leu	Ser	Arg	Thr	Pro	Ala		
		355					360					365					
Thr	Ile	Ala	Ile	Pro	Asp	Val	Ala	Gly	Gln	Thr	Val	Ala	Glu	Ala	Lys		
	370					375					380						
Ala	Thr	Leu	Lys	Lys	Ala	Asn	Phe	Glu	Ile	Gly	Glu	Glu	Lys	Thr	Glu		
385					390					395					400		
Ala	Ser	Glu	Lys	Val	Glu	Glu	Gly	Arg	Ile	Ile	Arg	Thr	Asp	Pro	Gly		
				405					410					415			
Ala	Gly	Thr	Gly	Arg	Lys	Glu	Gly	Thr	Lys	Ile	Asn	Leu	Val	Val	Ser		
			420					425					430				
Ser	Gly	Lys	Gln	Ser	Phe	Gln	Ile	Ser	Asn	Tyr	Val	Gly	Arg	Lys	Ser		
		435					440					445					
Ser	Asp	Val	Ile	Ala	Glu	Leu	Lys	Glu	Lys	Lys	Val	Pro	Asp	Asn	Leu		
	450					455					460						

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Ala Leu Ser Lys Ala  
485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 314  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1176  
  
<400> 314

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr

				245						250						255
Asn	Arg	Tyr	Arg	Ser	Val	Ser	Glu	Met	Tyr	Val	Asp	Leu	Ser	Ser	Ser	
			260					265					270			
Leu	Ser	Tyr	Asn	Arg	Arg	Asn	Glu	Ser	Lys	Leu	Ile	Phe	Asp	Glu	Thr	
		275					280					285				
Ser	Lys	Ala	Asp	Thr	Lys	Thr	Leu	Pro	Lys	Val	Ser	Gln	Ser	Thr	Leu	
	290					295					300					
Thr	Ser	Ile	Pro	Lys	Val	Gln	Ala	Gln	Thr	Glu	His	Lys	Ser	Ile	Lys	
305					310					315					320	
Asn	Pro	Ser	Gln	Ala	Val	Thr	Glu	Glu	Thr	Tyr	Gln	Pro	Gln	Ala	Pro	
			325						330					335		
Lys	Lys	His	Arg	Phe	Lys	Met	Arg	Tyr	Leu	Ile	Leu	Leu	Ala	Ser	Leu	
			340					345					350			
Val	Leu	Val	Ala	Ala	Ser	Leu	Ile	Trp	Ile	Leu	Ser	Arg	Thr	Pro	Ala	
		355					360					365				
Thr	Ile	Ala	Ile	Pro	Asp	Val	Ala	Gly	Gln	Thr	Val	Ala	Glu	Ala	Lys	
	370					375					380					
Ala	Thr	Leu	Lys	Lys	Ala	Asn	Phe	Glu	Ile	Gly	Glu	Glu	Lys	Thr	Glu	
385					390					395					400	
Ala	Ser	Glu	Lys	Val	Glu	Glu	Gly	Arg	Ile	Ile	Arg	Thr	Asp	Pro	Gly	
				405					410					415		
Ala	Gly	Thr	Gly	Arg	Lys	Glu	Gly	Thr	Lys	Ile	Asn	Leu	Val	Val	Ser	
			420					425					430			
Ser	Gly	Lys	Gln	Ser	Phe	Gln	Ile	Ser	Asn	Tyr	Val	Gly	Arg	Lys	Ser	
		435					440					445				
Ser	Asp	Val	Ile	Ala	Glu	Leu	Lys	Glu	Lys	Lys	Val	Pro	Asp	Asn	Leu	
	450					455					460					
Ile	Lys	Ile	Glu	Glu	Glu	Glu	Ser	Asn	Glu	Ser	Glu	Ala	Gly	Thr	Val	
465					470					475					480	
Leu	Lys	Gln	Ser	Leu	Pro	Glu	Gly	Thr	Thr	Tyr	Asp	Leu	Ser	Lys	Ala	
				485					490					495		



Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Val Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 315  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1322

<400> 315

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

Leu Ser Tyr Asn Arg Arg Asn Glu Ser Lys Leu Ile Phe Asp Glu Thr

275					280					285					
Ser	Lys	Ala	Asp	Thr	Lys	Thr	Leu	Pro	Lys	Val	Ser	Gln	Ser	Thr	Leu
290						295				300					
Thr	Ser	Ile	Pro	Lys	Val	Gln	Ala	Gln	Thr	Glu	His	Lys	Ser	Ile	Lys
305				310						315				320	
Asn	Pro	Ser	Gln	Ala	Val	Thr	Glu	Glu	Thr	Tyr	Gln	Pro	Gln	Ala	Pro
				325				330						335	
Lys	Lys	His	Arg	Phe	Lys	Met	Arg	Tyr	Leu	Ile	Leu	Leu	Ala	Ser	Leu
		340						345				350			
Val	Leu	Val	Ala	Ala	Ser	Leu	Ile	Trp	Ile	Leu	Ser	Arg	Thr	Pro	Ala
355						360						365			
Thr	Ile	Ala	Ile	Pro	Asp	Val	Ala	Gly	Gln	Thr	Val	Ala	Glu	Ala	Lys
370						375				380					
Ala	Thr	Leu	Lys	Lys	Ala	Asn	Phe	Glu	Ile	Gly	Glu	Glu	Lys	Thr	Glu
385				390						395				400	
Ala	Ser	Glu	Lys	Val	Glu	Glu	Gly	Arg	Ile	Ile	Arg	Thr	Asp	Pro	Gly
				405				410						415	
Ala	Gly	Thr	Gly	Arg	Lys	Glu	Gly	Thr	Lys	Ile	Asn	Leu	Val	Val	Ser
		420						425				430			
Ser	Gly	Lys	Gln	Ser	Phe	Gln	Ile	Ser	Asn	Tyr	Val	Gly	Arg	Lys	Ser
435						440				445					
Ser	Asp	Val	Ile	Ala	Glu	Leu	Lys	Glu	Lys	Lys	Val	Pro	Asp	Asn	Leu
450						455				460					
Ile	Lys	Ile	Glu	Glu	Glu	Glu	Ser	Asn	Glu	Ser	Glu	Ala	Gly	Thr	Val
465				470						475				480	
Leu	Lys	Gln	Ser	Leu	Pro	Glu	Gly	Thr	Thr	Tyr	Ala	Leu	Ser	Lys	Ala
				485				490						495	
Thr	Gln	Ile	Val	Leu	Thr	Val	Ala	Lys	Lys	Ala	Thr	Thr	Ile	Gln	Leu
		500						505				510			
Gly	Asn	Tyr	Ile	Gly	Arg	Asn	Ser	Thr	Glu	Val	Ile	Ser	Glu	Leu	Lys
515						520				525					

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 316  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-1369

<400> 316

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Pro Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys

305		310		315		320									
Asn	Pro	Ser	Gln	Ala	Val	Thr	Glu	Glu	Thr	Tyr	Gln	Pro	Gln	Ala	Pro
			325						330					335	
Lys	Lys	His	Arg	Phe	Lys	Met	Arg	Tyr	Leu	Ile	Leu	Leu	Ala	Ser	Leu
			340					345					350		
Val	Leu	Val	Ala	Ala	Ser	Leu	Ile	Trp	Ile	Leu	Ser	Arg	Thr	Pro	Ala
		355					360					365			
Thr	Ile	Ala	Ile	Pro	Asp	Val	Ala	Gly	Gln	Thr	Val	Ala	Glu	Ala	Lys
	370					375					380				
Ala	Thr	Leu	Lys	Lys	Ala	Asn	Phe	Glu	Ile	Gly	Glu	Glu	Lys	Thr	Glu
385					390					395					400
Ala	Ser	Glu	Lys	Val	Glu	Glu	Gly	Arg	Ile	Ile	Arg	Thr	Asp	Pro	Gly
				405					410					415	
Ala	Gly	Thr	Gly	Arg	Lys	Glu	Gly	Thr	Lys	Ile	Asn	Leu	Val	Val	Ser
			420					425					430		
Ser	Gly	Lys	Gln	Ser	Phe	Gln	Ile	Ser	Asn	Tyr	Val	Gly	Arg	Lys	Ser
		435					440					445			
Ser	Asp	Val	Ile	Ala	Glu	Leu	Lys	Glu	Lys	Lys	Val	Pro	Asp	Asn	Leu
	450					455					460				
Ile	Lys	Ile	Glu	Glu	Glu	Glu	Ser	Asn	Glu	Ser	Glu	Ala	Gly	Thr	Val
465					470					475					480
Leu	Lys	Gln	Ser	Leu	Pro	Glu	Gly	Thr	Thr	Tyr	Asp	Leu	Ser	Lys	Ala
				485					490					495	
Thr	Gln	Ile	Ile	Leu	Thr	Val	Ala	Lys	Lys	Ala	Thr	Thr	Ile	Gln	Leu
			500					505					510		
Gly	Asn	Tyr	Ile	Gly	Arg	Asn	Ser	Thr	Glu	Val	Ile	Ser	Glu	Leu	Lys
		515					520					525			
Gln	Lys	Lys	Val	Pro	Glu	Asn	Leu	Ile	Lys	Ile	Glu	Glu	Glu	Glu	Ser
	530					535					540				
Ser	Glu	Ser	Glu	Pro	Gly	Thr	Ile	Met	Lys	Gln	Ser	Pro	Gly	Ala	Gly
545					550					555					560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 317  
<211> 659  
<212> PRT  
<213> Streptococcus pneumoniae Pj-2185

<400> 317

Met Ile Gln Ile Gly Lys Ile Phe Ala Gly Arg Tyr Arg Ile Val Lys  
1 5 10 15

Gln Ile Gly Arg Gly Gly Met Ala Asp Val Tyr Leu Ala Lys Asp Leu  
20 25 30

Ile Leu Asp Gly Glu Glu Val Ala Val Lys Val Leu Arg Thr Asn Tyr  
35 40 45

Gln Thr Asp Pro Ile Ala Val Ala Arg Phe Gln Arg Glu Ala Arg Ala  
50 55 60

Met Ala Asp Leu Asp His Pro His Ile Val Arg Ile Thr Asp Ile Gly  
65 70 75 80

Glu Glu Asp Gly Gln Gln Tyr Leu Ala Met Glu Tyr Val Ala Gly Leu  
85 90 95

Asp Leu Lys Arg Tyr Ile Lys Glu His Tyr Pro Leu Ser Asn Glu Glu  
100 105 110

Ala Val Arg Ile Met Gly Gln Ile Leu Leu Ala Met Arg Leu Ala His  
115 120 125

Thr Arg Gly Ile Val His Arg Asp Leu Lys Pro Gln Asn Ile Leu Leu  
130 135 140

Thr Pro Asp Gly Thr Ala Lys Val Thr Asp Phe Gly Ile Ala Val Ala  
145 150 155 160

Phe Ala Glu Thr Ser Leu Thr Gln Thr Asn Ser Met Leu Gly Ser Val  
165 170 175

His Tyr Leu Ser Pro Glu Gln Ala Arg Gly Ser Lys Ala Thr Val Gln  
180 185 190

Ser Asp Ile Tyr Ala Met Gly Ile Ile Phe Tyr Glu Met Leu Thr Gly  
195 200 205

His Ile Pro Tyr Asp Gly Asp Ser Ala Val Thr Ile Ala Leu Gln His  
210 215 220

Phe Gln Lys Pro Leu Pro Ser Val Ile Ala Glu Asn Ser Ser Val Pro  
225 230 235 240

Gln Ala Leu Glu Asn Val Ile Ile Lys Ala Thr Ala Lys Lys Leu Thr  
245 250 255

Asn Arg Tyr Arg Ser Val Ser Glu Met Tyr Val Asp Leu Ser Ser Ser  
260 265 270

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

Ser Lys Ala Asp Thr Lys Thr Leu Pro Lys Val Ser Gln Ser Thr Leu  
290 295 300

Thr Ser Ile Pro Lys Val Gln Ala Gln Thr Glu His Lys Ser Ile Lys  
305 310 315 320

Asn Pro Ser Gln Ala Val Thr Glu Glu Thr Tyr Gln Pro Gln Ala Pro  
325 330 335

Lys Lys His Arg Phe Lys Met Arg Tyr Leu Ile Leu Leu Ala Ser Leu



340

345

350

Val Leu Val Ala Ala Ser Leu Ile Trp Ile Leu Ser Arg Thr Pro Ala  
 355 360 365

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

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

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

Ala Gly Thr Gly Arg Lys Glu Gly Thr Lys Ile Asn Leu Val Val Ser  
 420 425 430

Ser Gly Lys Gln Ser Phe Gln Ile Ser Asn Tyr Val Gly Arg Lys Ser  
 435 440 445

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

Ile Lys Ile Glu Glu Glu Glu Ser Asn Glu Ser Glu Ala Gly Thr Val  
 465 470 475 480

Leu Lys Gln Ser Leu Pro Glu Gly Thr Thr Tyr Asp Leu Ser Lys Ala  
 485 490 495

Thr Gln Ile Val Leu Thr Val Ala Lys Lys Ala Thr Thr Ile Gln Leu  
 500 505 510

Gly Asn Tyr Ile Gly Arg Asn Ser Thr Glu Val Ile Ser Glu Leu Lys  
 515 520 525

Gln Lys Lys Val Pro Glu Asn Leu Ile Lys Ile Glu Glu Glu Glu Ser  
 530 535 540

Ser Glu Ser Glu Pro Gly Thr Ile Met Lys Gln Ser Pro Gly Ala Gly  
 545 550 555 560

Thr Thr Tyr Asp Val Ser Lys Pro Thr Gln Ile Val Leu Thr Val Ala  
 565 570 575

Lys Lys Val Thr Ser Val Ala Met Pro Ser Tyr Ile Gly Ser Ser Leu  
 580 585 590

Glu Phe Thr Lys Asn Asn Leu Ile Gln Ile Val Gly Ile Lys Glu Ala  
595 600 605

Asn Ile Glu Val Val Glu Val Thr Thr Ala Pro Ala Gly Ser Ala Glu  
610 615 620

Gly Met Val Val Glu Gln Ser Pro Arg Ala Gly Glu Lys Val Asp Leu  
625 630 635 640

Asn Lys Thr Arg Val Lys Ile Ser Ile Tyr Lys Pro Lys Thr Thr Ser  
645 650 655

Ala Thr Pro

<210> 318  
<211> 309  
<212> PRT  
<213> Streptococcus pneumoniae CDC 5

<400> 318

Met Lys Lys Leu Gly Thr Leu Leu Val Leu Phe Leu Ser Ala Ile Ile  
1 5 10 15

Leu Val Ala Cys Ala Ser Gly Lys Lys Asp Thr Thr Ser Gly Gln Lys  
20 25 30

Leu Lys Val Val Ala Thr Asn Ser Ile Ile Ala Asp Ile Thr Lys Asn  
35 40 45

Ile Ala Gly Asp Lys Ile Asp Leu His Ser Ile Val Pro Ile Gly Gln  
50 55 60

Asp Pro His Glu Tyr Glu Pro Leu Pro Glu Asp Val Lys Lys Thr Ser  
65 70 75 80

Glu Ala Asp Leu Ile Phe Tyr Asn Gly Ile Asn Leu Glu Thr Gly Gly  
85 90 95

Asn Ala Trp Phe Thr Lys Leu Val Glu Asn Ala Lys Lys Thr Glu Asn  
100 105 110

Lys Asp Tyr Phe Ala Val Ser Asp Gly Val Asp Val Ile Tyr Leu Glu  
115 120 125

Gly Gln Asn Glu Lys Gly Lys Glu Asp Pro His Ala Trp Leu Asn Leu  
130 135 140

Glu Asn Gly Ile Ile Phe Ala Lys Asn Ile Ala Lys Gln Leu Ser Ala  
145 150 155 160

Lys Asp Pro Asn Asn Lys Glu Phe Tyr Glu Lys Asn Leu Lys Glu Tyr  
165 170 175

Thr Asp Lys Leu Asp Lys Leu Asp Lys Glu Ser Lys Asp Lys Phe Asn  
180 185 190

Lys Ile Pro Ala Glu Lys Lys Leu Ile Val Thr Ser Glu Gly Ala Phe  
195 200 205

Lys Tyr Phe Ser Lys Ala Tyr Gly Val Pro Ser Ala Tyr Ile Trp Glu  
210 215 220

Ile Asn Thr Glu Ala Glu Gly Thr Pro Glu Gln Ile Lys Thr Leu Val  
225 230 235 240

Glu Lys Leu Arg Gln Thr Lys Val Pro Ser Leu Phe Val Glu Ser Ser  
245 250 255

Val Asp Asp Arg Pro Met Lys Thr Val Ser Gln Asp Thr Asn Ile Pro  
260 265 270

Ile Tyr Ala Gln Ile Phe Thr Asp Ser Ile Ala Glu Gln Gly Lys Glu  
275 280 285

Gly Asp Ser Tyr Tyr Ser Met Met Lys Tyr Asn Leu Asp Lys Ile Ala  
290 295 300

Glu Gly Leu Ala Lys  
305

<210> 319  
<211> 309  
<212> PRT  
<213> Streptococcus pneumoniae CDC 8

<400> 319

Met Lys Lys Leu Gly Thr Leu Leu Val Leu Phe Leu Ser Ala Ile Ile  
1 5 10 15

Leu Val Ala Cys Ala Ser Gly Lys Lys Asp Thr Thr Ser Gly Gln Lys  
20 25 30

Leu Lys Val Val Ala Thr Asn Ser Ile Ile Ala Asp Ile Thr Lys Asn  
35 40 45

Ile Ala Gly Asp Lys Ile Asp Leu His Ser Ile Val Pro Ile Gly Gln  
50 55 60

Asp Pro His Glu Tyr Glu Pro Leu Pro Glu Asp Val Lys Lys Thr Ser  
65 70 75 80

Glu Ala Asp Leu Ile Phe Tyr Asn Gly Ile Asn Leu Glu Thr Gly Gly  
85 90 95

Asn Ala Trp Phe Thr Lys Leu Val Glu Asn Ala Lys Lys Thr Glu Asn  
100 105 110

Lys Asp Tyr Phe Ala Val Ser Asp Gly Val Asp Val Ile Tyr Leu Glu  
115 120 125

Gly Gln Asn Glu Lys Gly Lys Glu Asp Pro His Ala Trp Leu Asn Leu  
130 135 140

Glu Asn Gly Ile Ile Phe Ala Lys Asn Ile Ala Lys Gln Leu Ser Ala  
145 150 155 160

Lys Asp Pro Asn Asn Lys Glu Phe Tyr Glu Lys Asn Leu Lys Glu Tyr  
165 170 175

Thr Asp Lys Leu Asp Lys Leu Asp Lys Glu Ser Lys Asp Lys Phe Asn  
180 185 190

Lys Ile Pro Ala Glu Lys Lys Leu Ile Val Thr Ser Glu Gly Ala Phe  
195 200 205

Lys Tyr Phe Ser Lys Ala Tyr Gly Val Pro Ser Ala Tyr Ile Trp Glu  
210 215 220

Ile Asn Thr Glu Lys Glu Gly Thr Pro Glu Gln Ile Lys Thr Leu Val  
225 230 235 240

Glu Lys Leu Arg Gln Thr Lys Val Pro Ser Leu Phe Val Glu Ser Ser  
245 250 255

Val Asp Asp Arg Pro Met Lys Thr Val Ser Gln Asp Thr Asn Ile Pro  
260 265 270

Ile Tyr Ala Gln Ile Phe Thr Asp Ser Ile Ala Glu Gln Gly Lys Glu  
275 280 285

Gly Asp Ser Tyr Tyr Ser Met Met Lys Tyr Asn Leu Asp Lys Ile Ala  
290 295 300

Glu Gly Leu Ala Lys  
305

<210> 320  
<211> 309  
<212> PRT  
<213> Streptococcus pneumoniae CDC 12

<400> 320

Met Lys Lys Leu Gly Thr Leu Leu Val Leu Phe Leu Ser Ala Ile Ile  
1 5 10 15

Leu Val Ala Cys Ala Ser Gly Lys Lys Asp Thr Thr Ser Gly Gln Lys  
20 25 30

Leu Lys Val Val Ala Thr Asn Ser Ile Ile Ala Asp Ile Thr Lys Asn  
35 40 45

Ile Ala Gly Asp Lys Ile Asp Leu His Ser Ile Val Pro Ile Gly Gln  
50 55 60

Asp Pro His Glu Tyr Glu Pro Leu Pro Glu Asp Val Lys Lys Thr Ser  
65 70 75 80

Glu Ala Asn Leu Ile Phe Tyr Asn Gly Ile Asn Leu Glu Thr Gly Gly  
85 90 95

Asn Ala Trp Phe Thr Lys Leu Val Glu Asn Ala Lys Lys Thr Glu Asn  
100 105 110

Lys Asp Tyr Phe Ala Val Ser Asp Gly Val Asp Val Ile Tyr Leu Glu  
115 120 125

Gly Gln Asn Glu Lys Gly Lys Glu Asp Pro His Ala Trp Leu Asn Leu  
130 135 140

Glu Asn Gly Ile Ile Phe Ala Lys Asn Ile Ala Lys Gln Leu Ser Ala  
145 150 155 160

Lys Asp Pro Asn Asn Lys Glu Phe Tyr Glu Lys Asn Leu Lys Glu Tyr

165

170

175

Thr Asp Lys Leu Asp Lys Leu Asp Lys Glu Ser Lys Asp Lys Phe Asn  
 180 185 190

Lys Ile Pro Ala Glu Lys Lys Leu Ile Val Thr Ser Glu Gly Ala Phe  
 195 200 205

Lys Tyr Phe Ser Lys Ala Tyr Gly Val Pro Ser Ala Tyr Ile Trp Glu  
 210 215 220

Ile Asn Thr Glu Lys Glu Gly Thr Pro Glu Gln Ile Lys Thr Leu Val  
 225 230 235 240

Glu Lys Leu Arg Gln Thr Lys Val Pro Ser Leu Phe Val Glu Ser Ser  
 245 250 255

Val Asp Asp Arg Pro Met Lys Thr Val Ser Gln Asp Thr Asn Ile Pro  
 260 265 270

Ile Tyr Ala Gln Ile Phe Thr Asp Ser Ile Ala Glu Gln Gly Lys Glu  
 275 280 285

Gly Asp Ser Tyr Tyr Ser Met Met Lys Tyr Asn Leu Asp Lys Ile Ala  
 290 295 300

Glu Gly Leu Ala Lys  
 305

<210> 321  
 <211> 309  
 <212> PRT  
 <213> Streptococcus pneumoniae CDC 33

<400> 321

Met Lys Lys Leu Gly Thr Leu Leu Val Leu Phe Leu Ser Ala Ile Ile  
 1 5 10 15

Leu Val Ala Cys Ala Ser Gly Lys Lys Ala Thr Thr Ser Gly Gln Lys  
 20 25 30

Leu Lys Val Val Ala Thr Asn Ser Ile Ile Ala Asp Ile Thr Lys Asn  
 35 40 45

Ile Ala Gly Asp Lys Ile Asp Leu His Ser Ile Val Pro Ile Gly Gln  
 50 55 60

Asp Pro His Glu Tyr Glu Pro Leu Pro Glu Asp Val Lys Lys Thr Ser  
65 70 75 80

Glu Ala Asp Leu Ile Phe Tyr Asn Gly Ile Asn Leu Glu Thr Gly Gly  
85 90 95

Asn Ala Trp Phe Thr Lys Leu Val Glu Asn Ala Lys Lys Thr Glu Asn  
100 105 110

Lys Asp Tyr Phe Ala Val Ser Asp Gly Val Asp Val Ile Tyr Leu Glu  
115 120 125

Gly Gln Asn Glu Lys Gly Lys Glu Asp Pro His Ala Trp Leu Asn Leu  
130 135 140

Glu Asn Gly Ile Ile Phe Ala Lys Asn Ile Ala Lys Gln Leu Ser Ala  
145 150 155 160

Lys Asp Pro Asn Asn Lys Glu Phe Tyr Glu Lys Asn Leu Lys Glu Tyr  
165 170 175

Thr Asp Lys Leu Asp Lys Leu Asp Lys Glu Ser Lys Asp Lys Phe Asn  
180 185 190

Lys Ile Pro Ala Glu Lys Lys Leu Ile Val Thr Ser Glu Gly Ala Phe  
195 200 205

Lys Tyr Phe Ser Lys Ala Tyr Gly Val Pro Ser Ala Tyr Ile Trp Glu  
210 215 220

Ile Asn Thr Glu Glu Glu Gly Thr Pro Glu Gln Ile Lys Thr Leu Val  
225 230 235 240

Glu Lys Leu Arg Gln Thr Lys Val Pro Ser Leu Phe Val Glu Ser Ser  
245 250 255

Val Asp Asp Arg Pro Met Lys Thr Val Ser Gln Asp Thr Asn Ile Pro  
260 265 270

Ile Tyr Ala Gln Ile Phe Thr Asp Ser Ile Ala Glu Gln Gly Lys Glu  
275 280 285

Gly Asp Ser Tyr Tyr Ser Met Met Lys Tyr Asn Leu Asp Lys Ile Ala  
290 295 300

Glu Gly Leu Ala Lys  
305

<210> 322  
<211> 309  
<212> PRT  
<213> Streptococcus pneumoniae CDC 36

<400> 322

Met Lys Lys Leu Gly Thr Leu Leu Val Leu Phe Leu Ser Val Ile Ala  
1 5 10 15

Leu Val Ala Cys Ala Ser Gly Lys Lys Asp Ala Ala Ser Gly Gln Lys  
20 25 30

Leu Lys Val Val Ala Thr Asn Ser Ile Ile Ala Asp Ile Thr Lys Asn  
35 40 45

Ile Ala Gly Asp Lys Ile Asp Leu His Ser Ile Val Pro Val Gly Gln  
50 55 60

Asp Pro His Glu Tyr Glu Pro Leu Pro Glu Asp Val Lys Lys Thr Ser  
65 70 75 80

Glu Ala Asp Leu Ile Phe Tyr Asn Gly Ile Asn Leu Glu Thr Gly Gly  
85 90 95

Asn Ala Trp Phe Thr Lys Leu Val Glu Asn Ala Lys Lys Thr Glu Asn  
100 105 110

Lys Asp Tyr Phe Ala Val Ser Glu Gly Val Asp Val Ile Tyr Leu Glu  
115 120 125

Gly Lys Asn Glu Lys Gly Lys Glu Asp Pro His Ala Trp Leu Asn Leu  
130 135 140

Glu Asn Gly Ile Ile Phe Ala Lys Asn Ile Ala Lys Gln Leu Ser Ala  
145 150 155 160

Lys Asp Pro Ser Asn Lys Glu Phe Tyr Glu Lys Asn Leu Lys Glu Tyr  
165 170 175

Thr Asp Lys Leu Asp Lys Leu Asp Lys Glu Ala Lys Ala Lys Phe Asn  
180 185 190

Asn Ile Pro Ala Glu Lys Lys Leu Ile Val Thr Ser Glu Gly Cys Phe  
195 200 205



Lys Tyr Phe Ser Lys Ala Tyr Gly Val Pro Ser Ala Tyr Ile Trp Glu  
210 215 220

Ile Asn Thr Glu Glu Glu Gly Thr Pro Glu Gln Ile Lys Thr Leu Val  
225 230 235 240

Glu Lys Leu Arg Gln Thr Lys Val Pro Ser Leu Phe Val Glu Ser Ser  
245 250 255

Val Asp Asp Arg Pro Met Lys Thr Val Ser Gln Asp Thr Asn Ile Pro  
260 265 270

Ile Tyr Ala Gln Ile Phe Thr Asp Ser Ile Ala Glu Gln Gly Lys Glu  
275 280 285

Gly Asp Ser Tyr Tyr Asn Met Met Lys Tyr Asn Leu Asp Lys Ile Ala  
290 295 300

Glu Gly Leu Ala Lys  
305

<210> 323  
<211> 309  
<212> PRT  
<213> Streptococcus pneumoniae CDC 38

<400> 323

Met Lys Lys Leu Gly Thr Leu Leu Val Leu Phe Leu Ser Ala Ile Ile  
1 5 10 15

Leu Val Ala Cys Ala Ser Gly Lys Lys Ala Thr Thr Ser Gly Gln Lys  
20 25 30

Leu Lys Val Val Ala Thr Asn Ser Ile Ile Ala Asp Ile Thr Lys Asn  
35 40 45

Ile Ala Gly Asp Lys Ile Asp Leu His Ser Ile Val Pro Ile Gly Gln  
50 55 60

Asp Pro His Glu Tyr Glu Pro Leu Pro Glu Asp Val Lys Lys Thr Ser  
65 70 75 80

Glu Ala Asp Leu Ile Phe Tyr Asn Gly Ile Asn Leu Glu Thr Gly Gly  
85 90 95

Asn Ala Trp Phe Thr Lys Leu Val Glu Asn Ala Lys Lys Thr Glu Asn  
100 105 110

Lys Asp Tyr Phe Ala Val Ser Asp Gly Val Asp Val Ile Tyr Leu Glu  
115 120 125

Gly Gln Asn Glu Lys Gly Lys Glu Asp Pro His Ala Trp Leu Asn Leu  
130 135 140

Glu Asn Gly Ile Ile Phe Ala Lys Asn Ile Ala Lys Gln Leu Ser Ala  
145 150 155 160

Lys Asp Pro Asn Asn Lys Glu Phe Tyr Glu Lys Asn Leu Lys Glu Tyr  
165 170 175

Thr Asp Lys Leu Asp Lys Leu Asp Lys Glu Ser Lys Asp Lys Phe Asn  
180 185 190

Lys Ile Pro Ala Glu Lys Lys Leu Ile Val Thr Ser Glu Gly Ala Phe  
195 200 205

Lys Tyr Phe Ser Lys Ala Tyr Gly Val Pro Ser Ala Tyr Ile Trp Glu  
210 215 220

Ile Asn Thr Glu Glu Glu Gly Thr Pro Glu Gln Ile Lys Thr Leu Val  
225 230 235 240

Glu Lys Leu Arg Gln Thr Lys Val Pro Ser Leu Phe Val Glu Ser Ser  
245 250 255

Val Asp Asp Arg Pro Met Lys Thr Val Ser Gln Asp Thr Asn Ile Pro  
260 265 270

Ile Tyr Ala Gln Ile Phe Thr Asp Ser Ile Ala Glu Gln Gly Lys Glu  
275 280 285

Gly Asp Ser Tyr Tyr Ser Met Met Lys Tyr Asn Leu Asp Lys Ile Ala  
290 295 300

Glu Gly Leu Ala Lys  
305

<210> 324  
<211> 309  
<212> PRT  
<213> Streptococcus pneumoniae CDC 56

<400> 324

Met Lys Lys Leu Gly Thr Leu Leu Val Leu Phe Leu Ser Ala Ile Ile  
1 5 10 15

Leu Val Ala Cys Ala Ser Gly Lys Lys Asp Thr Thr Ser Gly Gln Lys  
20 25 30

Leu Lys Val Val Ala Thr Asn Ser Ile Ile Ala Asp Ile Thr Lys Asn  
35 40 45

Ile Ala Gly Asp Lys Ile Asp Leu His Ser Ile Val Pro Ile Gly Gln  
50 55 60

Asp Pro His Glu Tyr Glu Pro Leu Pro Glu Asp Val Lys Lys Thr Ser  
65 70 75 80

Glu Ala Asp Leu Ile Phe Tyr Asn Gly Ile Asn Leu Glu Thr Gly Gly  
85 90 95

Asn Ala Trp Phe Thr Lys Leu Val Glu Asn Ala Lys Lys Thr Glu Asn  
100 105 110

Lys Asp Tyr Phe Ala Val Ser Asp Gly Val Asp Val Ile Tyr Leu Glu  
115 120 125

Gly Gln Asn Glu Lys Gly Lys Glu Asp Pro His Ala Trp Leu Asn Leu  
130 135 140

Glu Asn Gly Ile Ile Phe Ala Lys Asn Ile Ala Lys Gln Leu Ser Ala  
145 150 155 160

Lys Asp Pro Asn Asn Lys Glu Phe Tyr Glu Lys Asn Leu Lys Glu Tyr  
165 170 175

Thr Asp Lys Leu Asp Lys Leu Asp Lys Glu Ser Lys Asp Lys Phe Asn  
180 185 190

Lys Ile Pro Ala Glu Lys Lys Leu Ile Val Thr Ser Glu Gly Ala Phe  
195 200 205

Lys Tyr Phe Ser Lys Ala Tyr Gly Val Pro Ser Ala Tyr Ile Trp Glu  
210 215 220

Ile Asn Thr Glu Lys Glu Gly Thr Pro Glu Gln Ile Lys Thr Leu Val  
225 230 235 240

Glu Lys Leu Arg Gln Thr Lys Val Pro Ser Leu Phe Val Glu Ser Ser  
245 250 255

Val Asp Asp Arg Pro Met Lys Thr Val Ser Gln Asp Thr Asn Ile Pro  
260 265 270

Ile Tyr Ala Gln Ile Phe Thr Asp Ser Ile Ala Glu Gln Gly Lys Glu  
275 280 285

Gly Asp Ser Tyr Tyr Ser Met Met Lys Tyr Asn Leu Asp Lys Ile Ala  
290 295 300

Glu Gly Leu Ala Lys  
305

<210> 325  
<211> 309  
<212> PRT  
<213> Streptococcus pneumoniae CDC 58

<400> 325

Met Lys Lys Leu Gly Thr Leu Leu Val Leu Phe Leu Ser Val Ile Ala  
1 5 10 15

Leu Val Ala Cys Ala Ser Gly Lys Lys Asp Ala Ala Ser Gly Gln Lys  
20 25 30

Leu Lys Val Val Ala Thr Asn Ser Ile Ile Ala Asp Ile Thr Lys Asn  
35 40 45

Ile Ala Gly Asp Lys Ile Asp Leu His Ser Ile Val Pro Val Gly Gln  
50 55 60

Asp Pro His Glu Tyr Glu Pro Leu Pro Glu Asp Val Lys Lys Thr Ser  
65 70 75 80

Glu Ala Asp Leu Ile Phe Tyr Asn Gly Ile Asn Leu Glu Thr Gly Gly  
85 90 95

Asn Ala Trp Phe Thr Lys Leu Val Glu Asn Ala Lys Lys Thr Glu Asn  
100 105 110

Lys Asp Tyr Phe Ala Val Ser Glu Gly Val Asp Val Ile Tyr Leu Glu  
115 120 125

Gly Lys Asn Glu Lys Gly Lys Glu Asp Pro His Ala Trp Leu Asn Leu

130

135

140

Glu Asn Gly Ile Ile Phe Ala Lys Asn Ile Ala Lys Gln Leu Ser Ala  
 145 150 155 160

Lys Asp Pro Ser Asn Lys Glu Phe Tyr Glu Lys Asn Leu Lys Glu Tyr  
 165 170 175

Thr Asp Lys Leu Asp Lys Leu Asp Lys Glu Ala Lys Ala Lys Phe Asn  
 180 185 190

Asn Ile Pro Ala Glu Lys Lys Leu Ile Val Thr Ser Glu Gly Cys Phe  
 195 200 205

Lys Tyr Phe Ser Lys Ala Tyr Gly Val Pro Ser Ala Tyr Ile Trp Glu  
 210 215 220

Ile Asn Thr Glu Glu Glu Gly Thr Pro Glu Gln Ile Lys Thr Leu Val  
 225 230 235 240

Glu Lys Leu Arg Gln Thr Lys Val Pro Ser Leu Phe Val Glu Ser Ser  
 245 250 255

Val Asp Asp Arg Pro Met Lys Thr Val Ser Gln Asp Thr Asn Ile Pro  
 260 265 270

Ile Tyr Ala Gln Ile Phe Thr Asp Ser Ile Ala Glu Gln Gly Lys Glu  
 275 280 285

Gly Asp Ser Tyr Tyr Asn Met Met Lys Tyr Asn Leu Asp Lys Ile Ala  
 290 295 300

Glu Gly Leu Ala Lys  
 305

<210> 326  
 <211> 309  
 <212> PRT  
 <213> Streptococcus pneumoniae CDC 66

<400> 326

Met Lys Lys Leu Gly Thr Leu Leu Val Leu Phe Leu Ser Ala Ile Ile  
 1 5 10 15

Leu Val Ala Cys Ala Ser Gly Lys Lys Asp Thr Thr Ser Gly Gln Lys  
 20 25 30

Leu Lys Val Val Ala Thr Asn Ser Ile Ile Ala Asp Ile Thr Lys Asn  
35 40 45

Ile Ala Gly Asp Lys Ile Asp Leu His Ser Ile Val Pro Ile Gly Gln  
50 55 60

Asp Pro His Glu Tyr Glu Pro Leu Pro Glu Asp Val Lys Lys Thr Ser  
65 70 75 80

Glu Ala Asn Leu Ile Phe Tyr Asn Gly Ile Asn Leu Glu Thr Gly Gly  
85 90 95

Asn Ala Trp Phe Thr Lys Leu Val Glu Asn Ala Lys Lys Thr Glu Asn  
100 105 110

Lys Asp Tyr Phe Ala Val Ser Asp Gly Val Asp Val Ile Tyr Leu Glu  
115 120 125

Gly Gln Asn Glu Lys Gly Lys Glu Asp Pro His Ala Trp Leu Asn Leu  
130 135 140

Glu Asn Gly Ile Ile Phe Ala Lys Asn Ile Ala Lys Gln Leu Ser Ala  
145 150 155 160

Lys Asp Pro Asn Asn Lys Glu Phe Tyr Glu Lys Asn Leu Lys Glu Tyr  
165 170 175

Thr Asp Lys Leu Asp Lys Leu Asp Lys Glu Ser Lys Asp Lys Phe Asn  
180 185 190

Lys Ile Pro Ala Glu Lys Lys Leu Ile Val Thr Ser Glu Gly Ala Phe  
195 200 205

Lys Tyr Phe Ser Lys Ala Tyr Gly Val Pro Ser Ala Tyr Ile Trp Glu  
210 215 220

Ile Asn Thr Glu Glu Glu Gly Thr Pro Glu Gln Ile Lys Thr Leu Val  
225 230 235 240

Glu Lys Leu Arg Gln Thr Lys Val Pro Ser Leu Phe Val Glu Ser Ser  
245 250 255

Val Asp Asp Arg Pro Met Lys Thr Val Ser Gln Asp Thr Asn Ile Pro  
260 265 270

Ile Tyr Ala Gln Ile Phe Thr Asp Ser Ile Ala Glu Gln Gly Lys Glu  
275 280 285

Gly Asp Ser Tyr Tyr Ser Met Met Lys Tyr Asn Leu Asp Lys Ile Ala  
290 295 300

Glu Gly Leu Ala Lys  
305

<210> 327  
<211> 309  
<212> PRT  
<213> Streptococcus pneumoniae CDC 69  
  
<400> 327

Met Lys Lys Leu Gly Thr Leu Leu Val Leu Phe Leu Ser Ala Ile Ile  
1 5 10 15

Leu Val Ala Cys Ala Ser Gly Lys Lys Asp Thr Thr Ser Gly Gln Lys  
20 25 30

Leu Lys Val Val Ala Thr Asn Ser Ile Ile Ala Asp Ile Thr Lys Asn  
35 40 45

Ile Ala Gly Asp Lys Ile Asp Leu His Ser Ile Val Pro Ile Gly Gln  
50 55 60

Asp Pro His Glu Tyr Glu Pro Leu Pro Glu Asp Val Lys Lys Thr Ser  
65 70 75 80

Glu Ala Asp Leu Ile Phe Tyr Asn Gly Ile Asn Leu Glu Thr Gly Gly  
85 90 95

Asn Ala Trp Phe Thr Lys Leu Val Glu Asn Ala Lys Lys Thr Glu Asn  
100 105 110

Lys Asp Tyr Phe Ala Val Ser Asp Gly Val Asp Val Ile Tyr Leu Glu  
115 120 125

Gly Gln Asn Glu Lys Gly Lys Glu Asp Pro His Ala Trp Leu Asn Leu  
130 135 140

Glu Asn Gly Ile Ile Phe Ala Lys Asn Ile Ala Lys Gln Leu Ser Ala  
145 150 155 160

Lys Asp Pro Asn Asn Lys Glu Phe Tyr Glu Lys Asn Leu Lys Glu Tyr  
165 170 175

Thr Asp Lys Leu Asp Lys Leu Asp Lys Glu Ser Lys Asp Lys Phe Asn  
180 185 190

Lys Ile Pro Ala Glu Lys Lys Leu Ile Val Thr Ser Glu Gly Ala Phe  
195 200 205

Lys Tyr Phe Ser Lys Ala Tyr Gly Val Pro Ser Ala Tyr Ile Trp Glu  
210 215 220

Ile Asn Thr Glu Glu Glu Gly Thr Pro Glu Gln Ile Lys Thr Leu Val  
225 230 235 240

Glu Lys Leu Arg Gln Thr Lys Val Pro Ser Leu Phe Val Glu Ser Ser  
245 250 255

Val Asp Asp Arg Pro Met Lys Thr Val Ser Gln Asp Thr Asn Ile Pro  
260 265 270

Ile Tyr Ala Gln Ile Phe Thr Asp Ser Ile Ala Glu Gln Gly Lys Glu  
275 280 285

Gly Asp Ser Tyr Tyr Ser Met Met Lys Tyr Asn Leu Asp Lys Ile Ala  
290 295 300

Glu Gly Leu Ala Lys  
305

<210> 328  
<211> 309  
<212> PRT  
<213> Streptococcus pneumoniae CDC 74  
  
<400> 328

Met Lys Lys Leu Gly Thr Leu Leu Val Leu Phe Leu Ser Ala Ile Ile  
1 5 10 15

Leu Val Ala Cys Ala Ser Gly Lys Lys Asp Thr Thr Ser Gly Gln Lys  
20 25 30

Leu Lys Val Val Ala Thr Asn Ser Ile Ile Ala Asp Ile Thr Lys Asn  
35 40 45

Ile Ala Gly Asp Lys Ile Asp Leu His Ser Ile Val Pro Ile Gly Gln  
50 55 60



Asp Pro His Glu Tyr Glu Pro Leu Pro Glu Asp Val Lys Lys Thr Ser  
65 70 75 80

Glu Ala Asp Leu Ile Phe Tyr Asn Gly Ile Asn Leu Glu Thr Gly Gly  
85 90 95

Asn Ala Trp Phe Thr Lys Leu Val Glu Asn Ala Lys Lys Thr Glu Asn  
100 105 110

Lys Asp Tyr Phe Ala Val Ser Asp Gly Val Asp Val Ile Tyr Leu Glu  
115 120 125

Gly Gln Asn Glu Lys Gly Lys Glu Asp Pro His Ala Trp Leu Asn Leu  
130 135 140

Glu Asn Gly Ile Ile Phe Ala Lys Asn Ile Ala Lys Gln Leu Ser Ala  
145 150 155 160

Lys Asp Pro Asn Asn Lys Glu Phe Tyr Glu Lys Asn Leu Lys Glu Tyr  
165 170 175

Thr Asp Lys Leu Asp Lys Leu Asp Lys Glu Ser Lys Asp Lys Phe Asn  
180 185 190

Lys Ile Pro Ala Glu Lys Lys Leu Ile Val Thr Ser Glu Gly Ala Phe  
195 200 205

Lys Tyr Phe Ser Lys Ala Tyr Gly Val Pro Ser Ala Tyr Ile Trp Glu  
210 215 220

Ile Asn Thr Glu Glu Glu Gly Thr Pro Glu Gln Ile Lys Thr Leu Val  
225 230 235 240

Glu Lys Leu Arg Gln Thr Lys Val Pro Ser Leu Phe Ala Glu Ser Ser  
245 250 255

Val Asp Asp Arg Pro Met Lys Thr Val Ser Gln Asp Thr Asn Ile Pro  
260 265 270

Ile Tyr Ala Gln Ile Phe Thr Asp Ser Ile Ala Glu Gln Gly Lys Glu  
275 280 285

Gly Asp Ser Tyr Tyr Ser Met Met Lys Tyr Asn Leu Asp Lys Ile Ala  
290 295 300

Glu Gly Leu Ala Lys

305

<210> 329  
<211> 309  
<212> PRT  
<213> Streptococcus pneumoniae CDC 96

<400> 329

Met Lys Lys Leu Gly Thr Leu Leu Val Leu Phe Leu Ser Ala Ile Ile  
1 5 10 15

Leu Val Ala Cys Ala Ser Gly Lys Lys Asp Thr Thr Ser Gly Gln Lys  
20 25 30

Leu Lys Val Val Ala Thr Asn Ser Ile Ile Ala Asp Ile Thr Lys Asn  
35 40 45

Ile Ala Gly Asp Lys Ile Asp Leu His Ser Ile Val Pro Ile Gly Gln  
50 55 60

Asp Pro His Glu Tyr Glu Pro Leu Pro Glu Asp Val Lys Lys Thr Ser  
65 70 75 80

Glu Ala Asp Leu Ile Phe Tyr Asn Gly Ile Asn Leu Glu Thr Gly Gly  
85 90 95

Asn Ala Trp Phe Thr Lys Leu Val Glu Asn Ala Lys Lys Thr Glu Asn  
100 105 110

Lys Asp Tyr Phe Ala Val Ser Asp Gly Val Asp Val Ile Tyr Leu Glu  
115 120 125

Gly Gln Asn Glu Lys Gly Lys Glu Asp Pro His Ala Trp Leu Asn Leu  
130 135 140

Glu Asn Gly Ile Ile Phe Ala Lys Asn Ile Ala Lys Gln Leu Ser Ala  
145 150 155 160

Lys Asp Pro Asn Asn Lys Glu Phe Tyr Glu Lys Asn Leu Lys Glu Tyr  
165 170 175

Thr Asp Lys Leu Asp Lys Leu Asp Lys Glu Ser Lys Asn Lys Phe Asn  
180 185 190

Lys Ile Pro Ala Glu Lys Lys Leu Ile Val Thr Ser Glu Gly Ala Phe  
195 200 205

Lys Tyr Phe Ser Lys Ala Tyr Gly Val Pro Ser Ala Tyr Ile Trp Glu  
210 215 220

Ile Asn Thr Glu Glu Glu Gly Thr Pro Glu Gln Ile Lys Thr Leu Val  
225 230 235 240

Glu Lys Leu Arg Gln Thr Lys Val Pro Ser Leu Phe Val Glu Ser Ser  
245 250 255

Val Asp Asp Arg Pro Met Lys Thr Val Ser Gln Asp Thr Asn Ile Pro  
260 265 270

Ile Tyr Ala Gln Ile Phe Thr Asp Ser Ile Ala Glu Gln Gly Lys Glu  
275 280 285

Gly Asp Ser Tyr Tyr Ser Met Met Lys Tyr Asn Leu Asp Lys Ile Ala  
290 295 300

Glu Gly Leu Ala Lys  
305

<210> 330  
<211> 309  
<212> PRT  
<213> Streptococcus pneumoniae CDC 114  
  
<400> 330

Met Lys Lys Leu Gly Thr Leu Leu Val Leu Phe Leu Ser Ala Ile Ile  
1 5 10 15

Leu Val Ala Cys Ala Ser Gly Lys Lys Asp Thr Thr Ser Gly Gln Lys  
20 25 30

Leu Lys Val Val Ala Thr Asn Ser Ile Ile Ala Asp Ile Thr Lys Asn  
35 40 45

Ile Ala Gly Asp Lys Ile Asp Leu His Ser Ile Val Pro Ile Gly Gln  
50 55 60

Asp Pro His Glu Tyr Glu Pro Leu Pro Glu Asp Val Lys Lys Thr Ser  
65 70 75 80

Glu Ala Asp Leu Ile Phe Tyr Asn Gly Ile Asn Leu Glu Thr Gly Gly  
85 90 95

Asn Ala Trp Phe Thr Lys Leu Val Glu Asn Ala Lys Lys Thr Glu Asn

100	105	110
Lys Asp Tyr Phe Ala Val Ser Asp Gly Val Asp Val Ile Tyr Leu Glu		
115	120	125
Gly Gln Asn Glu Lys Gly Lys Glu Asp Pro His Ala Trp Leu Asn Leu		
130	135	140
Glu Asn Gly Ile Ile Phe Ala Lys Asn Ile Ala Lys Gln Leu Ser Ala		
145	150	155
Lys Asp Pro Asn Asn Lys Glu Phe Tyr Glu Lys Asn Leu Lys Glu Tyr		
165	170	175
Thr Asp Lys Leu Asp Lys Leu Asp Lys Glu Ser Lys Asp Lys Phe Asn		
180	185	190
Lys Ile Ser Ala Glu Lys Lys Leu Ile Val Thr Ser Glu Gly Ala Phe		
195	200	205
Lys Tyr Phe Ser Lys Ala Tyr Gly Val Pro Ser Ala Tyr Ile Trp Glu		
210	215	220
Ile Asn Thr Glu Glu Glu Gly Thr Pro Glu Gln Ile Lys Thr Leu Val		
225	230	235
Glu Lys Leu Arg Gln Thr Lys Val Pro Ser Leu Phe Val Glu Ser Ser		
245	250	255
Val Asp Asp Arg Pro Met Lys Thr Val Ser Gln Asp Thr Asn Ile Pro		
260	265	270
Ile Tyr Ala Gln Ile Phe Thr Asp Ser Ile Ala Glu Gln Gly Lys Glu		
275	280	285
Gly Asp Ser Tyr Tyr Ser Met Met Lys Tyr Asn Leu Asp Lys Ile Ala		
290	295	300
Glu Gly Leu Ala Lys		
305		

<210> 331  
 <211> 309  
 <212> PRT  
 <213> Streptococcus pneumoniae CDC 116  
 <400> 331

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

Glu Lys Leu Arg Gln Thr Lys Val Pro Ser Leu Phe Val Glu Ser Ser  
245 250 255

Val Asp Asp Arg Pro Met Lys Thr Val Ser Gln Asp Thr Asn Ile Pro  
260 265 270

Ile Tyr Ala Gln Ile Phe Thr Asp Ser Ile Ala Glu Gln Gly Lys Glu  
275 280 285

Gly Asp Ser Tyr Tyr Ser Met Met Lys Tyr Asn Leu Asp Lys Ile Ala  
290 295 300

Glu Gly Leu Ala Lys  
305