

SEQUENCE LISTING PART OF DESCRIPTION

<110> Novartis Vaccines and Diagnostics, Srl

<120> COMPOSITIONS FOR TREATING OR PREVENTING STREPTOCOCCAL INFECTIONS

<130> PP028470.0002

<160> 35

<170> FastSEQ for Windows Version 4.0

<210> 1

<211> 1252

<212> PRT

<213> Streptococcus agalactiae

<400> 1

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Met Lys Arg Lys Asp Leu Phe Gly Asp Lys Gln Thr Gln Tyr Thr Ile
 1           5           10           15
Arg Lys Leu Ser Val Gly Val Ala Ser Val Ala Thr Gly Val Cys Ile
      20           25           30
Phe Leu His Ser Pro Gln Val Phe Ala Glu Glu Val Ser Val Ser Pro
      35           40           45
Ala Thr Thr Ala Ile Ala Lys Ser Asn Ile Asn Gln Val Asp Asn Arg
      50           55           60
Gln Ser Thr Asn Leu Lys Asp Asp Ile Asn Ser Asn Ser Glu Thr Val
65           70           75           80
Val Thr Pro Ser Asp Met Pro Asp Thr Lys Gln Leu Val Ser Asp Glu
      85           90           95
Thr Asp Thr Gln Lys Gly Val Thr Glu Pro Asp Lys Ala Thr Ser Leu
      100          105          110
Leu Glu Glu Asn Lys Gly Pro Val Ser Asp Lys Asn Thr Leu Asp Leu
      115          120          125
Lys Val Ala Pro Ser Thr Leu Gln Asn Thr Pro Asp Lys Thr Ser Gln
      130          135          140
Ala Ile Gly Ala Pro Ser Pro Thr Leu Lys Val Ala Asn Gln Ala Pro
145           150           155           160
Gln Ile Glu Asn Gly Tyr Phe Arg Leu His Leu Lys Glu Leu Pro Gln
      165          170          175
Gly His Pro Val Glu Ser Thr Gly Leu Trp Ile Trp Gly Asp Val Asp
      180          185          190
Gln Pro Ser Ser Asn Trp Pro Asn Gly Ala Ile Pro Met Thr Asn Ala
      195          200          205
Lys Lys Asp Asp Tyr Gly Tyr Tyr Val Asp Phe Lys Leu Ser Glu Lys
      210          215          220
Gln Arg Lys Gln Ile Ser Phe Leu Ile Asn Asn Lys Ala Gly Thr Asn
225           230           235           240
Leu Ser Gly Asp His His Ile Pro Leu Leu Arg Pro Glu Met Asn Gln
      245          250          255
Val Trp Ile Asp Glu Lys Tyr Gly Ile His Thr Tyr Gln Pro Leu Lys
      260          265          270

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Glu	Gly	Tyr	Val	Arg	Ile	Asn	Tyr	Leu	Ser	Ser	Ser	Gly	Asn	Tyr	Asp
		275					280					285			
His	Leu	Ser	Ala	Trp	Leu	Phe	Lys	Asp	Val	Ala	Thr	Pro	Ser	Thr	Thr
	290					295						300			
Trp	Pro	Asp	Gly	Ser	Asn	Phe	Val	Asn	Gln	Gly	Leu	Tyr	Gly	Arg	Tyr
305					310					315					320
Ile	Asp	Val	Pro	Leu	Lys	Thr	Asn	Ala	Lys	Glu	Ile	Gly	Phe	Leu	Ile
				325					330					335	
Leu	Asp	Glu	Ser	Lys	Thr	Gly	Asp	Ala	Val	Lys	Val	Gln	Pro	Asn	Asp
			340					345					350		
Tyr	Val	Phe	Arg	Asp	Leu	Ala	Asn	His	Asn	Gln	Ile	Phe	Val	Lys	Asp
		355					360					365			
Lys	Asp	Pro	Lys	Val	Tyr	Asn	Asn	Pro	Tyr	Tyr	Ile	Asp	Gln	Val	Gln
	370					375					380				
Leu	Lys	Asp	Ala	Gln	Gln	Thr	Asp	Leu	Thr	Ser	Ile	Gln	Ala	Ser	Phe
385					390					395					400
Thr	Thr	Leu	Asp	Gly	Val	Asp	Lys	Thr	Glu	Ile	Leu	Lys	Glu	Leu	Lys
				405					410					415	
Val	Thr	Asp	Lys	Asn	Gln	Asn	Ala	Ile	Gln	Ile	Ser	Asp	Ile	Thr	Leu
			420					425					430		
Asp	Thr	Ser	Lys	Ser	Leu	Leu	Ile	Ile	Lys	Gly	Asp	Phe	Asn	Pro	Lys
		435					440					445			
Gln	Gly	His	Phe	Asn	Ile	Ser	Tyr	Asn	Gly	Asn	Asn	Val	Thr	Thr	Arg
	450					455					460				
Gln	Ser	Trp	Glu	Phe	Lys	Asp	Gln	Leu	Tyr	Ala	Tyr	Ser	Gly	Asn	Leu
465					470					475					480
Gly	Ala	Val	Leu	Asn	Gln	Asp	Gly	Ser	Lys	Val	Glu	Ala	Ser	Leu	Trp
				485					490					495	
Ser	Pro	Ser	Ala	Asp	Ser	Val	Thr	Met	Ile	Ile	Tyr	Asp	Lys	Asp	Asn
			500					505					510		
Gln	Asn	Arg	Val	Val	Ala	Thr	Thr	Pro	Leu	Val	Lys	Asn	Asn	Lys	Gly
		515					520						525		
Val	Trp	Gln	Thr	Ile	Leu	Asp	Thr	Lys	Leu	Gly	Ile	Lys	Asn	Tyr	Thr
	530					535					540				
Gly	Tyr	Tyr	Tyr	Leu	Tyr	Glu	Ile	Lys	Arg	Gly	Lys	Asp	Lys	Val	Lys
545					550					555					560
Ile	Leu	Asp	Pro	Tyr	Ala	Lys	Ser	Leu	Ala	Glu	Trp	Asp	Ser	Asn	Thr
				565					570					575	
Val	Asn	Asp	Asp	Ile	Lys	Thr	Ala	Lys	Ala	Ala	Phe	Val	Asn	Pro	Ser
			580					585					590		
Gln	Leu	Gly	Pro	Gln	Asn	Leu	Ser	Phe	Ala	Lys	Ile	Ala	Asn	Phe	Lys
		595				600						605			
Gly	Arg	Gln	Asp	Ala	Val	Ile	Tyr	Glu	Ala	His	Val	Arg	Asp	Phe	Thr
	610					615					620				
Ser	Asp	Gln	Ser	Leu	Asp	Gly	Lys	Leu	Lys	Asn	Gln	Leu	Gly	Thr	Phe
625					630					635					640
Ala	Ala	Phe	Ser	Glu	Lys	Leu	Asp	Tyr	Leu	Gln	Lys	Leu	Gly	Val	Thr
				645					650					655	
His	Ile	Gln	Leu	Leu	Pro	Val	Leu	Ser	Tyr	Phe	Tyr	Val	Asn	Glu	Met
			660					665					670		
Asp	Lys	Ser	Arg	Ser	Thr	Ala	Tyr	Thr	Ser	Ser	Asp	Asn	Asn	Tyr	Asn
		675				680						685			
Trp	Gly	Tyr	Asp	Pro	Gln	Ser	Tyr	Phe	Ala	Leu	Ser	Gly	Met	Tyr	Ser
	690					695					700				
Glu	Lys	Pro	Lys	Asp	Pro	Ser	Ala	Arg	Ile	Ala	Glu	Leu	Lys	Gln	Leu

705					710					715				720
Ile	His	Asp	Ile	His	Lys	Arg	Gly	Met	Gly	Val	Ile	Leu	Asp	Val
				725					730					735
Tyr	Asn	His	Thr	Ala	Lys	Thr	Tyr	Leu	Phe	Glu	Asp	Ile	Glu	Pro
			740					745					750	Asn
Tyr	Tyr	His	Phe	Met	Asn	Glu	Asp	Gly	Ser	Pro	Arg	Glu	Ser	Phe
		755					760					765		Gly
Gly	Gly	Arg	Leu	Gly	Thr	Thr	His	Ala	Met	Ser	Arg	Arg	Val	Leu
		770				775					780			Val
Asp	Ser	Ile	Lys	Tyr	Leu	Thr	Ser	Glu	Phe	Lys	Val	Asp	Gly	Phe
785					790					795				Arg
Phe	Asp	Met	Met	Gly	Asp	His	Asp	Ala	Ala	Ile	Glu	Leu	Ala	Tyr
				805					810					815
Lys	Glu	Ala	Lys	Ala	Ile	Asn	Pro	Asn	Met	Ile	Met	Ile	Gly	Glu
			820					825					830	Gly
Trp	Arg	Thr	Phe	Gln	Gly	Asp	Gln	Gly	Lys	Pro	Val	Lys	Pro	Ala
		835					840					845		Asp
Gln	Asp	Trp	Met	Lys	Ser	Thr	Asp	Thr	Val	Gly	Val	Phe	Ser	Asp
	850					855				860				Asp
Ile	Arg	Asn	Ser	Leu	Lys	Ser	Gly	Phe	Pro	Asn	Glu	Gly	Thr	Pro
865					870					875				Ala
Phe	Ile	Thr	Gly	Gly	Pro	Gln	Ser	Leu	Gln	Gly	Ile	Phe	Lys	Asn
			885						890					Ile
Lys	Ala	Gln	Pro	Gly	Asn	Phe	Glu	Ala	Asp	Ser	Pro	Gly	Asp	Val
			900					905					910	Val
Gln	Tyr	Ile	Ala	Ala	His	Asp	Asn	Leu	Thr	Leu	His	Asp	Val	Ile
	915						920					925		Ala
Lys	Ser	Ile	Asn	Lys	Asp	Pro	Lys	Val	Ala	Glu	Glu	Asp	Ile	His
	930					935					940			Arg
Arg	Leu	Arg	Leu	Gly	Asn	Val	Met	Ile	Leu	Thr	Ser	Gln	Gly	Thr
945					950					955				Ala
Phe	Ile	His	Ser	Gly	Gln	Glu	Tyr	Gly	Arg	Thr	Lys	Arg	Leu	Leu
			965						970					Asn
Pro	Asp	Tyr	Met	Thr	Lys	Val	Ser	Asp	Asp	Lys	Leu	Pro	Asn	Lys
		980						985					990	Ala
Thr	Leu	Ile	Glu	Ala	Val	Lys	Glu	Tyr	Pro	Tyr	Phe	Ile	His	Asp
	995						1000					1005		Ser
Tyr	Asp	Ser	Ser	Asp	Ala	Ile	Asn	His	Phe	Asp	Trp	Ala	Ala	Ala
	1010					1015					1020			Thr
Asp	Asn	Asn	Lys	His	Pro	Ile	Ser	Thr	Lys	Thr	Gln	Ala	Tyr	Thr
1025					1030					1035				Ala
Gly	Leu	Ile	Thr	Leu	Arg	Arg	Ser	Thr	Asp	Ala	Phe	Arg	Lys	Leu
			1045						1050					Ser
Lys	Ala	Glu	Ile	Asp	Arg	Glu	Val	Ser	Leu	Ile	Thr	Glu	Val	Gln
			1060					1065					1070	
Gly	Asp	Ile	Lys	Glu	Lys	Asp	Leu	Val	Ile	Ala	Tyr	Gln	Thr	Ile
	1075						1080					1085		Asp
Ser	Lys	Gly	Asp	Ile	Tyr	Ala	Val	Phe	Val	Asn	Ala	Asp	Ser	Lys
	1090					1095					1100			Ala
Arg	Asn	Val	Leu	Leu	Gly	Glu	Lys	Tyr	Lys	His	Leu	Leu	Lys	Gly
1105					1110					1115				Gln
Val	Ile	Val	Asp	Ala	Asp	Gln	Ala	Gly	Ile	Lys	Pro	Ile	Ser	Thr
			1125						1130					Pro
Arg	Gly	Val	His	Phe	Glu	Lys	Asp	Ser	Leu	Leu	Ile	Asp	Pro	Leu
			1140					1145					1150	Thr

Ala Ile Val Ile Lys Val Gly Lys Val Ala Pro Ser Pro Lys Glu Glu
 1155 1160 1165
 Leu Gln Ala Asp Tyr Pro Lys Thr Gln Ser Phe Lys Gly Ser Lys Thr
 1170 1175 1180
 Val Glu Lys Val Asn Arg Ile Ala Asn Lys Thr Ser Ile Thr Pro Val
 1185 1190 1195 1200
 Val Ser Asn Lys Thr Asp Ser Tyr Leu Thr Asn Glu Ala Asn Leu Pro
 1205 1210 1215
 Lys Thr Gly Asp Lys Ser Ser Lys Ile Leu Ser Val Val Gly Ile Ser
 1220 1225 1230
 Ile Leu Ala Ser Leu Leu Ala Leu Leu Gly Leu Ser Leu Lys Arg Asn
 1235 1240 1245
 Arg His Leu Lys
 1250

<210> 2
 <211> 109
 <212> PRT
 <213> Streptococcus pyogenes

<400> 2
 His His Leu Arg Met His Phe Lys Thr Leu Pro Ala Gly Glu Ser Leu
 1 5 10 15
 Gly Ser Leu Gly Leu Trp Val Trp Gly Asp Val Asp Gln Pro Ser Lys
 20 25 30
 Asp Trp Pro Asn Gly Ala Ile Thr Met Thr Lys Ala Lys Lys Asp Asp
 35 40 45
 Tyr Gly Tyr Tyr Leu Asp Val Pro Leu Ala Ala Lys His Arg Gln Gln
 50 55 60
 Val Ser Tyr Leu Ile Asn Asn Lys Ala Gly Glu Asn Leu Ser Lys Asp
 65 70 75 80
 Gln His Ile Ser Leu Thr Pro Lys Met Asn Glu Val Trp Ile Asp
 85 90 95
 Glu Asn Tyr His Ala His Ala Tyr Arg Pro Leu Lys Lys
 100 105

<210> 3
 <211> 111
 <212> PRT
 <213> Streptococcus pyogenes

<400> 3
 Gly Tyr Leu Arg Ile Asn Tyr His Asn Gln Ser Gly His Tyr Asp Asn
 1 5 10 15
 Leu Ala Val Trp Thr Phe Lys Asp Val Lys Thr Pro Thr Thr Asp Trp
 20 25 30
 Pro Asn Gly Leu Asp Leu Ser His Lys Gly His Tyr Gly Ala Tyr Val
 35 40 45
 Asp Val Pro Leu Lys Glu Gly Ala Asn Glu Ile Gly Phe Leu Ile Leu
 50 55 60
 Asp Lys Ser Lys Thr Gly Asp Ala Ile Lys Val Gln Pro Lys Asp Tyr
 65 70 75 80
 Leu Phe Lys Glu Leu Asp Asn His Thr Gln Val Phe Val Lys Asp Thr
 85 90 95
 Asp Pro Lys Val Tyr Asn Asn Pro Tyr Tyr Ile Asp Gln Val Ser

100

105

110

<210> 4

<211> 110

<212> PRT

<213> Streptococcus pneumoniae

<400> 4

Asp	Asn	Tyr	Phe	Arg	Ile	His	Val	Lys	Lys	Leu	Pro	Glu	Glu	Asn	Lys
1				5					10					15	
Asp	Ala	Gln	Gly	Leu	Trp	Thr	Trp	Asp	Asp	Val	Glu	Lys	Pro	Ser	Glu
		20						25					30		
Asn	Trp	Pro	Asn	Gly	Ala	Leu	Ser	Phe	Lys	Asp	Ala	Lys	Lys	Asp	Asp
		35					40					45			
Tyr	Gly	Tyr	Tyr	Leu	Asp	Val	Lys	Leu	Lys	Gly	Glu	Gln	Ala	Lys	Lys
	50					55					60				
Ile	Ser	Phe	Leu	Ile	Asn	Asn	Thr	Ala	Gly	Lys	Asn	Leu	Thr	Gly	Asp
65					70					75					80
Lys	Ser	Val	Glu	Lys	Leu	Val	Pro	Lys	Met	Asn	Glu	Ala	Trp	Leu	Asp
				85					90					95	
Gln	Asp	Tyr	Lys	Val	Phe	Ser	Tyr	Glu	Pro	Gln	Pro	Ala	Gly		
			100					105					110		

<210> 5

<211> 111

<212> PRT

<213> Streptococcus pneumoniae

<400> 5

Thr	Val	Arg	Val	Asn	Tyr	Tyr	Arg	Thr	Asp	Gly	Asn	Tyr	Asp	Lys	Lys
1				5					10					15	
Ser	Leu	Trp	Tyr	Trp	Gly	Asp	Val	Lys	Asn	Pro	Ser	Ser	Ala	Gln	Trp
			20					25					30		
Pro	Asp	Gly	Thr	Asp	Phe	Thr	Ala	Thr	Gly	Lys	Tyr	Gly	Arg	Tyr	Ile
		35					40					45			
Asp	Ile	Pro	Leu	Asn	Glu	Ala	Ala	Arg	Glu	Phe	Gly	Phe	Leu	Leu	Leu
	50					55					60				
Asp	Glu	Ser	Lys	Gln	Gly	Asp	Asp	Val	Lys	Ile	Arg	Lys	Glu	Asn	Tyr
65					70					75					80
Lys	Phe	Thr	Asp	Leu	Lys	Asn	His	Ser	Gln	Ile	Phe	Leu	Lys	Asp	Asp
				85					90					95	
Asp	Glu	Ser	Ile	Tyr	Thr	Asn	Pro	Tyr	Tyr	Val	His	Asp	Ile	Arg	
			100					105					110		

<210> 6

<211> 110

<212> PRT

<213> Streptococcus agalactiae

<400> 6

Gly	Tyr	Phe	Arg	Leu	His	Leu	Lys	Glu	Leu	Pro	Gln	Gly	His	Pro	Val
1				5					10					15	
Glu	Ser	Thr	Gly	Leu	Trp	Ile	Trp	Gly	Asp	Val	Asp	Gln	Pro	Ser	Ser
			20					25					30		
Asn	Trp	Pro	Asn	Gly	Ala	Ile	Pro	Met	Thr	Asn	Ala	Lys	Lys	Asp	Asp

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          35          40          45
Tyr Gly Tyr Tyr Val Asp Phe Lys Leu Ser Glu Lys Gln Arg Lys Gln
   50          55          60
Ile Ser Phe Leu Ile Asn Asn Lys Ala Gly Thr Asn Leu Ser Gly Asp
65          70          75          80
His His Ile Pro Leu Leu Arg Pro Glu Met Asn Gln Val Trp Ile Asp
          85          90          95
Glu Lys Tyr Gly Ile His Thr Tyr Gln Pro Leu Lys Glu Gly
          100          105          110

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<210> 7
 <211> 106
 <212> PRT
 <213> Streptococcus agalactiae

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<400> 7
Tyr Val Arg Ile Asn Tyr Leu Ser Ser Ser Gly Asn Tyr Asp His Leu
  1          5          10          15
Ser Ala Trp Leu Phe Lys Asp Val Ala Thr Pro Ser Thr Thr Trp Pro
          20          25          30
Asp Gly Ser Asn Phe Val Asn Gln Gly Leu Tyr Gly Arg Tyr Ile Asp
          35          40          45
Val Pro Leu Lys Thr Asn Ala Lys Glu Ile Gly Phe Leu Ile Leu Asp
          50          55          60
Glu Ser Lys Thr Gly Asp Ala Val Lys Val Gln Pro Asn Asp Tyr Val
65          70          75          80
Phe Arg Asp Leu Ala Asn His Asn Gln Ile Phe Val Lys Asp Lys Asp
          85          90          95
Pro Lys Val Tyr Asn Asn Pro Tyr Tyr Ile
          100          105

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<210> 8
 <211> 110
 <212> PRT
 <213> Streptococcus agalactiae

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<400> 8
Gly Tyr Phe Arg Leu His Leu Lys Glu Leu Pro Gln Gly His Pro Val
  1          5          10          15
Glu Ser Thr Gly Leu Trp Ile Trp Gly Asp Val Asp Gln Pro Ser Ser
          20          25          30
Asn Trp Pro Asn Gly Ala Ile Pro Met Thr Asp Ala Lys Lys Asp Asp
          35          40          45
Tyr Gly Tyr Tyr Val Asp Phe Lys Leu Ser Glu Lys Gln Arg Lys Gln
          50          55          60
Ile Ser Phe Leu Ile Asn Asn Lys Ala Gly Thr Asn Leu Ser Gly Asp
65          70          75          80
His His Ile Pro Leu Leu Arg Pro Glu Met Asn Gln Val Trp Ile Asp
          85          90          95
Glu Lys Tyr Gly Ile His Thr Tyr Gln Pro Leu Lys Glu Gly
          100          105          110

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<210> 9
 <211> 106
 <212> PRT

<213> Streptococcus agalactiae

<400> 9

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Tyr Val Arg Ile Asn Tyr Leu Ser Ser Ser Ser Asn Tyr Asp His Leu
 1           5           10           15
Ser Ala Trp Leu Phe Lys Asp Val Ala Thr Pro Ser Thr Thr Trp Pro
      20           25           30
Asp Gly Ser Asn Phe Val Asn Gln Gly Leu Tyr Gly Arg Tyr Ile Asp
      35           40           45
Val Ser Leu Lys Thr Asn Ala Lys Glu Ile Gly Phe Leu Ile Leu Asp
      50           55           60
Glu Ser Lys Thr Gly Asp Ala Val Lys Val Gln Pro Asn Asp Tyr Val
65           70           75           80
Phe Arg Asp Leu Ala Asn His Asn Gln Ile Phe Val Lys Asp Lys Asp
      85           90           95
Pro Lys Val Tyr Asn Asn Pro Tyr Tyr Ile
      100           105

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<210> 10

<211> 110

<212> PRT

<213> Streptococcus agalactiae

<400> 10

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Gly Tyr Phe Arg Leu His Leu Lys Glu Leu Pro Gln Gly His Pro Val
 1           5           10           15
Glu Ser Thr Gly Leu Trp Ile Trp Gly Asp Val Asp Gln Pro Ser Ser
      20           25           30
Asn Trp Pro Asn Gly Ala Ile Pro Met Thr Asp Ala Lys Lys Asp Asp
      35           40           45
Tyr Gly Tyr Tyr Val Asp Phe Lys Leu Ser Glu Lys Gln Arg Lys Gln
      50           55           60
Ile Ser Phe Leu Ile Asn Asn Lys Ala Gly Thr Asn Leu Ser Gly Asp
65           70           75           80
His His Ile Ser Leu Leu Arg Pro Glu Met Asn Gln Val Trp Ile Asp
      85           90           95
Glu Lys Tyr Gly Ile His Thr Tyr Gln Pro Leu Lys Glu Gly
      100           105           110

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<210> 11

<211> 106

<212> PRT

<213> Streptococcus agalactiae

<400> 11

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Tyr Val Arg Ile Asn Tyr Leu Ser Ser Ser Gly Asn Tyr Asp His Leu
 1           5           10           15
Ser Ala Trp Leu Phe Lys Asp Val Ala Asn Pro Ser Thr Thr Trp Pro
      20           25           30
Asp Gly Ser Asn Phe Val Asn Gln Gly Leu Tyr Gly Arg Tyr Ile Asp
      35           40           45
Val Pro Leu Lys Thr Asn Ala Lys Glu Ile Gly Phe Leu Ile Leu Asp
      50           55           60
Glu Ser Lys Thr Gly Asp Ala Val Lys Val Gln Pro Asn Asp Tyr Val
65           70           75           80

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<210> 12
<211> 110
<212> PRT
<213> Streptococcus agalactiae
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<210> 13
<211> 106
<212> PRT
<213> Streptococcus agalactiae
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<210> 14
<211> 110
<212> PRT
<213> Streptococcus agalactiae
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<400> 14
Gly Tyr Phe Arg Leu His Leu Lys Glu Leu Pro Gln Gly His Pro Val
1 5 10 15

Glu Ser Thr Gly Leu Trp Ile Trp Gly Asp Val Asp Gln Pro Ser Ser
 20 25 30
 Asn Trp Pro Asn Gly Ala Ile Pro Met Thr Asn Ala Lys Lys Asp Asp
 35 40 45
 Tyr Gly Tyr Tyr Val Asp Phe Lys Leu Ser Glu Lys Gln Arg Lys Gln
 50 55 60
 Ile Ser Phe Leu Ile Asn Asn Lys Ala Gly Thr Asn Leu Ser Gly Asp
 65 70 75 80
 His His Ile Pro Leu Leu Arg Pro Glu Met Asn Gln Val Trp Ile Asp
 85 90 95
 Glu Lys Tyr Gly Ile His Thr Tyr Gln Pro Leu Lys Glu Gly
 100 105 110

<210> 15

<211> 106

<212> PRT

<213> Streptococcus agalactiae

<400> 15

Tyr Val Arg Ile Asn Tyr Leu Ser Ser Ser Gly Asn Tyr Asp His Leu
 1 5 10 15
 Ser Ala Trp Leu Phe Lys Asp Val Ala Thr Pro Ser Thr Thr Trp Pro
 20 25 30
 Asp Gly Ser Asn Phe Val Asn Gln Gly Leu Tyr Gly Arg Tyr Ile Asp
 35 40 45
 Val Pro Leu Lys Thr Asn Ala Lys Glu Ile Gly Phe Leu Ile Leu Asp
 50 55 60
 Glu Ser Lys Thr Gly Asp Ala Val Lys Val Gln Pro Asn Asp Tyr Val
 65 70 75 80
 Phe Arg Asp Leu Ala Asn His Asn Gln Ile Phe Val Lys Asp Lys Asp
 85 90 95
 Pro Lys Val Tyr Asn Asn Pro Tyr Tyr Ile
 100 105

<210> 16

<211> 110

<212> PRT

<213> Streptococcus agalactiae

<400> 16

Gly Tyr Phe Arg Leu His Leu Lys Glu Leu Pro Gln Gly His Pro Val
 1 5 10 15
 Glu Ser Thr Gly Leu Trp Ile Trp Gly Asp Val Asp Gln Pro Ser Ser
 20 25 30
 Asn Trp Pro Asn Gly Ala Ile Pro Met Thr Asp Ala Lys Lys Asp Asp
 35 40 45
 Tyr Gly Tyr Tyr Val Asp Phe Lys Leu Ser Glu Lys Gln Arg Lys Gln
 50 55 60
 Ile Ser Phe Leu Ile Asn Asn Lys Ala Gly Thr Asn Leu Ser Gly Asp
 65 70 75 80
 His His Ile Pro Leu Leu Arg Pro Glu Met Asn Gln Val Trp Ile Asp
 85 90 95
 Glu Lys Tyr Gly Ile His Thr Tyr Gln Pro Leu Lys Glu Gly
 100 105 110

<210> 17
 <211> 106
 <212> PRT
 <213> Streptococcus

<400> 17
 Tyr Val Arg Ile Asn Tyr Leu Ser Ser Ser Gly Asn Tyr Asp His Leu
 1 5 10 15
 Ser Ala Trp Leu Phe Lys Asp Val Ala Asn Pro Ser Thr Thr Trp Pro
 20 25 30
 Asp Gly Ser Asn Phe Val Asn Gln Gly Leu Tyr Gly Arg Tyr Ile Asp
 35 40 45
 Val Pro Leu Lys Thr Asn Ala Lys Glu Ile Gly Phe Leu Ile Leu Asp
 50 55 60
 Glu Ser Lys Thr Gly Asp Ala Val Lys Val Gln Pro Asn Asp Tyr Val
 65 70 75 80
 Phe Arg Asp Leu Ala Asn His Asn Gln Ile Phe Val Lys Asp Lys Asp
 85 90 95
 Pro Lys Val Tyr Asn Asn Pro Tyr Tyr Ile
 100 105

<210> 18
 <211> 110
 <212> PRT
 <213> Streptococcus agalactiae

<400> 18
 Gly Tyr Phe Arg Leu His Leu Lys Glu Leu Pro Gln Gly His Pro Val
 1 5 10 15
 Glu Ser Thr Gly Leu Trp Ile Trp Gly Asp Val Asp Gln Pro Ser Ser
 20 25 30
 Asn Trp Pro Asn Gly Ala Ile Pro Met Thr Asp Ala Lys Lys Asp Asp
 35 40 45
 Tyr Gly Tyr Tyr Val Asp Phe Lys Leu Ser Glu Lys Gln Arg Lys Gln
 50 55 60
 Ile Ser Phe Leu Ile Asn Asn Lys Ala Gly Thr Asn Leu Ser Gly Asp
 65 70 75 80
 His His Ile Pro Leu Leu Arg Pro Glu Met Asn Gln Val Trp Ile Asp
 85 90 95
 Glu Lys Tyr Gly Thr His Thr Tyr Gln Pro Leu Lys Glu Gly
 100 105 110

<210> 19
 <211> 106
 <212> PRT
 <213> Streptococcus agalactiae

<400> 19
 Tyr Val Arg Ile Asn Tyr Leu Ser Ser Ser Ser Asn Tyr Asp His Leu
 1 5 10 15
 Ser Ala Trp Leu Phe Lys Asp Val Ala Thr Pro Ser Thr Thr Trp Pro
 20 25 30
 Asp Gly Ser Asn Phe Val Asn Gln Gly Leu Tyr Gly Arg Tyr Ile Asp
 35 40 45
 Val Ser Leu Lys Thr Asn Ala Lys Glu Ile Gly Phe Leu Ile Leu Asp

50		55		60
Glu Ser Lys Thr Gly Asp Ala Val Lys Val Gln Pro Asn Asp Tyr Val				
65		70		75
Phe Arg Asp Leu Ala Asn His Asn Gln Ile Phe Val Lys Asp Lys Asp				80
	85		90	95
Pro Lys Val Tyr Asn Asn Pro Tyr Tyr Ile				
	100		105	

<210> 20
 <211> 297
 <212> PRT
 <213> Streptococcus agalactiae

<400> 20

Thr His Ile Gln Leu Leu Pro Val Leu Ser Tyr Phe Tyr Val Asn Glu				
1	5	10	15	
Met Asp Lys Ser Arg Ser Thr Ala Tyr Thr Ser Ser Asp Asn Asn Tyr				
	20	25	30	
Asn Trp Gly Tyr Asp Pro Gln Ser Tyr Phe Ala Leu Ser Gly Met Tyr				
	35	40	45	
Ser Glu Lys Pro Lys Asp Pro Ser Ala Arg Ile Ala Glu Leu Lys Gln				
50	55	60		
Leu Ile His Asp Ile His Lys Arg Gly Met Gly Val Ile Leu Asp Val				80
65	70	75		
Val Tyr Asn His Thr Ala Lys Thr Tyr Leu Phe Glu Asp Ile Glu Pro				95
	85	90		
Asn Tyr Tyr His Phe Met Asn Glu Asp Gly Ser Pro Arg Glu Ser Phe				
	100	105	110	
Gly Gly Gly Arg Leu Gly Thr Thr His Ala Met Ser Arg Arg Val Leu				
	115	120	125	
Val Asp Ser Ile Lys Tyr Leu Thr Ser Glu Phe Lys Val Asp Gly Phe				
130	135	140		
Arg Phe Asp Met Met Gly Asp His Asp Ala Ala Ile Glu Leu Ala				160
145	150	155		
Tyr Lys Glu Ala Lys Ala Ile Asn Pro Asn Met Ile Met Ile Gly Glu				175
	165	170		
Gly Trp Arg Thr Phe Gln Gly Asp Gln Gly Lys Pro Val Lys Pro Ala				
	180	185	190	
Asp Gln Asp Trp Met Lys Ser Thr Asp Thr Val Gly Val Phe Ser Asp				
	195	200	205	
Asp Ile Arg Asn Ser Leu Lys Ser Gly Phe Pro Asn Glu Gly Thr Pro				
210	215	220		
Ala Phe Ile Thr Gly Gly Pro Gln Ser Leu Gln Gly Ile Phe Lys Asn				240
225	230	235		
Ile Lys Ala Gln Pro Gly Asn Phe Glu Ala Asp Ser Pro Gly Asp Val				255
	245	250		
Val Gln Tyr Ile Ala Ala His Asp Asn Leu Thr Leu His Asp Val Ile				
	260	265	270	
Ala Lys Ser Ile Asn Lys Asp Pro Lys Val Ala Glu Glu Asp Ile His				
	275	280	285	
Arg Arg Leu Arg Leu Gly Asn Val Met				
290	295			

<210> 21
 <211> 240

<212> PRT

<213> Streptococcus pneumoniae

<400> 21

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

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<210> 22

<211> 239

<212> PRT

<213> Streptococcus pyogenes

<400> 22

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Thr His Val Gln Leu Leu Pro Val Leu Ser Tyr Phe Tyr Ala Asn Glu
 1          5          10          15
Leu Asp Lys Ser Arg Ser Thr Ala Tyr Thr Ser Ser Asp Asn Asn Tyr
          20          25          30
Asn Trp Gly Tyr Asp Pro Gln His Tyr Phe Ala Leu Ser Gly Met Tyr
          35          40          45
Ser Ala Asn Pro Asn Asp Pro Ala Leu Arg Ile Ala Glu Leu Lys Asn
 50          55          60
Leu Val Asn Glu Ile His Lys Arg Gly Met Gly Val Ile Phe Asp Val
65          70          75          80
Val Tyr Asn His Thr Ala Arg Thr Tyr Leu Phe Glu Asp Leu Glu Pro
          85          90          95
Asn Tyr Tyr His Phe Met Asn Ala Asp Gly Thr Ala Arg Glu Ser Phe
          100          105          110

```

Gly	Gly	Gly	Arg	Leu	Gly	Thr	Thr	His	Ala	Met	Ser	Arg	Arg	Ile	Leu
		115					120					125			
Val	Asp	Ser	Ile	Thr	Tyr	Leu	Thr	Arg	Glu	Phe	Lys	Val	Asp	Gly	Phe
		130				135					140				
Arg	Phe	Asp	Met	Met	Gly	Asp	His	Asp	Ala	Ala	Ala	Ile	Glu	Gln	Ala
145					150					155					160
Phe	Lys	Ala	Ala	Lys	Ala	Ile	Asn	Pro	Asn	Thr	Ile	Met	Ile	Gly	Glu
				165					170					175	
Gly	Trp	Arg	Thr	Tyr	Gln	Gly	Asp	Glu	Gly	Lys	Lys	Glu	Ile	Ala	Ala
			180					185					190		
Asp	Gln	Asp	Trp	Met	Lys	Ala	Thr	Asn	Thr	Val	Gly	Val	Phe	Ser	Asp
		195					200					205			
Asp	Ile	Arg	Asn	Thr	Leu	Lys	Ser	Gly	Phe	Pro	Asn	Glu	Gly	Thr	Ala
	210					215					220				
Ala	Phe	Ile	Thr	Gly	Gly	Ala	Lys	Asn	Leu	Glu	Gly	Leu	Phe	Lys	
225					230					235					

<210> 23

<211> 5

<212> PRT

<213> Artificial Sequence

<220>

<221> VARIANT

<222> (1)...(5)

<223> Xaa = Any Amino Acid

<223> motif

<400> 23

Leu	Pro	Xaa	Thr	Gly
1				5

<210> 24

<211> 5

<212> PRT

<213> Artificial Sequence

<220>

<223> motif

<400> 24

Tyr	Asn	Trp	Gly	Tyr
1				5

<210> 25

<211> 5

<212> PRT

<213> Artificial Sequence

<220>

<223> motif

<400> 25

Leu	Pro	Lys	Thr	Gly
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5

<220>
<223> motif

<400> 26
Pro Tyr Ser Ile Arg Lys Xaa
1 5

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<400> 27
Met Lys Val Gln Pro Asn Asp Tyr Val Phe
 1             5             10
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<210> 28
<211> 1165
<212> PRT
<213> Streptococcus pyogenes
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<400> 28															
Met	Lys	Lys	Lys	Val	Asn	Gln	Gly	Ser	Lys	Arg	Tyr	Gln	Tyr	Leu	Leu
1				5					10					15	
Lys	Lys	Trp	Gly	Ile	Gly	Phe	Val	Ile	Ala	Ala	Thr	Gly	Thr	Val	Val
			20					25					30		
Leu	Gly	Cys	Thr	Pro	Ser	Ile	Leu	Thr	His	Gln	Val	Ala	Ala	Lys	Thr
		35					40					45			
Ile	Val	Gly	Leu	Ala	Arg	Asp	Glu	Ala	Gln	Gln	Gly	Asp	Gly	Asn	Ala
	50					55					60				
Lys	Ser	Gly	Asp	Gly	Leu	Gln	Ser	Ser	Ser	Lys	Glu	Ala	Lys	Pro	Val
65					70					75				80	
Leu	Asp	Ser	Ser	Ser	Ala	Asn	Pro	Ala	Ser	Ile	Ala	Glu	His	His	Leu
				85					90					95	
Arg	Met	His	Phe	Lys	Thr	Leu	Pro	Ala	Gly	Glu	Ser	Leu	Gly	Ser	Leu
			100					105					110		
Gly	Leu	Trp	Val	Trp	Gly	Asp	Val	Asp	Gln	Pro	Ser	Lys	Asp	Trp	Pro
		115					120					125			
Asn	Gly	Ala	Ile	Thr	Met	Thr	Lys	Ala	Lys	Lys	Asp	Asp	Tyr	Gly	Tyr
	130					135					140				
Tyr	Leu	Asp	Val	Pro	Leu	Ala	Ala	Lys	His	Arg	Gln	Gln	Val	Ser	Tyr
145					150					155					160
Leu	Ile	Asn	Asn	Lys	Ala	Gly	Glu	Asn	Leu	Ser	Lys	Asp	Gln	His	Ile
				165					170					175	

Ser	Leu	Leu	Thr	Pro	Lys	Met	Asn	Glu	Val	Trp	Ile	Asp	Glu	Asn	Tyr
			180					185					190		
His	Ala	His	Ala	Tyr	Arg	Pro	Leu	Lys	Lys	Gly	Tyr	Leu	Arg	Ile	Asn
		195					200					205			
Tyr	His	Asn	Gln	Ser	Gly	His	Tyr	Asp	Asn	Leu	Ala	Val	Trp	Thr	Phe
	210					215					220				
Lys	Asp	Val	Lys	Thr	Pro	Thr	Thr	Asp	Trp	Pro	Asn	Gly	Leu	Asp	Leu
225					230					235					240
Ser	His	Lys	Gly	His	Tyr	Gly	Ala	Tyr	Val	Asp	Val	Pro	Leu	Lys	Glu
				245					250					255	
Gly	Ala	Asn	Glu	Ile	Gly	Phe	Leu	Ile	Leu	Asp	Lys	Ser	Lys	Thr	Gly
		260						265					270		
Asp	Ala	Ile	Lys	Val	Gln	Pro	Lys	Asp	Tyr	Leu	Phe	Lys	Glu	Leu	Asp
		275					280					285			
Asn	His	Thr	Gln	Val	Phe	Val	Lys	Asp	Thr	Asp	Pro	Lys	Val	Tyr	Asn
	290					295					300				
Asn	Pro	Tyr	Tyr	Ile	Asp	Gln	Val	Ser	Leu	Lys	Gly	Ala	Glu	Gln	Thr
305					310					315					320
Thr	Pro	Asn	Glu	Ile	Lys	Ala	Ile	Phe	Thr	Thr	Leu	Asp	Gly	Leu	Asp
			325						330					335	
Glu	Asp	Ala	Val	Lys	Gln	Asn	Ile	Lys	Ile	Thr	Asp	Lys	Ala	Gly	Lys
		340						345					350		
Thr	Val	Ala	Ile	Asp	Glu	Leu	Thr	Leu	Asp	Arg	Asp	Lys	Ser	Val	Met
		355					360					365			
Thr	Leu	Lys	Gly	Asp	Phe	Lys	Ala	Gln	Gly	Ala	Val	Tyr	Thr	Val	Thr
	370					375					380				
Phe	Gly	Glu	Val	Ser	Gln	Val	Ala	Arg	Gln	Ser	Trp	Gln	Leu	Lys	Asp
385					390					395					400
Lys	Leu	Tyr	Ala	Tyr	Asp	Gly	Glu	Leu	Gly	Ala	Thr	Leu	Ala	Lys	Asp
			405						410					415	
Gly	Ser	Val	Asp	Leu	Ala	Leu	Trp	Ser	Pro	Ser	Ala	Asp	Thr	Val	Lys
		420						425					430		
Val	Val	Val	Tyr	Asp	Lys	Gln	Asp	Gln	Thr	Arg	Val	Val	Gly	Gln	Ala
		435					440					445			
Asp	Leu	Thr	Lys	Ser	Asp	Lys	Gly	Val	Trp	Arg	Ala	His	Leu	Thr	Ser
	450					455					460				
Asp	Ser	Val	Lys	Gly	Ile	Ser	Asp	Tyr	Thr	Gly	Tyr	Tyr	Tyr	Leu	Tyr
465					470					475					480
Glu	Ile	Thr	Arg	Gly	Gln	Glu	Lys	Val	Met	Val	Leu	Asp	Pro	Tyr	Ala
			485						490					495	
Lys	Ser	Leu	Ala	Ala	Trp	Asn	Asp	Ala	Thr	Ala	Thr	Asp	Asp	Ile	Lys
		500						505					510		
Thr	Ala	Lys	Ala	Ala	Phe	Ile	Asp	Pro	Ser	Lys	Leu	Gly	Pro	Thr	Gly
		515					520					525			
Leu	Asp	Phe	Ala	Lys	Ile	Asn	Asn	Phe	Lys	Lys	Arg	Glu	Asp	Ala	Ile
	530					535					540				
Ile	Tyr	Glu	Ala	His	Val	Arg	Asp	Phe	Thr	Ser	Asp	Lys	Ala	Leu	Glu
545					550					555					560
Gly	Lys	Leu	Thr	His	Pro	Phe	Gly	Thr	Phe	Ser	Ala	Phe	Val	Glu	Gln
			565						570					575	
Leu	Asp	Tyr	Leu	Lys	Asp	Leu	Gly	Val	Thr	His	Val	Gln	Leu	Leu	Pro
		580						585					590		
Val	Leu	Ser	Tyr	Phe	Tyr	Ala	Asn	Glu	Leu	Asp	Lys	Ser	Arg	Ser	Thr
		595					600					605			
Ala	Tyr	Thr	Ser	Ser	Asp	Asn	Asn	Tyr	Asn	Trp	Gly	Tyr	Asp	Pro	Gln

610	615	620
His Tyr Phe Ala Leu Ser Gly Met Tyr Ser Ala Asn Pro Asn Asp Pro		
625	630	635
Ala Leu Arg Ile Ala Glu Leu Lys Asn Leu Val Asn Glu Ile His Lys		
	645	650
Arg Gly Met Gly Val Ile Phe Asp Val Val Tyr Asn His Thr Ala Arg		
	660	665
Thr Tyr Leu Phe Glu Asp Leu Glu Pro Asn Tyr Tyr His Phe Met Asn		
	675	680
Ala Asp Gly Thr Ala Arg Glu Ser Phe Gly Gly Gly Arg Leu Gly Thr		
	690	695
Thr His Ala Met Ser Arg Arg Ile Leu Val Asp Ser Ile Thr Tyr Leu		
705	710	715
Thr Arg Glu Phe Lys Val Asp Gly Phe Arg Phe Asp Met Met Gly Asp		
	725	730
His Asp Ala Ala Ala Ile Glu Gln Ala Phe Lys Ala Ala Lys Ala Ile		
	740	745
Asn Pro Asn Thr Ile Met Ile Gly Glu Gly Trp Arg Thr Tyr Gln Gly		
	755	760
Asp Glu Gly Lys Lys Glu Ile Ala Ala Asp Gln Asp Trp Met Lys Ala		
	770	775
Thr Asn Thr Val Gly Val Phe Ser Asp Asp Ile Arg Asn Thr Leu Lys		
785	790	795
Ser Gly Phe Pro Asn Glu Gly Thr Ala Ala Phe Ile Thr Gly Gly Ala		
	805	810
Lys Asn Leu Glu Gly Leu Phe Lys Thr Ile Lys Ala Gln Pro Gly Asn		
	820	825
Phe Glu Ala Asp Ala Pro Gly Asp Val Val Gln Tyr Ile Ala Ala His		
	835	840
Asp Asn Leu Thr Leu His Asp Val Ile Ala Lys Ser Ile Asn Lys Asp		
	850	855
Pro Lys Val Ala Glu Glu Ile His Lys Arg Ile Arg Leu Gly Asn		
865	870	875
Thr Met Ile Leu Thr Ala Gln Gly Thr Ala Phe Ile His Ser Gly Gln		
	885	890
Glu Tyr Gly Arg Thr Lys Gln Leu Leu Asn Pro Asp Tyr Lys Thr Lys		
	900	905
Ala Ser Asp Asp Lys Val Pro Asn Lys Ala Thr Leu Ile Asp Ala Val		
	915	920
Ala Gln Tyr Pro Tyr Phe Ile His Asp Ser Tyr Asp Ser Ser Asp Ala		
	930	935
Val Asn His Phe Asp Trp Ala Lys Ala Thr Asp Ser Ile Ala His Pro		
945	950	955
Ile Ser Asn Gln Thr Lys Ala Tyr Thr Gln Gly Leu Ile Ala Leu Arg		
	965	970
Arg Ser Thr Asp Ala Phe Thr Lys Ala Thr Lys Ala Glu Val Asp Arg		
	980	985
Asp Val Thr Leu Ile Thr Gln Ala Gly Gln Asp Gly Ile Gln Gln Glu		
	995	1000
Asp Leu Ile Met Gly Tyr Gln Thr Val Ala Ser Asn Gly Asp Arg Tyr		
	1010	1015
Ala Val Phe Val Asn Ala Asp Asn Lys Thr Arg Lys Val Val Leu Pro		
1025	1030	1035
Gln Ala Tyr Arg Tyr Leu Leu Gly Ala Gln Val Leu Val Asp Ala Glu		
	1045	1050
		1055

Gln Ala Gly Val Thr Ala Ile Ala Lys Pro Lys Gly Val Gln Phe Thr
 1060 1065 1070
 Lys Glu Gly Leu Thr Ile Glu Gly Leu Thr Ala Leu Val Leu Lys Val
 1075 1080 1085
 Ser Ser Lys Thr Ala Asn Pro Ser Gln Gln Lys Ser Gln Thr Asp Asn
 1090 1095 1100
 His Gln Thr Lys Thr Pro Asp Gly Ser Lys Asp Leu Asp Lys Ser Leu
 1105 1110 1115 1120
 Met Thr Arg Pro Lys Arg Ala Lys Thr Asn Gln Lys Leu Pro Lys Thr
 1125 1130 1135
 Gly Glu Ala Ser Ser Lys Gly Leu Leu Ala Ala Gly Ile Ala Leu Leu
 1140 1145 1150
 Leu Leu Ala Ile Ser Leu Leu Met Lys Arg Gln Lys Asp
 1155 1160 1165

<210> 29

<211> 1279

<212> PRT

<213> Streptococcus pneumoniae

<400> 29

Met Arg Lys Thr Pro Ser His Thr Glu Lys Lys Met Val Tyr Ser Ile
 1 5 10 15
 Arg Ser Leu Lys Asn Gly Thr Gly Ser Val Leu Ile Gly Ala Ser Leu
 20 25 30
 Val Leu Leu Ala Met Ala Thr Pro Thr Ile Ser Ser Asp Glu Ser Thr
 35 40 45
 Pro Thr Thr Asn Glu Pro Asn Asn Arg Asn Thr Thr Thr Leu Ala Gln
 50 55 60
 Pro Leu Thr Asp Thr Ala Ala Gly Ser Gly Lys Asn Glu Ser Asp Ile
 65 70 75 80
 Ser Ser Pro Gly Asn Ala Asn Ala Ser Leu Glu Lys Thr Glu Glu Lys
 85 90 95
 Pro Ala Ala Ser Pro Ala Asp Pro Ala Pro Gln Thr Gly Gln Asp Arg
 100 105 110
 Ser Ser Glu Pro Thr Thr Ser Thr Ser Pro Val Thr Thr Glu Thr Lys
 115 120 125
 Ala Glu Glu Pro Ile Glu Asp Asn Tyr Phe Arg Ile His Val Lys Lys
 130 135 140
 Leu Pro Glu Glu Asn Lys Asp Ala Gln Gly Leu Trp Thr Trp Asp Asp
 145 150 155 160
 Val Glu Lys Pro Ser Glu Asn Trp Pro Asn Gly Ala Leu Ser Phe Lys
 165 170 175
 Asp Ala Lys Lys Asp Asp Tyr Gly Tyr Leu Asp Val Lys Leu Lys
 180 185 190
 Gly Glu Gln Ala Lys Lys Ile Ser Phe Leu Ile Asn Asn Thr Ala Gly
 195 200 205
 Lys Asn Leu Thr Gly Asp Lys Ser Val Glu Lys Leu Val Pro Lys Met
 210 215 220
 Asn Glu Ala Trp Leu Asp Gln Asp Tyr Lys Val Phe Ser Tyr Glu Pro
 225 230 235 240
 Gln Pro Ala Gly Thr Val Arg Val Asn Tyr Tyr Arg Thr Asp Gly Asn
 245 250 255
 Tyr Asp Lys Lys Ser Leu Trp Tyr Trp Gly Asp Val Lys Asn Pro Ser
 260 265 270

Ser	Ala	Gln	Trp	Pro	Asp	Gly	Thr	Asp	Phe	Thr	Ala	Thr	Gly	Lys	Tyr
		275					280					285			
Gly	Arg	Tyr	Ile	Asp	Ile	Pro	Leu	Asn	Glu	Ala	Ala	Arg	Glu	Phe	Gly
	290					295					300				
Phe	Leu	Leu	Leu	Asp	Glu	Ser	Lys	Gln	Gly	Asp	Asp	Val	Lys	Ile	Arg
305					310					315					320
Lys	Glu	Asn	Tyr	Lys	Phe	Thr	Asp	Leu	Lys	Asn	His	Ser	Gln	Ile	Phe
				325						330				335	
Leu	Lys	Asp	Asp	Asp	Glu	Ser	Ile	Tyr	Thr	Asn	Pro	Tyr	Tyr	Val	His
			340					345					350		
Asp	Ile	Arg	Met	Thr	Gly	Ala	Gln	His	Val	Gly	Thr	Ser	Ser	Ile	Glu
		355					360						365		
Ser	Ser	Phe	Ser	Thr	Leu	Val	Gly	Ala	Lys	Lys	Glu	Asp	Ile	Leu	Lys
	370					375					380				
His	Ser	Asn	Ile	Thr	Asn	His	Leu	Gly	Asn	Lys	Val	Thr	Ile	Thr	Asp
385					390					395					400
Val	Ala	Ile	Asp	Glu	Ala	Gly	Lys	Lys	Val	Thr	Tyr	Ser	Gly	Asp	Phe
				405					410					415	
Ser	Asp	Thr	Lys	His	Pro	Tyr	Thr	Val	Ser	Tyr	Asn	Ser	Asp	Gln	Phe
			420					425					430		
Thr	Thr	Lys	Thr	Ser	Trp	Arg	Leu	Lys	Asp	Glu	Thr	Tyr	Ser	Tyr	Asp
		435					440					445			
Gly	Lys	Leu	Gly	Ala	Asp	Leu	Lys	Glu	Glu	Gly	Lys	Gln	Val	Asp	Leu
	450					455					460				
Thr	Leu	Trp	Ser	Pro	Ser	Ala	Asp	Lys	Val	Ser	Val	Val	Val	Tyr	Asp
465					470					475					480
Lys	Asn	Asp	Pro	Asp	Lys	Val	Val	Gly	Thr	Val	Ala	Leu	Glu	Lys	Gly
				485					490					495	
Glu	Arg	Gly	Thr	Trp	Lys	Gln	Thr	Leu	Asp	Ser	Thr	Asn	Lys	Leu	Gly
			500					505					510		
Ile	Thr	Asp	Phe	Thr	Gly	Tyr	Tyr	Tyr	Gln	Tyr	Gln	Ile	Glu	Arg	Gln
		515					520					525			
Gly	Lys	Thr	Val	Leu	Ala	Leu	Asp	Pro	Tyr	Ala	Lys	Ser	Leu	Ala	Ala
	530					535					540				
Trp	Asn	Ser	Asp	Asp	Ser	Lys	Ile	Asp	Asp	Ala	His	Lys	Val	Ala	Lys
545					550					555					560
Ala	Ala	Phe	Val	Asp	Pro	Ala	Lys	Leu	Gly	Pro	Gln	Asp	Leu	Thr	Tyr
				565					570					575	
Gly	Lys	Ile	His	Asn	Phe	Lys	Thr	Arg	Glu	Asp	Ala	Val	Ile	Tyr	Glu
			580					585					590		
Ala	His	Val	Arg	Asp	Phe	Thr	Ser	Asp	Pro	Ala	Ile	Ala	Lys	Asp	Leu
		595					600					605			
Thr	Lys	Pro	Phe	Gly	Thr	Phe	Glu	Ala	Phe	Ile	Glu	Lys	Leu	Asp	Tyr
	610					615					620				
Leu	Lys	Asp	Leu	Gly	Val	Thr	His	Ile	Gln	Leu	Leu	Pro	Val	Leu	Ser
625					630					635					640
Tyr	Tyr	Phe	Val	Asn	Glu	Leu	Lys	Asn	His	Glu	Arg	Leu	Ser	Asp	Tyr
				645					650					655	
Ala	Ser	Ser	Asn	Ser	Asn	Tyr	Asn	Trp	Gly	Tyr	Asp	Pro	Gln	Asn	Tyr
			660					665					670		
Phe	Ser	Leu	Thr	Gly	Met	Tyr	Ser	Ser	Asp	Pro	Lys	Asn	Pro	Glu	Lys
		675					680					685			
Arg	Ile	Ala	Glu	Phe	Lys	Asn	Leu	Ile	Asn	Glu	Ile	His	Lys	Arg	Gly
	690					695					700				
Met	Gly	Ala	Ile	Leu	Asp	Val	Val	Tyr	Asn	His	Thr	Ala	Lys	Val	Asp

705					710					715				720
Leu	Phe	Glu	Asp	Leu	Glu	Pro	Asn	Tyr	Tyr	His	Phe	Met	Asp	Ala
				725					730					735
Gly	Thr	Pro	Arg	Thr	Ser	Phe	Gly	Gly	Gly	Arg	Leu	Gly	Thr	His
			740					745					750	
His	Met	Thr	Lys	Arg	Leu	Leu	Ile	Asp	Ser	Ile	Lys	Tyr	Leu	Val
	755						760					765		Asp
Thr	Tyr	Lys	Val	Asp	Gly	Phe	Arg	Phe	Asp	Met	Met	Gly	Asp	His
	770					775					780			Asp
Ala	Ala	Ser	Ile	Glu	Glu	Ala	Tyr	Lys	Ala	Ala	Arg	Ala	Leu	Asn
785					790					795				800
Asn	Leu	Ile	Met	Leu	Gly	Glu	Gly	Trp	Arg	Thr	Tyr	Ala	Gly	Asp
				805					810					815
Asn	Met	Pro	Thr	Lys	Ala	Ala	Asp	Gln	Asp	Trp	Met	Lys	His	Thr
			820					825					830	Asp
Thr	Val	Ala	Val	Phe	Ser	Asp	Asp	Ile	Arg	Asn	Asn	Leu	Lys	Ser
	835						840					845		Gly
Tyr	Pro	Asn	Glu	Gly	Gln	Pro	Ala	Phe	Ile	Thr	Gly	Gly	Lys	Arg
	850					855					860			Asp
Val	Asn	Thr	Ile	Phe	Lys	Asn	Leu	Ile	Ala	Gln	Pro	Thr	Asn	Phe
865					870					875				Glu
Ala	Asp	Ser	Pro	Gly	Asp	Val	Ile	Gln	Tyr	Ile	Ala	Ala	His	Asp
				885					890					895
Leu	Thr	Leu	Phe	Asp	Ile	Ile	Ala	Gln	Ser	Ile	Lys	Lys	Asp	Pro
			900					905					910	Ser
Lys	Ala	Glu	Asn	Tyr	Ala	Glu	Ile	His	Arg	Arg	Leu	Arg	Leu	Gly
	915					920						925		Asn
Leu	Met	Val	Leu	Thr	Ala	Gln	Gly	Thr	Pro	Phe	Ile	His	Ser	Gly
	930					935					940			Gln
Glu	Tyr	Gly	Arg	Thr	Lys	Gln	Phe	Arg	Asp	Pro	Ala	Tyr	Lys	Thr
945					950					955				Pro
Val	Ala	Glu	Asp	Lys	Val	Pro	Asn	Lys	Ser	His	Leu	Leu	Arg	Asp
				965					970					Lys
Asp	Gly	Asn	Pro	Phe	Asp	Tyr	Pro	Tyr	Phe	Ile	His	Asp	Ser	Tyr
		980						985					990	Asp
Ser	Ser	Asp	Ala	Val	Asn	Lys	Phe	Asp	Trp	Thr	Lys	Ala	Thr	Asp
	995						1000					1005		Gly
Lys	Ala	Tyr	Pro	Glu	Asn	Val	Lys	Ser	Arg	Asp	Tyr	Met	Lys	Gly
	1010					1015					1020			Leu
Ile	Ala	Leu	Arg	Gln	Ser	Thr	Asp	Ala	Phe	Arg	Leu	Lys	Ser	Leu
1025					1030					1035				Gln
Asp	Ile	Lys	Asp	Arg	Val	His	Leu	Ile	Thr	Val	Pro	Gly	Gln	Asn
				1045					1050					Gly
Val	Glu	Lys	Glu	Asp	Val	Val	Ile	Gly	Tyr	Gln	Ile	Thr	Ala	Pro
			1060					1065					1070	Asn
Gly	Asp	Ile	Tyr	Ala	Val	Phe	Val	Asn	Ala	Asp	Glu	Lys	Ala	Arg
	1075						1080					1085		Glu
Phe	Asn	Leu	Gly	Thr	Ala	Phe	Ala	His	Leu	Arg	Asn	Ala	Glu	Val
	1090					1095					1100			Leu
Ala	Asp	Glu	Asn	Gln	Ala	Gly	Pro	Val	Gly	Ile	Ala	Asn	Pro	Lys
1105					1110					1115				Gly
Leu	Glu	Trp	Thr	Glu	Lys	Gly	Leu	Lys	Leu	Asn	Ala	Leu	Thr	Ala
				1125					1130					Thr
Val	Leu	Arg	Val	Ser	Gln	Asn	Gly	Thr	Ser	His	Glu	Ser	Thr	Ala
			1140					1145					1150	Glu

Glu Lys Pro Asp Ser Thr Pro Ser Lys Pro Glu His Gln Asn Glu Ala
 1155 1160 1165
 Ser His Pro Ala His Gln Asp Pro Ala Pro Glu Ala Arg Pro Asp Ser
 1170 1175 1180
 Thr Lys Pro Asp Ala Lys Val Ala Asp Ala Glu Asn Lys Pro Ser Gln
 1185 1190 1195 1200
 Ala Thr Ala Asp Ser Gln Ala Glu Gln Pro Ala Gln Glu Ala Gln Ala
 1205 1210 1215
 Ser Ser Val Lys Glu Ala Val Arg Asn Glu Ser Val Glu Asn Ser Ser
 1220 1225 1230
 Lys Glu Asn Ile Pro Ala Thr Pro Asp Lys Gln Ala Glu Leu Pro Asn
 1235 1240 1245
 Thr Gly Ile Lys Asn Glu Asn Lys Leu Leu Phe Ala Gly Ile Ser Leu
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<210> 30

<211> 1252

<212> PRT

<213> Streptococcus agalactiae

<400> 30

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 Arg Lys Leu Ser Val Gly Val Ala Ser Val Thr Thr Gly Val Cys Ile
 20 25 30
 Phe Leu His Ser Pro Gln Val Phe Ala Glu Glu Val Ser Val Ser Pro
 35 40 45
 Ala Thr Thr Ala Ile Ala Glu Ser Asn Ile Asn Gln Val Asp Asn Gln
 50 55 60
 Gln Ser Thr Asn Leu Lys Asp Asp Ile Asn Ser Asn Ser Glu Thr Val
 65 70 75 80
 Val Thr Pro Ser Asp Met Pro Asp Thr Lys Gln Leu Val Ser Asp Glu
 85 90 95
 Thr Asp Thr Gln Lys Gly Val Thr Glu Pro Asp Lys Ala Thr Ser Leu
 100 105 110
 Leu Glu Glu Asn Lys Gly Pro Val Ser Asp Lys Asn Thr Leu Asp Leu
 115 120 125
 Lys Val Ala Pro Ser Thr Leu Gln Asn Thr Pro Asp Lys Thr Ser Gln
 130 135 140
 Ala Ile Gly Ala Pro Ser Pro Thr Leu Lys Val Ala Asn Gln Ala Pro
 145 150 155 160
 Arg Ile Glu Asn Gly Tyr Phe Arg Leu His Leu Lys Glu Leu Pro Gln
 165 170 175
 Gly His Pro Val Glu Ser Thr Gly Leu Trp Ile Trp Gly Asp Val Asp
 180 185 190
 Gln Pro Ser Ser Asn Trp Pro Asn Gly Ala Ile Pro Met Thr Asp Ala
 195 200 205
 Lys Lys Asp Asp Tyr Gly Tyr Tyr Val Asp Phe Lys Leu Ser Glu Lys
 210 215 220
 Gln Arg Lys Gln Ile Ser Phe Leu Ile Asn Asn Lys Ala Gly Thr Asn
 225 230 235 240
 Leu Ser Gly Asp His Ile Pro Leu Leu Arg Pro Glu Met Asn Gln
 245 250 255

Val	Trp	Ile	Asp	Glu	Lys	Tyr	Gly	Ile	His	Thr	Tyr	Gln	Pro	Leu	Lys
			260					265					270		
Glu	Gly	Tyr	Val	Arg	Ile	Asn	Tyr	Leu	Ser	Ser	Ser	Ser	Asn	Tyr	Asp
		275					280					285			
His	Leu	Ser	Ala	Trp	Leu	Phe	Lys	Asp	Val	Ala	Thr	Pro	Ser	Thr	Thr
	290					295					300				
Trp	Pro	Asp	Gly	Ser	Asn	Phe	Val	Asn	Gln	Gly	Leu	Tyr	Gly	Arg	Tyr
305					310					315					320
Ile	Asp	Val	Ser	Leu	Lys	Thr	Asn	Ala	Lys	Glu	Ile	Gly	Phe	Leu	Ile
				325					330					335	
Leu	Asp	Glu	Ser	Lys	Thr	Gly	Asp	Ala	Val	Lys	Val	Gln	Pro	Asn	Asp
			340					345					350		
Tyr	Val	Phe	Arg	Asp	Leu	Ala	Asn	His	Asn	Gln	Ile	Phe	Val	Lys	Asp
	355						360					365			
Lys	Asp	Pro	Lys	Val	Tyr	Asn	Asn	Pro	Tyr	Tyr	Ile	Asp	Gln	Val	Gln
	370					375					380				
Leu	Lys	Asp	Ala	Gln	Gln	Ile	Asp	Leu	Thr	Ser	Ile	Gln	Ala	Ser	Phe
385					390					395					400
Thr	Thr	Leu	Asp	Gly	Val	Asp	Lys	Thr	Glu	Ile	Leu	Lys	Glu	Leu	Lys
				405					410					415	
Val	Thr	Asp	Lys	Asn	Gln	Asn	Ala	Ile	Gln	Ile	Ser	Asp	Ile	Thr	Leu
			420					425					430		
Asp	Thr	Ser	Lys	Ser	Leu	Leu	Ile	Ile	Lys	Gly	Asp	Phe	Asn	Pro	Lys
	435						440					445			
Gln	Gly	His	Phe	Asn	Ile	Ser	Tyr	Asn	Gly	Asn	Asn	Val	Met	Thr	Arg
	450					455					460				
Gln	Ser	Trp	Glu	Phe	Lys	Asp	Gln	Leu	Tyr	Ala	Tyr	Ser	Gly	Asn	Leu
465					470					475					480
Gly	Ala	Val	Leu	Asn	Gln	Asp	Gly	Ser	Lys	Val	Glu	Ala	Ser	Leu	Trp
				485					490					495	
Ser	Pro	Ser	Ala	Asp	Ser	Val	Thr	Met	Ile	Ile	Tyr	Asp	Lys	Asp	Asn
			500					505					510		
Gln	Asn	Arg	Val	Val	Ala	Thr	Thr	Pro	Leu	Val	Lys	Asn	Asn	Lys	Gly
	515						520					525			
Val	Trp	Gln	Thr	Ile	Leu	Asp	Thr	Lys	Leu	Gly	Ile	Lys	Asn	Tyr	Thr
	530					535					540				
Gly	Tyr	Tyr	Tyr	Leu	Tyr	Glu	Ile	Lys	Arg	Gly	Lys	Asp	Lys	Val	Lys
545					550					555					560
Ile	Leu	Asp	Pro	Tyr	Ala	Lys	Ser	Leu	Ala	Glu	Trp	Asp	Ser	Asn	Thr
				565					570					575	
Val	Asn	Asp	Asp	Ile	Lys	Thr	Ala	Lys	Ala	Ala	Phe	Val	Asn	Pro	Ser
			580					585					590		
Gln	Leu	Gly	Pro	Gln	Asn	Leu	Ser	Phe	Ala	Lys	Ile	Ala	Asn	Phe	Lys
	595						600					605			
Gly	Arg	Gln	Asp	Ala	Val	Ile	Tyr	Glu	Ala	His	Val	Arg	Asp	Phe	Thr
	610					615					620				
Ser	Asp	Arg	Ser	Leu	Asp	Gly	Lys	Leu	Lys	Asn	Gln	Phe	Gly	Thr	Phe
625					630					635					640
Ala	Ala	Phe	Ser	Glu	Lys	Leu	Asp	Tyr	Leu	Gln	Lys	Leu	Gly	Val	Thr
				645					650					655	
His	Ile	Gln	Leu	Leu	Pro	Val	Leu	Ser	Tyr	Phe	Tyr	Val	Asn	Glu	Met
			660					665					670		
Asp	Lys	Ser	Arg	Ser	Thr	Ala	Tyr	Thr	Ser	Ser	Asp	Asn	Asn	Tyr	Asn
	675						680					685			
Trp	Gly	Tyr	Asp	Pro	Gln	Ser	Tyr	Phe	Ala	Leu	Ser	Gly	Met	Tyr	Ser

690	695	700
Glu Lys Pro Lys Asp Pro Ser Ala Arg Ile Ala Glu Leu Lys Gln Leu		
705	710	715
Ile His Asp Ile His Lys Arg Gly Met Gly Val Ile Leu Asp Val Val		
	725	730
Tyr Asn His Thr Ala Lys Thr Tyr Leu Phe Glu Asp Ile Glu Pro Asn		
	740	745
Tyr Tyr His Phe Met Asn Glu Asp Gly Ser Pro Arg Glu Ser Phe Gly		
	755	760
Gly Gly Arg Leu Gly Thr Thr His Ala Met Ser Arg Arg Val Leu Val		
	770	775
Asp Ser Ile Lys Tyr Leu Thr Ser Glu Phe Lys Val Asp Gly Phe Arg		
785	790	795
Phe Asp Met Met Gly Asp His Asp Ala Ala Ile Glu Leu Ala Tyr		
	805	810
Lys Glu Ala Lys Ala Ile Asn Pro Asn Met Ile Met Ile Gly Glu Gly		
	820	825
Trp Arg Thr Phe Gln Gly Asp Gln Gly Gln Pro Val Lys Pro Ala Asp		
	835	840
Gln Asp Trp Met Lys Ser Thr Asp Thr Val Gly Val Phe Ser Asp Asp		
	850	855
Ile Arg Asn Ser Leu Lys Ser Gly Phe Pro Asn Glu Gly Thr Pro Ala		
865	870	875
Phe Ile Thr Gly Gly Pro Gln Ser Leu Gln Gly Ile Phe Lys Asn Ile		
	885	890
Lys Ala Gln Pro Gly Asn Phe Glu Ala Asp Ser Pro Gly Asp Val Val		
	900	905
Gln Tyr Ile Ala Ala His Asp Asn Leu Thr Leu His Asp Val Ile Ala		
	915	920
Lys Ser Ile Asn Lys Asp Pro Lys Val Ala Glu Glu Glu Ile His Arg		
	930	935
Arg Leu Arg Leu Gly Asn Val Met Ile Leu Thr Ser Gln Gly Thr Ala		
945	950	955
Phe Ile His Ser Gly Gln Glu Tyr Gly Arg Thr Lys Arg Leu Leu Asn		
	965	970
Pro Asp Tyr Met Thr Lys Val Ser Asp Asp Lys Leu Pro Asn Lys Ala		
	980	985
Thr Leu Ile Glu Ala Val Lys Glu Tyr Pro Tyr Phe Ile His Asp Ser		
	995	1000
Tyr Asp Ser Ser Asp Ala Ile Asn His Phe Asp Trp Ala Ala Ala Thr		
	1010	1015
Asp Asn Asn Lys His Pro Ile Ser Thr Lys Thr Gln Ala Tyr Thr Ala		
1025	1030	1035
Gly Leu Ile Thr Leu Arg Arg Ser Thr Asp Ala Phe Arg Lys Leu Ser		
	1045	1050
Lys Ala Glu Ile Asp Arg Glu Val Ser Leu Ile Thr Glu Val Gly Gln		
	1060	1065
Gly Asp Ile Lys Glu Lys Asp Leu Val Ile Ala Tyr Gln Thr Ile Asp		
	1075	1080
Ser Lys Gly Asp Ile Tyr Ala Val Phe Val Asn Ala Asp Ser Lys Ala		
	1090	1095
Arg Asn Val Leu Leu Gly Glu Lys Tyr Lys His Leu Leu Lys Gly Gln		
1105	1110	1115
Val Ile Val Asp Ala Asp Gln Ala Gly Ile Lys Pro Ile Ser Thr Pro		
	1125	1130
		1135

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Arg Gly Val His Phe Glu Lys Asp Ser Leu Leu Ile Asp Pro Leu Thr
      1140      1145      1150
Ala Ile Val Ile Lys Val Gly Lys Val Ala Pro Ser Pro Lys Glu Glu
      1155      1160      1165
Leu Gln Ala Asp Tyr Pro Lys Thr Gln Ser Phe Lys Glu Ser Lys Thr
      1170      1175      1180
Val Glu Lys Val Asn Arg Ile Ala Asn Lys Thr Ser Ile Thr Pro Val
      1185      1190      1195      1200
Val Ser Lys Lys Ala Asp Ser Tyr Leu Thr Asn Glu Ala Asn Leu Pro
      1205      1210      1215
Lys Thr Gly Asp Lys Ser Ser Lys Ile Leu Ser Val Val Gly Ile Ser
      1220      1225      1230
Ile Leu Ala Ser Leu Leu Ala Leu Val Gly Leu Ser Leu Lys Arg Asn
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Arg His Leu Lys
      1250

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<210> 31

<211> 1123

<212> PRT

<213> Streptococcus agalactiae

<400> 31

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Met Ala Pro Ser Thr Leu Gln Asn Thr Pro Asp Lys Thr Ser Gln Ala
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Ile Glu Asn Gly Tyr Phe Arg Leu His Leu Lys Glu Leu Pro Gln Gly
      35      40      45
His Pro Val Glu Ser Thr Gly Leu Trp Ile Trp Gly Asp Val Asp Gln
      50      55      60
Pro Ser Ser Asn Trp Pro Asn Gly Ala Ile Pro Met Thr Asp Ala Lys
      65      70      75      80
Lys Asp Asp Tyr Gly Tyr Tyr Val Asp Phe Lys Leu Ser Glu Lys Gln
      85      90      95
Arg Lys Gln Ile Ser Phe Leu Ile Asn Asn Lys Ala Gly Thr Asn Leu
      100      105      110
Ser Gly Asp His His Ile Ser Leu Leu Arg Pro Glu Met Asn Gln Val
      115      120      125
Trp Ile Asp Glu Lys Tyr Gly Ile His Thr Tyr Gln Pro Leu Lys Glu
      130      135      140
Gly Tyr Val Arg Ile Asn Tyr Leu Ser Ser Ser Gly Asn Tyr Asp His
      145      150      155      160
Leu Ser Ala Trp Leu Phe Lys Asp Val Ala Asn Pro Ser Thr Thr Trp
      165      170      175
Pro Asp Gly Ser Asn Phe Val Asn Gln Gly Leu Tyr Gly Arg Tyr Ile
      180      185      190
Asp Val Pro Leu Lys Thr Asn Ala Lys Glu Ile Gly Phe Leu Ile Leu
      195      200      205
Asp Glu Ser Lys Thr Gly Asp Ala Val Lys Val Gln Pro Asn Asp Tyr
      210      215      220
Val Phe Arg Asp Leu Ala Asn His Asn Gln Ile Phe Val Lys Asp Lys
      225      230      235      240
Asp Pro Lys Val Tyr Asn Asn Pro Tyr Tyr Ile Asp Gln Val Gln Leu
      245      250      255

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Lys	Asp	Ala	Gln	Gln	Ile	Asp	Leu	Thr	Ser	Ile	Gln	Ala	Ser	Phe	Thr
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Thr	Leu	Asp	Gly	Val	Asp	Lys	Thr	Glu	Ile	Leu	Lys	Glu	Leu	Lys	Val
		275					280					285			
Thr	Asp	Lys	Asn	Gln	Asn	Ala	Ile	Gln	Ile	Ser	Asp	Ile	Thr	Leu	Asp
	290					295					300				
Thr	Ser	Lys	Ser	Leu	Leu	Ile	Ile	Lys	Gly	Asp	Phe	Asn	Pro	Lys	Gln
305					310					315					320
Gly	His	Phe	Asn	Ile	Ser	Tyr	Asn	Gly	Asn	Asn	Val	Met	Thr	Arg	Gln
			325					330						335	
Ser	Trp	Glu	Phe	Lys	Asp	Gln	Leu	Tyr	Ala	Tyr	Ser	Gly	Asn	Leu	Gly
		340						345					350		
Ala	Val	Phe	Asn	Gln	Asp	Gly	Ser	Lys	Val	Glu	Ala	Ser	Leu	Trp	Ser
		355					360					365			
Pro	Ser	Ala	Asp	Ser	Val	Thr	Met	Ile	Ile	Tyr	Asp	Lys	Asp	Asn	Gln
	370					375					380				
Asn	Arg	Val	Val	Ala	Thr	Thr	Pro	Leu	Val	Lys	Asn	Asn	Lys	Gly	Val
385					390					395					400
Trp	Gln	Thr	Ile	Leu	Asp	Thr	Lys	Leu	Gly	Ile	Lys	Asn	Tyr	Thr	Gly
			405						410					415	
Tyr	Tyr	Tyr	Leu	Tyr	Glu	Ile	Lys	Arg	Gly	Lys	Asp	Lys	Val	Lys	Ile
		420					425						430		
Leu	Asp	Pro	Tyr	Ala	Lys	Ser	Leu	Ala	Glu	Trp	Asp	Ser	Asn	Thr	Val
	435						440					445			
Asn	Asp	Asp	Ile	Lys	Thr	Ala	Lys	Ala	Ala	Phe	Val	Asn	Pro	Ser	Gln
	450					455					460				
Leu	Gly	Pro	Gln	Asn	Leu	Ser	Phe	Ala	Lys	Ile	Ala	Asn	Phe	Lys	Gly
465					470					475					480
Arg	Gln	Asp	Ala	Val	Ile	Tyr	Glu	Ala	His	Val	Arg	Asp	Phe	Thr	Ser
			485						490					495	
Asp	Arg	Ser	Leu	Asp	Gly	Lys	Leu	Lys	Asn	Gln	Phe	Gly	Thr	Phe	Ala
		500						505					510		
Ala	Phe	Ser	Glu	Lys	Leu	Asp	Tyr	Leu	Gln	Lys	Leu	Gly	Val	Thr	His
		515					520					525			
Ile	Gln	Leu	Leu	Pro	Val	Leu	Ser	Tyr	Phe	Tyr	Val	Asn	Glu	Met	Asp
	530					535					540				
Lys	Ser	Arg	Ser	Thr	Ala	Tyr	Thr	Ser	Ser	Asp	Asn	Asn	Tyr	Asn	Trp
545					550					555					560
Gly	Tyr	Asp	Pro	Gln	Ser	Tyr	Phe	Ala	Leu	Ser	Gly	Met	Tyr	Ser	Glu
			565						570					575	
Lys	Pro	Lys	Asp	Pro	Ser	Ala	Arg	Ile	Ala	Glu	Leu	Lys	Gln	Leu	Ile
		580					585						590		
His	Asp	Ile	His	Lys	Arg	Gly	Met	Gly	Val	Ile	Leu	Asp	Val	Val	Tyr
	595					600						605			
Asn	His	Thr	Ala	Lys	Thr	Tyr	Leu	Phe	Glu	Asp	Ile	Glu	Pro	Asn	Tyr
	610					615					620				
Tyr	His	Phe	Met	Asn	Glu	Asp	Gly	Ser	Pro	Arg	Glu	Ser	Phe	Gly	Gly
625					630					635					640
Gly	Arg	Leu	Gly	Thr	Thr	His	Ala	Met	Ser	Arg	Arg	Val	Leu	Val	Asp
			645						650					655	
Ser	Ile	Lys	Tyr	Leu	Thr	Asn	Glu	Phe	Lys	Val	Asp	Gly	Phe	Arg	Phe
		660						665					670		
Asp	Met	Met	Gly	Asp	His	Asp	Ala	Ala	Ala	Ile	Glu	Leu	Ala	Tyr	Lys
		675					680					685			
Glu	Ala	Lys	Ala	Ile	Asn	Pro	Asn	Met	Ile	Met	Ile	Gly	Glu	Gly	Trp

690	695	700
Arg Thr Phe Gln Gly Asp Gln Gly Lys Pro Val Lys Pro Ala Asp Gln		
705	710	715
Asp Trp Met Lys Ser Thr Asp Thr Val Gly Val Phe Ser Asp Asp Ile		
	725	730
Arg Asn Ser Leu Lys Ser Gly Phe Pro Asn Glu Gly Thr Pro Ala Phe		
	740	745
Ile Thr Gly Gly Pro Gln Ser Leu Gln Gly Ile Phe Lys Asn Ile Lys		
	755	760
Ala Gln Pro Gly Asn Phe Glu Ala Asp Ser Pro Gly Asp Val Val Gln		
	770	775
Tyr Ile Ala Ala His Asp Asn Leu Thr Leu His Asp Val Ile Ala Lys		
785	790	795
Ser Ile Asn Lys Asp Pro Lys Val Ala Glu Glu Ile His Arg Arg		
	805	810
Leu Arg Leu Gly Asn Val Met Ile Leu Thr Ser Gln Gly Thr Ala Phe		
	820	825
Ile His Ser Gly Gln Glu Tyr Gly Arg Thr Lys Arg Leu Leu Asn Pro		
	835	840
Asp Tyr Met Thr Lys Val Ser Asp Asp Lys Leu Pro Asn Lys Ala Thr		
	850	855
Leu Ile Glu Ala Val Lys Glu Tyr Pro Tyr Phe Ile His Asp Ser Tyr		
865	870	875
Asp Ser Ser Asp Ala Ile Asn His Phe Asp Trp Ala Ala Ala Thr Asp		
	885	890
Asn Asn Lys His Pro Ile Ser Thr Lys Thr Gln Ala Tyr Thr Ala Gly		
	900	905
Leu Ile Thr Leu Arg Arg Ser Thr Asp Ala Phe Arg Lys Leu Ser Lys		
	915	920
Ala Lys Ile Asp Leu Glu Val Ser Leu Ile Thr Glu Val Gly Gln Gly		
	930	935
Asp Ile Lys Glu Lys Asp Leu Val Ile Ala Tyr Gln Thr Ile Asp Ser		
945	950	955
Lys Gly Asp Ile Tyr Ala Val Phe Val Asn Ala Asp Ser Lys Ala Arg		
	965	970
Asn Val Leu Leu Gly Glu Lys Tyr Lys His Leu Leu Lys Gly Gln Val		
	980	985
Ile Val Asp Ala Asp Gln Ala Gly Ile Lys Pro Ile Ser Thr Pro Arg		
	995	1000
Gly Val His Phe Glu Lys Asp Ser Leu Leu Ile Asp Pro Leu Thr Ala		
	1010	1015
Ile Val Ile Lys Val Gly Lys Val Ala Pro Ser Pro Lys Glu Glu Leu		
1025	1030	1035
Gln Ala Asp Tyr Pro Lys Thr Gln Ser Phe Lys Glu Ser Lys Thr Val		
	1045	1050
Glu Lys Val Asn Arg Ile Ala Asn Lys Thr Ser Ile Ile Pro Val Val		
	1060	1065
Ser Lys Lys Ala Asp Ser Tyr Leu Thr Asn Glu Ala Asn Leu Pro Lys		
	1075	1080
Thr Gly Asp Lys Ser Ser Lys Ile Leu Ser Val Val Gly Ile Ser Ile		
	1090	1095
Leu Ala Ser Leu Leu Ala Leu Leu Gly Leu Ser Leu Lys Arg Asn Arg		
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His Leu Lys		1120

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Arg	Lys	Leu	Ser	Val	Gly	Val	Ala	Ser	Val	Ala	Thr	Gly	Val	Cys 30	Ile
			20					25							
Phe	Leu	His	Ser	Pro	Gln	Val	Phe	Ala	Glu	Glu	Val	Ser	Val	Ser	Pro
		35					40					45			
Ala	Thr	Thr	Ala	Ile	Ala	Glu	Ser	Asn	Ile	Asn	Gln	Val	Asp	Asn	Gln
	50					55					60				
Gln	Ser	Thr	Asn	Leu	Lys	Asp	Asp	Ile	Asn	Ser	Asn	Ser	Glu	Thr	Val
65				70						75				80	
Val	Thr	Pro	Ser	Asp	Met	Pro	Asp	Thr	Lys	Gln	Leu	Val	Ser	Asp	Glu
				85					90					95	
Thr	Asp	Thr	Gln	Lys	Gly	Val	Thr	Glu	Pro	Asp	Lys	Ala	Thr	Ser	Leu
			100					105					110		
Leu	Glu	Glu	Asn	Lys	Gly	Pro	Val	Ser	Asp	Lys	Asn	Thr	Leu	Asp	Leu
		115				120					125				
Lys	Val	Ala	Pro	Ser	Thr	Leu	Gln	Asn	Thr	Pro	Asp	Lys	Thr	Ser	Gln
	130					135				140					
Ala	Ile	Gly	Ala	Pro	Ser	Pro	Thr	Leu	Lys	Val	Ala	Asn	Gln	Ala	Pro
145				150						155				160	
Arg	Ile	Glu	Asn	Gly	Tyr	Phe	Arg	Leu	His	Leu	Lys	Glu	Leu	Pro	Gln
				165					170					175	
Gly	His	Pro	Val	Glu	Ser	Thr	Gly	Leu	Trp	Ile	Trp	Gly	Asp	Val	Asp
			180					185					190		
Gln	Pro	Ser	Ser	Asn	Trp	Pro	Asn	Gly	Ala	Ile	Pro	Met	Thr	Asp	Ala
		195				200					205				
Lys	Lys	Asp	Asp	Tyr	Gly	Tyr	Tyr	Val	Asp	Phe	Lys	Leu	Ser	Glu	Lys
	210				215					220					
Gln	Arg	Lys	Gln	Ile	Ser	Phe	Leu	Ile	Asn	Asn	Lys	Ala	Gly	Thr	Asn
225				230						235				240	
Leu	Ser	Gly	Asp	His	His	Ile	Pro	Leu	Leu	Arg	Pro	Glu	Met	Asn	Gln
				245					250					255	
Val	Trp	Ile	Asp	Glu	Lys	Tyr	Gly	Ile	His	Thr	Tyr	Gln	Pro	Leu	Lys
			260					265					270		
Glu	Gly	Tyr	Val	Arg	Ile	Asn	Tyr	Leu	Ser	Ser	Ser	Gly	Asn	Tyr	Asp
		275				280						285			
His	Leu	Ser	Ala	Trp	Leu	Phe	Lys	Asp	Val	Ala	Asn	Pro	Ser	Thr	Thr
	290					295				300					
Trp	Pro	Asp	Gly	Ser	Asn	Phe	Val	Asn	Gln	Gly	Leu	Tyr	Gly	Arg	Tyr
305				310						315				320	
Ile	Asp	Val	Pro	Leu	Lys	Thr	Asn	Ala	Lys	Glu	Ile	Gly	Phe	Leu	Ile
				325					330					335	
Leu	Asp	Glu	Ser	Lys	Thr	Gly	Asp	Ala	Val	Lys	Val	Gln	Pro	Asn	Asp
			340					345					350		
Tyr	Val	Phe													

Leu	Lys	Asp	Ala	Gln	Gln	Ile	Asp	Leu	Thr	Ser	Ile	Gln	Ala	Ser	Phe
385					390					395					400
Thr	Thr	Leu	Asp	Gly	Val	Asp	Lys	Thr	Glu	Ile	Leu	Lys	Glu	Leu	Lys
				405					410						415
Val	Thr	Asp	Lys	Asn	Gln	Asn	Ala	Ile	Gln	Ile	Ser	Asp	Ile	Thr	Leu
			420					425					430		
Asp	Thr	Ser	Lys	Ser	Leu	Leu	Ile	Ile	Lys	Gly	Asp	Phe	Asn	Pro	Lys
		435					440					445			
Gln	Gly	His	Phe	Asn	Ile	Ser	Tyr	Asn	Gly	Asn	Asn	Val	Thr	Thr	Arg
	450					455					460				
Gln	Ser	Trp	Glu	Phe	Lys	Asp	Gln	Leu	Tyr	Ala	Tyr	Ser	Gly	Asn	Leu
465					470					475					480
Gly	Ala	Val	Leu	Asn	Gln	Asp	Gly	Ser	Lys	Val	Glu	Ala	Ser	Leu	Trp
				485					490						495
Ser	Pro	Ser	Ala	Asp	Ser	Val	Thr	Met	Ile	Ile	Tyr	Asp	Lys	Asp	Asn
			500					505					510		
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Lys	Glu	Ala	Lys	Ala	Ile	Asn	Ser	Asn	Met	Ile	Met	Ile	Gly	Glu	Gly

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

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