

# SEQUENCE LISTING

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 <120> Method for the detection of H. pylori infection  
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 <150> EP 13 004 038.9  
 <151> 2013-08-13  
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 atggagttat taaaaacccg ctatgacatc atggcagagc gttttgctgc ctatgacgag 1980  
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<220>  
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 <223> H. pylori strain G27

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Asn Pro Gln Gln Phe Ile Asn Asn Leu Gln Val Ala Phe Leu Lys Val  
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Asp Asn Ala Val Ala Ser Tyr Asp Pro Asp Gln Lys Pro Ile Val Asp  
 35 40 45

Lys Asn Asp Arg Asp Asn Arg Gln Ala Phe Asn Gly Ile Ser Gln Leu  
 50 55 60

Arg Glu Glu Tyr Ser Asn Lys Ala Ile Lys Asn Pro Ala Lys Lys Asn

65					70						75				80
Gln	Tyr	Phe	Ser	Asp	Phe	Ile	Asp	Lys	Ser	Asn	Asn	Leu	Ile	Asn	Lys
				85					90					95	
Asp	Ala	Leu	Ile	Asp	Val	Glu	Ser	Ser	Thr	Lys	Ser	Phe	Gln	Lys	Phe
			100					105					110		
Gly	Asp	Gln	Arg	Tyr	Gln	Ile	Phe	Thr	Ser	Trp	Val	Ser	His	Gln	Asn
		115					120					125			
Asp	Pro	Ser	Lys	Ile	Asn	Thr	Arg	Ser	Ile	Arg	Asn	Phe	Met	Glu	Asn
	130					135					140				
Ile	Ile	Gln	Pro	Pro	Ile	Pro	Asp	Asp	Lys	Glu	Lys	Ala	Glu	Phe	Leu
145					150					155					160
Lys	Ser	Ala	Lys	Gln	Ser	Phe	Ala	Gly	Ile	Ile	Ile	Gly	Asn	Gln	Ile
				165					170					175	
Arg	Thr	Asp	Gln	Lys	Phe	Met	Gly	Val	Phe	Asp	Glu	Ser	Leu	Lys	Glu
			180					185					190		
Arg	Gln	Glu	Ala	Glu	Lys	Asn	Gly	Gly	Pro	Thr	Gly	Gly	Asp	Trp	Leu
		195					200					205			
Asp	Ile	Phe	Leu	Ser	Phe	Ile	Phe	Asp	Lys	Lys	Gln	Ser	Ser	Asp	Val
	210					215					220				
Lys	Glu	Ala	Ile	Asn	Gln	Glu	Pro	Val	Pro	His	Val	Gln	Pro	Asp	Ile
225					230					235					240
Ala	Thr	Thr	Thr	Thr	Asp	Ile	Gln	Gly	Leu	Pro	Pro	Glu	Ala	Arg	Asp
				245					250					255	
Leu	Leu	Asp	Glu	Arg	Gly	Asn	Phe	Ser	Lys	Phe	Thr	Leu	Gly	Asp	Met
			260					265					270		
Glu	Met	Leu	Asp	Val	Glu	Gly	Val	Ala	Asp	Ile	Asp	Pro	Asn	Tyr	Lys
		275					280					285			
Phe	Asn	Gln	Leu	Leu	Ile	His	Asn	Asn	Ala	Leu	Ser	Ser	Val	Leu	Met
	290					295					300				

Gly Ser His Asn Gly Ile Glu Pro Glu Lys Val Ser Leu Leu Tyr Gly  
 305 310 315 320

Gly Asn Gly Gly Pro Lys Ala Lys His Asp Trp Asn Ala Thr Val Gly  
 325 330 335

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

Met Lys Asn Gly Ser Gly Leu Val Ile Ala Gly Gly Glu Lys Gly Ile  
 355 360 365

Asn Asn Pro Ser Phe Tyr Leu Tyr Lys Glu Asp Gln Leu Thr Gly Ser  
 370 375 380

Gln Arg Ala Leu Ser Gln Glu Glu Ile Arg Asn Lys Val Asp Phe Met  
 385 390 395 400

Glu Phe Leu Ala Gln Asn Asn Ala Lys Leu Asp Asn Leu Ser Glu Lys  
 405 410 415

Glu Glu Glu Lys Phe Arg Asn Glu Ile Lys Asp Phe Gln Lys Asp Ser  
 420 425 430

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

Lys Lys Asp Thr Lys His Ser Ala Leu Ile Thr Glu Phe Gly Asn Gly  
 450 455 460

Asp Leu Ser Tyr Thr Leu Lys Asp Tyr Gly Lys Lys Ala Asp Lys Ala  
 465 470 475 480

Leu Asp Arg Glu Lys Asn Val Thr Leu Gln Gly Asn Leu Lys His Asp  
 485 490 495

Gly Val Met Phe Val Asp Tyr Ser Asn Phe Lys Tyr Thr Asn Ala Ser  
 500 505 510

Lys Asn Pro Asn Lys Gly Val Gly Val Thr Asn Gly Val Ser His Leu  
 515 520 525

Glu Ala Gly Phe Ser Lys Val Ala Val Phe Asn Leu Pro Asp Leu Asn  
 530 535 540



Asn Leu Ala Ile Thr Ser Leu Val Arg Arg Asp Leu Glu Asp Lys Leu  
545 550 555 560

Ile Ala Lys Gly Leu Ser Pro Gln Glu Thr Asn Lys Leu Val Lys Asp  
565 570 575

Phe Leu Ser Ser Asn Lys Glu Leu Val Gly Lys Ala Leu Asn Phe Asn  
580 585 590

Lys Ala Val Ala Glu Ala Lys Asn Thr Gly Asn Tyr Asp Glu Val Lys  
595 600 605

Gln Ala Gln Lys Asp Leu Glu Lys Ser Leu Lys Lys Arg Glu Arg Leu  
610 615 620

Glu Lys Glu Val Ala Lys Lys Leu Glu Ser Lys Ser Gly Asn Lys Asn  
625 630 635 640

Lys Met Glu Ala Lys Ser Gln Ala Asn Ser Gln Lys Asp Glu Ile Phe  
645 650 655

Ala Leu Ile Asn Lys Glu Ala Asn Arg Glu Ala Arg Ala Ile Thr Tyr  
660 665 670

Ala Gln Asn Leu Lys Gly Ile Lys Arg Glu Leu Ser Asp Lys Leu Glu  
675 680 685

Asn Val Asn Lys Asn Leu Lys Asp Phe Ser Lys Ser Phe Asp Glu Phe  
690 695 700

Lys Asn Gly Lys Asn Lys Asp Phe Ser Lys Ser Glu Glu Thr Leu Lys  
705 710 715 720

Ala Leu Lys Gly Ser Val Lys Asp Leu Gly Ile Asn Pro Glu Trp Ile  
725 730 735

Ser Lys Val Glu Asn Leu Asn Ala Ala Leu Asn Glu Phe Lys Asn Gly  
740 745 750

Lys Asn Lys Asp Phe Ser Lys Val Thr Gln Ala Lys Ser Asp Leu Glu  
755 760 765

Asn Ser Val Lys Asp Val Ile Ile Asn Gln Lys Val Thr Asp Lys Val  
770 775 780

Asp Asn Leu Asn Gln Ala Val Ser Val Ala Lys Ala Thr Gly Asp Phe  
785 790 795 800

Ser Arg Val Glu Gln Ala Leu Ala Asp Leu Lys Asn Phe Ser Lys Glu  
805 810 815

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

Asn Ser Ala Leu Tyr Gln Ser Val Lys Asn Gly Val Asn Gly Thr Leu  
835 840 845

Val Gly Asn Gly Leu Ser Lys Ala Glu Ala Thr Thr Leu Ser Lys Asn  
850 855 860

Phe Ser Asp Ile Lys Lys Glu Leu Asn Ala Lys Leu Gly Asn Phe Asn  
865 870 875 880

Asn Asn Asn Asn Asn Gly Leu Lys Asn Ser Thr Glu Pro Ile Tyr Ala  
885 890 895

Lys Val Asn Lys Lys Lys Ala Gly Gln Ala Ala Ser Pro Glu Glu Pro  
900 905 910

Ile Tyr Ala Gln Val Ala Lys Lys Val Asn Ala Lys Ile Asp Arg Leu  
915 920 925

Asn Gln Ile Ala Ser Gly Leu Gly Val Val Gly Gln Ala Val Gly Phe  
930 935 940

Pro Leu Lys Arg His Asp Lys Val Gly Asp Leu Ser Lys Val Gly Gln  
945 950 955 960

Ser Val Ser Pro Glu Pro Ile Tyr Ala Thr Ile Asp Asp Leu Gly Gly  
965 970 975

Pro Phe Pro Leu Lys Arg His Asp Lys Val Gly Asp Leu Ser Lys Val  
980 985 990

Gly Leu Ser Val Ser Pro Glu Pro Ile Tyr Ala Thr Ile Asp Asp Leu  
995 1000 1005

Gly Gly Pro Phe Pro Leu Lys Arg His Asp Lys Val Gly Asp Leu

1010		1015		1020
Ser Lys Val Gly Leu Ser Arg Glu Gln Gln Leu Lys Gln Lys Ile				
1025		1030		1035
Asp Asn Leu Ser Gln Ala Val Ser Glu Ala Lys Ala Gly Phe Phe				
1040		1045		1050
Gly Asn Leu Glu Gln Thr Ile Asp Asn Leu Lys Asp Ser Ala Lys				
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Asn Asn Pro Val Ser Leu Trp Ala Glu Gly Ala Lys Lys Val Pro				
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Ala Ser Leu Ser Ala Lys Leu Asp Asn Tyr Ala Thr Asn Ser His				
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Thr Arg Ile Asn Ser Asn Ile Gln Ser Gly Ala Ile Asn Glu Lys				
1100		1105		1110
Ala Thr Gly Met Leu Thr Gln Lys Asn Pro Glu Trp Leu Lys Leu				
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Val Asn Asp Lys Ile Val Ala His Asn Val Gly Ser Val Pro Leu				
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Leu Glu Tyr Asp Lys Ile Gly Phe Asn Gln Lys Ser Met Lys Asp				
1145		1150		1155
Tyr Ser Asp Ser Phe Lys Phe Ser Thr Glu Leu Asn Asn Ala Val				
1160		1165		1170
Lys Asp Val Lys Ser Gly Phe Thr Gln Phe Leu Ala Asn Ala Phe				
1175		1180		1185
Ser Thr Gly Tyr Tyr Arg Leu Ala Gly Glu Asn Ala Glu His Gly				
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Ile Lys Asn Val Asn Thr Lys Gly Gly Ser Lys Asn Leu Lys Gly				
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Leu Arg Asn Thr Lys Asn Ala Lys Thr Thr Pro Cys				
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 <223> H. pylori strain G27

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Ala Ala Phe Phe Thr Thr Val Ile Ile Pro Ala Ile Val Gly Gly Ile  
 35 40 45

Ala Thr Gly Thr Ala Val Gly Thr Val Ser Gly Leu Leu Ser Trp Gly  
 50 55 60

Leu Lys Gln Ala Glu Glu Ala Asn Lys Asn Pro Asp Lys Pro Asp Lys  
 65 70 75 80

Val Trp Arg Ile Gln Ala Gly Lys Gly Phe Asn Glu Phe Pro Asn Lys  
 85 90 95

Glu Tyr Asp Leu Tyr Lys Ser Leu Leu Ser Ser Lys Ile Asp Gly Gly  
 100 105 110

Trp Asp Trp Gly Asn Ala Ala Arg His Tyr Trp Val Lys Gly Gly Gln  
115 120 125

Trp Asn Lys Leu Glu Val Asp Met Lys Asp Ala Val Gly Thr Tyr Lys  
130 135 140

Leu Ser Gly Leu Arg Asn Phe Thr Gly Gly Asp Leu Asp Val Asn Met  
145 150 155 160

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

Ser Tyr Lys Asp Ala Ala Asp Arg Thr Thr Arg Val Asn Phe Asn Ala  
180 185 190

Lys Asn Ile Ser Ile Asp Asn Phe Val Glu Ile Asn Asn Arg Val Gly  
195 200 205

Ser Gly Ala Gly Arg Lys Ala Ser Ser Thr Val Leu Thr Leu Gln Ala  
210 215 220

Ser Glu Gly Ile Thr Ser Asp Lys Asn Ala Glu Ile Ser Leu Tyr Asp  
225 230 235 240

Gly Ala Thr Leu Asn Leu Ala Ser Ser Ser Val Lys Leu Met Gly Asn  
245 250 255

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

Tyr Ser Thr Ile Asn Thr Ser Lys Val Thr Gly Glu Val Asn Phe Asn  
275 280 285

His Leu Thr Val Gly Asp Lys Asn Ala Ala Gln Ala Gly Ile Ile Ala  
290 295 300

Ser Asn Lys Thr His Ile Gly Thr Leu Asp Leu Trp Gln Ser Ala Gly  
305 310 315 320

Leu Asn Ile Ile Ala Pro Pro Glu Gly Gly Tyr Lys Asp Lys Pro Asn  
325 330 335

Asn Thr Pro Ser Gln Ser Gly Thr Lys Asn Asp Lys Asn Glu Ser Ala  
340 345 350

Lys Asn Asp Lys Gln Glu Ser Ser Gln Asn Asn Ser Asn Thr Gln Val  
355 360 365

Ile Asn Pro Pro Asn Ser Thr Gln Lys Thr Glu Ile Gln Pro Thr Gln  
370 375 380

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

Asn Arg Ile Asn Thr Asn Ala Asp Gly Thr Ile Arg Val Gly Gly Phe  
405 410 415

Lys Ala Ser Leu Thr Thr Asn Ala Ala His Leu His Ile Gly Lys Gly  
420 425 430

Gly Val Asn Leu Ser Asn Gln Ala Ser Gly Arg Thr Leu Leu Val Glu  
435 440 445

Asn Leu Thr Gly Asn Ile Thr Val Asp Gly Pro Leu Arg Val Asn Asn  
450 455 460

Gln Val Gly Gly Tyr Ala Leu Ala Gly Ser Ser Ala Asn Phe Glu Phe  
465 470 475 480

Lys Ala Gly Val Asp Thr Lys Asn Gly Thr Ala Thr Phe Asn Asn Asp  
485 490 495

Ile Ser Leu Gly Arg Phe Val Asn Leu Lys Val Asp Ala His Thr Ala  
500 505 510

Asn Phe Lys Gly Ile Asp Thr Gly Asn Gly Gly Phe Asn Thr Leu Asp  
515 520 525

Phe Ser Gly Val Thr Asp Lys Val Asn Ile Asn Lys Leu Ile Thr Ala  
530 535 540

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

Lys Thr Asn Gly Ile Ser Val Gly Glu Tyr Thr His Phe Ser Glu Asp  
565 570 575

Ile Gly Ser Gln Ser Arg Ile Asn Thr Val Arg Leu Glu Thr Gly Thr



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Arg Ser Ile Phe Ser Gly Gly Val Lys Phe Lys Ser Gly Glu Lys Leu		
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Val Ile Asp Glu Phe Tyr Tyr Ser Pro Trp Asn Tyr Phe Asp Ala Arg		
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Asn Val Lys Asn Val Glu Ile Thr Arg Lys Phe Ala Ser Ser Thr Pro		
625	630	635
Glu Asn Pro Trp Gly Thr Ser Lys Leu Met Phe Asn Asn Leu Thr Leu		
	645	650
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Gly Gln Asn Ala Val Met Asp Tyr Ser Gln Phe Ser Asn Leu Thr Ile		
	660	665
		670
Gln Gly Asp Phe Ile Asn Asn Gln Gly Thr Ile Asn Tyr Leu Val Arg		
	675	680
		685
Gly Gly Lys Val Ala Thr Leu Ser Val Gly Asn Ala Ala Ala Met Met		
	690	695
		700
Phe Asn Asn Asp Ile Asp Ser Ala Thr Gly Phe Tyr Lys Pro Leu Ile		
705	710	715
		720
Lys Ile Asn Ser Ala Gln Asp Leu Ile Lys Asn Thr Glu His Val Leu		
	725	730
		735
Leu Lys Ala Lys Ile Ile Gly Tyr Gly Asn Val Ser Thr Gly Thr Asn		
	740	745
		750
Ser Ile Ser Asn Val Asn Leu Glu Glu Gln Phe Lys Glu Arg Leu Ala		
	755	760
		765
Leu Tyr Asn Asn Asn Asn Arg Met Asp Thr Cys Val Val Arg Asn Thr		
	770	775
		780
Asp Asp Ile Lys Ala Cys Gly Met Ala Ile Gly Asn Gln Ser Met Val		
785	790	795
		800
Asn Asn Pro Asp Asn Tyr Lys Tyr Leu Ile Gly Lys Ala Trp Lys Asn		
	805	810
		815

Ile Gly Ile Ser Lys Thr Ala Asn Gly Ser Lys Ile Ser Val Tyr Tyr  
820 825 830

Leu Gly Asn Ser Thr Pro Thr Glu Asn Gly Gly Asn Thr Thr Asn Leu  
835 840 845

Pro Thr Asn Thr Thr Asn Asn Ala Arg Ser Ala Asn Tyr Ala Leu Val  
850 855 860

Lys Asn Ala Pro Phe Ala His Ser Ala Thr Pro Asn Leu Val Ala Ile  
865 870 875 880

Asn Gln His Asp Phe Gly Thr Ile Glu Ser Val Phe Glu Leu Ala Asn  
885 890 895

Arg Ser Lys Asp Ile Asp Thr Leu Tyr Thr His Ser Gly Val Gln Gly  
900 905 910

Arg Asp Leu Leu Gln Thr Leu Leu Ile Asp Ser His Asp Ala Gly Tyr  
915 920 925

Ala Arg Gln Met Ile Asp Asn Thr Ser Thr Gly Glu Ile Thr Lys Gln  
930 935 940

Leu Asn Ala Ala Thr Asp Ala Leu Asn Asn Ile Ala Ser Leu Glu His  
945 950 955 960

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

Asn Ser Arg Leu Val Asn Leu Ser Arg Lys His Thr Asn His Ile Asp  
980 985 990

Ser Phe Ala Gln Arg Leu Gln Ala Leu Lys Gly Gln Arg Phe Ala Ser  
995 1000 1005

Leu Glu Ser Ala Ala Glu Val Leu Tyr Gln Phe Ala Pro Lys Tyr  
1010 1015 1020

Glu Lys Pro Thr Asn Val Trp Ala Asn Ala Ile Gly Gly Ala Ser  
1025 1030 1035

Leu Asn Asn Gly Gly Asn Ala Ser Leu Tyr Gly Thr Ser Ala Gly  
1040 1045 1050

Val	Asp	Ala	Tyr	Leu	Asn	Gly	Glu	Val	Glu	Ala	Ile	Val	Gly	Gly
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Phe	Gly	Ser	Tyr	Gly	Tyr	Ser	Ser	Phe	Ser	Asn	Arg	Ala	Asn	Ser
1070						1075					1080			
Leu	Asn	Ser	Gly	Ala	Asn	Asn	Ala	Asn	Phe	Gly	Val	Tyr	Ser	Arg
1085						1090					1095			
Ile	Phe	Ala	Asn	Gln	His	Glu	Phe	Asp	Phe	Glu	Ala	Gln	Gly	Ala
1100						1105					1110			
Leu	Gly	Ser	Asp	Gln	Ser	Ser	Leu	Asn	Phe	Lys	Ser	Ala	Leu	Leu
1115						1120					1125			
Gln	Asp	Leu	Asn	Gln	Ser	Tyr	His	Tyr	Leu	Ala	Tyr	Ser	Ala	Ala
1130						1135					1140			
Thr	Arg	Ala	Ser	Tyr	Gly	Tyr	Asp	Phe	Ala	Phe	Phe	Arg	Asn	Ala
1145						1150					1155			
Leu	Val	Leu	Lys	Pro	Ser	Val	Gly	Val	Ser	Tyr	Asn	His	Leu	Gly
1160						1165					1170			
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1175						1180					1185			
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1205						1210					1215			
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1235						1240					1245			
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<220>  
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 <223> H. pylori strain G27

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 35 40 45

Thr Lys Asp Gly Val Ser Val Ala Lys Glu Ile Glu Leu Ser Cys Pro

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 290 295 300

Gly Leu Ser Leu Glu Asn Ala Glu Val Glu Phe Leu Gly Lys Ala Gly  
 305 310 315 320

Arg Ile Val Ile Asp Lys Asp Asn Thr Thr Ile Val Asp Gly Lys Gly  
 325 330 335

His Ser Asp Asp Val Lys Asp Arg Val Ala Gln Ile Lys Thr Gln Ile  
 340 345 350

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

Glu Val Glu Met Lys Glu Lys Lys Asp Arg Val Asp Asp Ala Leu Ser  
 385 390 395 400

Ala Thr Lys Ala Ala Val Glu Glu Gly Ile Val Ile Gly Gly Gly Ala  
 405 410 415

Ala Leu Ile Arg Ala Ala Gln Lys Val His Leu Asn Leu His Asp Asp  
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Glu Lys Val Gly Tyr Glu Ile Ile Met Arg Ala Ile Lys Ala Pro Leu  
 435 440 445

Ala Gln Ile Ala Ile Asn Ala Gly Tyr Asp Gly Gly Val Val Val Asn  
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Glu Val Glu Lys His Glu Gly His Phe Gly Phe Asn Ala Ser Asn Gly  
 465 470 475 480

Lys Tyr Val Asp Met Phe Lys Glu Gly Ile Ile Asp Pro Leu Lys Val  
 485 490 495

Glu Arg Ile Ala Leu Gln Asn Ala Val Ser Val Ser Ser Leu Leu Leu  
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Thr Thr Glu Ala Thr Val His Glu Ile Lys Glu Glu Lys Ala Ala Pro  
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 <213> H. pylori

<220>  
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 <223> H. pylori 26695

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Asp Asn Leu Val Ser Val Ile Glu Lys Gln Thr Asn Lys Lys Val Arg  
 35 40 45

Ile Leu Glu Ile Lys Pro Leu Lys Ser Ser Gln Asp Leu Lys Met Val  
 50 55 60

Val Ile Glu Asp Pro Asp Thr Lys Tyr Asn Ile Pro Leu Val Val Ser  
 65 70 75 80

Lys Asp Gly Asn Leu Ile Ile Gly Leu Ser Asn Ile Phe Phe Ser Asn  
 85 90 95

Lys Ser Asp Asp Val Gln Leu Val Ala Glu Thr Asn Gln Lys Val Gln  
 100 105 110

Ala Leu Asn Ala Thr Gln Gln Asn Ser Ala Lys Leu Asn Ala Ile Phe

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Ala Asn Lys Asp Lys Ile Leu Tyr Ile Val Ser Asp Pro Met Cys Pro		
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His Cys Gln Lys Glu Leu Thr Lys Leu Arg Asp His Leu Lys Glu Asn		
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Thr Val Arg Met Val Val Val Gly Trp Leu Gly Val Asn Ser Ala Lys		
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Lys Ala Ala Leu Ile Gln Glu Glu Met Ala Lys Ala Arg Ala Arg Gly		
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Ala Ser Val Glu Asp Lys Ile Ser Ile Leu Glu Lys Ile Tyr Ser Thr		
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Gln Tyr Asp Ile Asn Ala Gln Lys Glu Pro Glu Asp Leu Arg Thr Lys		
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ttaaaaatgg tcgttattga agatccggac actaaataca atatcccgct tgtgggtgagt	240
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<212> PRT
<213> H. pylori

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Phe Gly Gly Ala Asn Gly Asn Lys Ile Ser Leu Phe Tyr Asn Asn Glu
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Leu Tyr Met Val Lys Phe Pro Pro Lys Pro Ser Thr His Lys Glu Met
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Ser Tyr Thr Asn Gly Cys Phe Ser Glu Tyr Val Ala Cys His Ile Val
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Asn Lys Ile Val Val Ala Cys Lys Asp Phe Thr Thr His Gln Tyr Glu
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Leu Val Asp Phe Leu Ser Leu Lys Asn Thr Met Ile Glu Leu Glu Lys
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Ser Gly Lys Asp Thr Asn Leu Asn Asp Val Leu Tyr Ala Ile Asp Asn  
115 120 125

Gln His Phe Ile Glu Pro Lys Val Leu Lys Cys Phe Phe Trp Asp Met  
130 135 140

Phe Val Ala Asp Thr Leu Leu Gly Asn Phe Asp Arg His Asn Gly Asn  
145 150 155 160

Trp Gly Phe Leu Arg Ala Ser Asn Ser Lys Glu Tyr Gln Ile Ala Pro  
165 170 175

Ile Phe Asp Cys Gly Ser Cys Leu Tyr Pro Gln Ala Asp Asp Val Val  
180 185 190

Cys Gln Lys Val Leu Ser Asn Ile Asp Glu Leu Asn Ala Arg Ile Tyr  
195 200 205

Asn Phe Pro Gln Ser Ile Leu Lys Asp Asp Asn Asp Lys Lys Ile Asn  
210 215 220

Tyr Tyr Asp Phe Leu Thr Gln Thr Asn Asn Lys Asp Cys Leu Asp Ala  
225 230 235 240

Leu Leu Arg Ile Tyr Pro Arg Ile Asp Met Asn Lys Ile His Ser Ile  
245 250 255

Ile Asp Asn Thr Pro Phe Met Ser Glu Ile His Lys Glu Phe Leu His  
260 265 270

Thr Met Leu Asp Glu Arg Lys Ser Lys Ile Ile Asp Val Ala His Thr  
275 280 285

Arg Ala Ile Glu Leu Ser Leu Gln His Lys Gln Ala His Ser Asn Pro  
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305 310 315 320

Pro Lys Arg Arg Arg  
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<212> DNA  
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<400> 17

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