

53730 K\_seqprot\_ST25  
SEQUENCE LISTING

<110> Life Science Inkubator Betriebs GmbH & Co. KG  
 <120> Verfahren zur Aufreinigung von Virusähnlichen Partikeln (VLP)  
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 <170> PatentIn version 3.5  
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 <212> DNA  
 <213> JC polyomavirus  
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 <223> capsid protein VP1  
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<220>

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<221> misc\_feature

<222> (1)..(1065)

<223> VP1 capsid protein; codon optimized

<400> 2

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<213> JC polyomavirus

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<222> (1)..(354)

<223> capsid protein VP1

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Gly Val Asp Ser Ile Thr Glu Val Glu Cys Phe Leu Thr Pro Glu Met
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Gly Asp Pro Asp Glu His Leu Arg Gly Phe Ser Lys Ser Ile Ser Ile

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Ser Asp Thr Phe Glu Ser Asp Ser Pro Asn Arg Asp Met Leu Pro Cys  
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Tyr Ser Val Ala Arg Ile Pro Leu Pro Asn Leu Asn Glu Asp Leu Thr  
85 90 95

Cys Gly Asn Ile Leu Met Trp Glu Ala Val Thr Leu Lys Thr Glu Val  
100 105 110

Ile Gly Val Thr Ser Leu Met Asn Val His Ser Asn Gly Gln Ala Thr  
115 120 125

His Asp Asn Gly Ala Gly Lys Pro Val Gln Gly Thr Ser Phe His Phe  
130 135 140

Phe Ser Val Gly Gly Glu Ala Leu Glu Leu Gln Gly Val Val Phe Asn  
145 150 155 160

Tyr Arg Thr Lys Tyr Pro Asp Gly Thr Ile Phe Pro Lys Asn Ala Thr  
165 170 175

Val Gln Ser Gln Val Met Asn Thr Glu His Lys Ala Tyr Leu Asp Lys  
180 185 190

Asn Lys Ala Tyr Pro Val Glu Cys Trp Val Pro Asp Pro Thr Arg Asn  
195 200 205

Glu Asn Thr Arg Tyr Phe Gly Thr Leu Thr Gly Gly Glu Asn Val Pro  
210 215 220

Pro Val Leu His Ile Thr Asn Thr Ala Thr Thr Val Leu Leu Asp Glu  
225 230 235 240

Phe Gly Val Gly Pro Leu Cys Lys Gly Asp Asn Leu Tyr Leu Ser Ala  
245 250 255

Val Asp Val Cys Gly Met Phe Thr Asn Arg Ser Gly Ser Gln Gln Trp  
260 265 270

Arg Gly Leu Ser Arg Tyr Phe Lys Val Gln Leu Arg Lys Arg Arg Val  
275 280 285

Lys Asn Pro Tyr Pro Ile Ser Phe Leu Leu Thr Asp Leu Ile Asn Arg  
290 295 300

Arg Thr Pro Arg Val Asp Gly Gln Pro Met Tyr Gly Met Asp Ala Gln  
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Val Glu Glu Val Arg Val Phe Glu Gly Thr Glu Glu Leu Pro Gly Asp

325 53730 K\_seqprot\_ST25 330 335

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Met Leu

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<213> JC polyomavirus

<220>  
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<223> cpasid protein VP2

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<210> 5  
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<221> misc\_feature

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<222> (1)..(1062)  
 <223> Capsid protein VP2-HA including haemagglutinin epitop tag, codon optimized

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gaaattgcca gcctggccac cgtggaaggc atcaccagca cctctgaagc cattgccgcc      180
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tttgctgctc tgggtgcagac agtgaccggc ggctctgcca ttgctcagct gggctacaga      300
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ggcctgtacg gcacagtgc accagccctg gaagcctacg aggacggccc caacaagaag      960
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Glu Ala Ala Ala Thr Ile Glu Val Glu Ile Ala Ser Leu Ala Thr Val
35          40          45

Glu Gly Ile Thr Ser Thr Ser Glu Ala Ile Ala Ala Ile Gly Leu Thr
  
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55

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Pro Glu Thr Tyr Ala Val Ile Thr Gly Ala Pro Gly Ala Val Ala Gly  
65 70 75 80

Phe Ala Ala Leu Val Gln Thr Val Thr Gly Gly Ser Ala Ile Ala Gln  
85 90 95

Leu Gly Tyr Arg Phe Phe Ala Asp Trp Asp His Lys Val Ser Thr Val  
100 105 110

Gly Leu Phe Gln Gln Pro Ala Met Ala Leu Gln Leu Phe Asn Pro Glu  
115 120 125

Asp Tyr Tyr Asp Ile Leu Phe Pro Gly Val Asn Ala Phe Val Asn Asn  
130 135 140

Ile His Tyr Leu Asp Pro Arg His Trp Gly Pro Ser Leu Phe Ser Thr  
145 150 155 160

Ile Ser Gln Ala Phe Trp Asn Leu Val Arg Asp Asp Leu Pro Ala Leu  
165 170 175

Thr Ser Gln Glu Ile Gln Arg Arg Thr Gln Lys Leu Phe Val Glu Ser  
180 185 190

Leu Ala Arg Phe Leu Glu Glu Thr Thr Trp Ala Ile Val Asn Ser Pro  
195 200 205

Ala Asn Leu Tyr Asn Tyr Ile Ser Asp Tyr Tyr Ser Arg Leu Ser Pro  
210 215 220

Val Arg Pro Ser Met Val Arg Gln Val Ala Gln Arg Glu Gly Thr Tyr  
225 230 235 240

Ile Ser Phe Gly His Ser Tyr Thr Gln Ser Ile Asp Asp Ala Asp Ser  
245 250 255

Ile Gln Glu Val Thr Gln Arg Leu Asp Leu Lys Thr Pro Asn Val Gln  
260 265 270

Ser Gly Glu Phe Ile Glu Arg Ser Ile Ala Pro Gly Gly Ala Asn Gln  
275 280 285

Arg Ser Ala Pro Gln Trp Met Leu Pro Leu Leu Leu Gly Leu Tyr Gly  
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Thr Val Thr Pro Ala Leu Glu Ala Tyr Glu Asp Gly Pro Asn Lys Lys  
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<210> 7  
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tag, codon optimized

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35 40 45

Glu Gly Ile Thr Ser Thr Ser Glu Ala Ile Ala Ala Ile Gly Leu Thr  
50 55 60

Pro Glu Thr Tyr Ala Val Ile Thr Gly Ala Pro Gly Ala Val Ala Gly  
65 70 75 80

Phe Ala Ala Leu Val Gln Thr Val Thr Gly Gly Ser Ala Ile Ala Gln  
85 90 95

Leu Gly Tyr Arg Phe Phe Ala Asp Trp Asp His Lys Val Ser Thr Val  
100 105 110

Gly Leu Phe Gln Gln Pro Ala Met Ala Leu Gln Leu Phe Asn Pro Glu  
115 120 125

Asp Tyr Tyr Asp Ile Leu Phe Pro Gly Val Asn Ala Phe Val Asn Asn  
130 135 140

Ile His Tyr Leu Asp Pro Arg His Trp Gly Pro Ser Leu Phe Ser Thr  
145 150 155 160

Ile Ser Gln Ala Phe Trp Asn Leu Val Arg Asp Asp Leu Pro Ala Leu  
165 170 175

Thr Ser Gln Glu Ile Gln Arg Arg Thr Gln Lys Leu Phe Val Glu Ser  
180 185 190

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Leu Ala Arg Phe Leu Glu Glu Thr Thr Trp Ala Ile Val Asn Ser Pro  
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Ala Asn Leu Tyr Asn Tyr Ile Ser Asp Tyr Tyr Ser Arg Leu Ser Pro  
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Val Arg Pro Ser Met Val Arg Gln Val Ala  
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agaagttcta gaagttaa 678

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tatatcagct tcggccactc ctacacccag agcatcgacg acgccgacag catccaggaa 420  
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<212> PRT  
<213> JC polyoma virus

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His Trp Gly Pro Ser Leu Phe Ser Thr Ile Ser Gln Ala Phe Trp Asn  
35 40 45

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

Arg Thr Gln Lys Leu Phe Val Glu Ser Leu Ala Arg Phe Leu Glu Glu  
65 70 75 80

Thr Thr Trp Ala Ile Val Asn Ser Pro Ala Asn Leu Tyr Asn Tyr Ile  
85 90 95

Ser Asp Tyr Tyr Ser Arg Leu Ser Pro Val Arg Pro Ser Met Val Arg  
100 105 110

Gln Val Ala Gln Arg Glu Gly Thr Tyr Ile Ser Phe Gly His Ser Tyr  
115 120 125

Thr Gln Ser Ile Asp Asp Ala Asp Ser Ile Gln Glu Val Thr Gln Arg  
130 135 140

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Leu Asp Leu Lys Thr Pro Asn Val Gln Ser Gly Glu Phe Ile Glu Arg  
145 150 155 160

Ser Ile Ala Pro Gly Gly Ala Asn Gln Arg Ser Ala Pro Gln Trp Met  
165 170 175

Leu Pro Leu Leu Leu Gly Leu Tyr Gly Thr Val Thr Pro Ala Leu Glu  
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Ala Tyr Glu Asp Gly Pro Asn Lys Lys Lys Arg Arg Lys Glu Gly Pro  
195 200 205

Arg Ala Ser Ser Lys Thr Ser Tyr Lys Arg Arg Ser Arg Ser Ser Arg  
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Ser  
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His Trp Gly Pro Ser Leu Phe Ser Thr Ile Ser Gln Ala Phe Trp Asn  
35 40 45

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

Arg Thr Gln Lys Leu Phe Val Glu Ser Leu Ala Arg Phe Leu Glu Glu  
65 70 75 80

Thr Thr Trp Ala Ile Val Asn Ser Pro Ala Asn Leu Tyr Asn Tyr Ile  
85 90 95

Ser Asp Tyr Tyr Ser Arg Leu Ser Pro Val Arg Pro Ser Met Val Arg  
100 105 110

Gln val Ala Gln Arg Glu Gly Thr Tyr Ile Ser Phe Gly His Ser Tyr  
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115 53730K\_seqprot\_ST25 120 125

Thr Gln Ser Ile Asp Asp Ala Asp Ser Ile Gln Glu Val Thr Gln Arg  
130 135 140

Leu Asp Leu Lys Thr Pro Asn Val Gln Ser Gly Glu Phe Ile Glu Arg  
145 150 155 160

Ser Ile Ala Pro Gly Gly Ala Asn Gln Arg Ser Ala Pro Gln Trp Met  
165 170 175

Leu Pro Leu Leu Leu Gly Leu Tyr Gly Thr Val Thr Pro Ala Leu Glu  
180 185 190

Ala Tyr Glu Asp Gly Pro Asn Lys Lys Lys Arg Arg Lys Glu Gly Pro  
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Arg Ala Ser Ser Lys Thr Ser Tyr Lys Arg Arg Ser Arg Ser Ser Arg  
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Ser Tyr Pro Tyr Asp Val Pro Asp Tyr Ala  
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<210> 12  
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<212> DNA  
<213> Human papillomavirus type 16

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<210> 13  
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 <212> PRT  
 <213> Human papillomavirus type 16

<220>  
 <221> MISC\_FEATURE  
 <222> (1)..(531)  
 <223> capsid protein L1

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

Pro Asn Asn Asn Lys Ile Leu Val Pro Lys Val Ser Gly Leu Gln Tyr  
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Arg Val Phe Arg Ile His Leu Pro Asp Pro Asn Lys Phe Gly Phe Pro  
 Seite 12

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

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Asn Phe Lys Glu Tyr Leu Arg His Gly Glu Glu Tyr Asp Leu Gln Phe  
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Ile Phe Gln Leu Cys Lys Ile Thr Leu Thr Ala Asp Val Met Thr Tyr  
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Ile His Ser Met Asn Ser Thr Ile Leu Glu Asp Trp Asn Phe Gly Leu  
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Gln Pro Pro Pro Gly Gly Thr Leu Glu Asp Thr Tyr Arg Phe Val Thr  
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Ser Gln Ala Ile Ala Cys Gln Lys His Thr Pro Pro Ala Pro Lys Glu  
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Asp Pro Leu Lys Lys Tyr Thr Phe Trp Glu Val Asn Leu Lys Glu Lys  
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Phe Ser Ala Asp Leu Asp Gln Phe Pro Leu Gly Arg Lys Phe Leu Leu  
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Ile Pro Lys Val Glu Gly Lys Thr Ile Ala Asp Gln Ile Leu Gln Tyr  
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Gly Ser Met Gly Val Phe Phe Gly Gly Leu Gly Ile Gly Thr Gly Ser  
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Gly Thr Gly Gly Arg Thr Gly Tyr Ile Pro Leu Gly Thr Arg Pro Pro  
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Thr Ala Thr Asp Thr Leu Ala Pro Val Arg Pro Pro Leu Thr Val Asp  
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Pro Val Gly Pro Ser Asp Pro Ser Ile Val Ser Leu Val Glu Glu Thr  
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Ser Phe Ile Asp Ala Gly Ala Pro Thr Ser Val Pro Ser Ile Pro Pro  
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Asp Val Ser Gly Phe Ser Ile Thr Thr Ser Thr Asp Thr Thr Pro Ala  
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Ile Leu Asp Ile Asn Asn Thr Val Thr Thr Val Thr Thr His Asn Asn  
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Pro Thr Phe Thr Asp Pro Ser Val Leu Gln Pro Pro Thr Pro Ala Glu  
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Thr Gly Gly His Phe Thr Leu Ser Ser Ser Thr Ile Ser Thr His Asn  
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Tyr Glu Glu Ile Pro Met Asp Thr Phe Ile Val Ser Thr Asn Pro Asn  
195 200 205

Thr Val Thr Ser Ser Thr Pro Ile Pro Gly Ser Arg Pro Val Ala Arg  
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Leu Gly Leu Tyr Ser Arg Thr Thr Gln Gln Val Lys Val Val Asp Pro  
225 230 235 240

Ala Phe Val Thr Thr Pro Thr Lys Leu Ile Thr Tyr Asp Asn Pro Ala  
245 250 255

Tyr Glu Gly Ile Asp Val Asp Asn Thr Leu Tyr Phe Ser Ser Asn Asp  
260 265 270

Asn Ser Ile Asn Ile Ala Pro Asp Pro Asp Phe Leu Asp Ile Val Ala  
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Leu His Arg Pro Ala Leu Thr Ser Arg Arg Thr Gly Ile Arg Tyr Ser  
290 295 300

Arg Ile Gly Asn Lys Gln Thr Leu Arg Thr Arg Ser Gly Lys Ser Ile  
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Gly Ala Lys Val His Tyr Tyr Tyr Asp Phe Ser Thr Ile Asp Pro Ala  
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Glu Glu Ile Glu Leu Gln Thr Ile Thr Pro Ser Thr Tyr Thr Thr Thr  
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Ser His Ala Ala Ser Pro Thr Ser Ile Asn Asn Gly Leu Tyr Asp Ile  
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Tyr Ala Asp Asp Phe Ile Thr Asp Thr Ser Thr Thr Pro Val Pro Ser  
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Val Pro Ser Thr Ser Leu Ser Gly Tyr Ile Pro Ala Asn Thr Thr Ile  
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Pro Phe Gly Gly Ala Tyr Asn Ile Pro Leu Val Ser Gly Pro Asp Ile  
405 410 415

Pro Ile Asn Ile Thr Asp Gln Ala Pro Ser Leu Ile Pro Ile Val Pro  
420 425 430

Gly Ser Pro Gln Tyr Thr Ile Ile Ala Asp Ala Gly Asp Phe Tyr Leu  
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His Pro Ser Tyr Tyr Met Leu Arg Lys Arg Arg Lys Arg Leu Pro Tyr  
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Phe Phe Ser Asp Val Ser Leu Ala Ala  
465 470