

# SEQUENCE LISTING

<110> Pieris AG

<120> Muteins of hNGAL and related proteins with binding affinity for a given target

<130> P41608

<160> 34

<170> PatentIn version 3.3

<210> 1

<211> 178

<212> PRT

<213> Homo sapiens

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

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

Arg Thr Phe Val Pro Gly Cys Gln Pro Gly Glu Phe Thr Leu Gly Asn  
85 90 95

Ile Lys Ser Tyr Pro Gly Leu Thr Ser Tyr Leu Val Arg Val Val Ser  
100 105 110

Thr Asn Tyr Asn Gln His Ala Met Val Phe Phe Lys Lys Val Ser Gln  
115 120 125

Asn Arg Glu Tyr Phe Lys Ile Thr Leu Tyr Gly Arg Thr Lys Glu Leu  
130 135 140

Thr Ser Glu Leu Lys Glu Asn Phe Ile Arg Phe Ser Lys Ser Leu Gly  
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Gln Val Gly Arg Ala Gly Asn Ala Ala Leu Arg Glu Asp Lys Asp Pro  
35 40 45

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

Asn Val Thr Ala Val Arg Phe Arg Lys Lys Lys Cys Asp Tyr Ala Ile  
65 70 75 80

Met Thr Phe Val Pro Gly Ser Gln Pro Gly Glu Phe Thr Leu Gly Asn  
85 90 95

Ile Lys Ser Tyr Pro Gly Leu Thr Ser Tyr Leu Val Arg Val Val Ser  
100 105 110

Thr Asn Tyr Asn Gln His Ala Met Val Phe Phe Lys Lys Val Ser Gln  
115 120 125

Asn Arg Glu Tyr Phe Ser Ile Thr Leu Leu Gly Arg Thr Lys Glu Leu  
130 135 140

Ala Ser Glu Leu Lys Glu Asn Phe Ile Arg Phe Ser Lys Ser Leu Gly  
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Gln Val Gly Arg Ala Gly Asn Ala Ala Leu Arg Glu Asp Lys Asp Pro  
35 40 45

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

Ile Lys Ser Tyr Pro Gly Leu Thr Ser Tyr Leu Val Arg Val Val Ser  
100 105 110

Thr Asn Tyr Asn Gln His Ala Met Val Phe Phe Lys Lys Val Ser Gln  
115 120 125

Asn Arg Glu Tyr Phe Ser Ile Thr Leu Leu Gly Arg Thr Lys Glu Leu  
130 135 140

Ala Ser Glu Leu Lys Glu Asn Phe Ile Arg Phe Ser Lys Ser Leu Gly  
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Asp Gly

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Pro Leu Gln Gln Asn Phe Gln Asp Asn Gln Phe His Gly Lys Trp Tyr  
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Gln Val Gly Arg Ala Gly Asn Ala Ala Leu Arg Glu Asp Lys Asp Pro  
35 40 45

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

Asn Val Thr Ala Val Arg Phe Arg Lys Lys Lys Cys Asp Tyr Ala Thr  
65 70 75 80

Met Thr Phe Val Pro Gly Ser Gln Pro Gly Glu Phe Thr Leu Gly Asn  
85 90 95

Ile Lys Ser Tyr Pro Gly Leu Thr Ser Tyr Leu Val Arg Val Val Ser  
100 105 110

Thr Asn Tyr Asn Gln His Ala Met Val Phe Phe Lys Lys Val Ser Gln  
115 120 125

Asn Arg Glu Tyr Phe Ser Ile Thr Leu Leu Gly Arg Thr Lys Glu Leu  
130 135 140

Ala Ser Glu Leu Lys Glu Asn Phe Ile Arg Phe Ser Lys Ser Leu Gly  
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Gln Val Gly Arg Ala Gly Asn Ala Ala Leu Arg Glu Asp Lys Asp Pro  
35 40 45

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

Asn Val Thr Ala Val Arg Ser Arg Glu Lys Lys Cys Asp Tyr Ala Thr  
65 70 75 80

Met Thr Phe Val Pro Gly Ser Gln Pro Gly Glu Phe Thr Leu Gly Asn  
85 90 95

Ile Lys Ser Tyr Pro Gly Leu Thr Ser Tyr Leu Val Arg Val Val Ser  
100 105 110

Thr Asn Tyr Asn Gln His Ala Met Val Phe Phe Lys Lys Val Ser Gln  
115 120 125

Asn Arg Glu Tyr Phe Ser Ile Thr Leu Leu Gly Arg Thr Lys Glu Leu  
130 135 140

Ala Ser Glu Leu Lys Glu Asn Phe Ile Arg Phe Ser Lys Ser Leu Gly  
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Gln Val Gly Arg Ala Gly Asn Ala Ala Leu Arg Glu Asp Lys Asp Pro  
35 40 45

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

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

Ile Lys Ser Tyr Pro Gly Leu Thr Ser Tyr Leu Val Arg Val Val Ser  
100 105 110

Thr Asn Tyr Asn Gln His Ala Met Val Phe Phe Lys Lys Val Ser Gln  
115 120 125

Asn Arg Glu Tyr Phe Ser Ile Thr Leu Leu Gly Arg Thr Lys Glu Leu  
130 135 140

Ala Ser Glu Leu Lys Glu Asn Phe Ile Arg Phe Ser Lys Ser Leu Gly  
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Gln Val Gly Arg Ala Gly Asn Ala Ala Leu Arg Glu Asp Lys Asp Pro  
35 40 45

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

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

Ile Lys Ser Tyr Pro Gly Leu Thr Ser Tyr Leu Val Arg Val Val Ser  
100 105 110

Thr Asn Tyr Asn Gln His Ala Met Val Phe Phe Lys Lys Val Gln Gln  
115 120 125

Asn Arg Glu Tyr Phe Ser Ile Thr Leu Leu Gly Arg Thr Lys Glu Leu  
130 135 140

Ala Ser Glu Leu Lys Glu Asn Phe Ile Arg Phe Ser Lys Ser Leu Gly  
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Gln Val Gly Arg Ala Gly Asn Ala Ala Leu Arg Glu Asp Lys Asp Pro  
 35 40 45

Gln Lys Met Thr Ala Gln Ile Tyr Glu Leu Lys Glu Asp Lys Ser Tyr  
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Asn Val Thr Ala Val Arg Phe Arg Lys Lys Lys Cys Asp Tyr Leu Thr  
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Met Thr Phe Val Pro Gly Ser Gln Pro Gly Glu Phe Thr Leu Gly Asn  
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Ile Lys Ser Tyr Pro Gly Leu Thr Ser Tyr Leu Val Arg Val Val Ser  
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Thr Asn Tyr Asn Gln His Ala Met Val Phe Phe Lys Lys Val Gln Gln  
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Asn Arg Glu Tyr Phe Ser Ile Ser Leu Leu Gly Arg Thr Lys Glu Leu  
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Ala Ser Glu Leu Lys Glu Asn Phe Ile Arg Phe Ser Lys Ser Leu Gly  
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Gln Val Gly Arg Ala Gly Asn Ala Ala Leu Arg Glu Asp Lys Asp Pro  
 35 40 45

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

Ile Lys Ser Tyr Pro Gly Leu Thr Ser Tyr Leu Val Arg Val Val Ser  
 100 105 110

Thr Asn Tyr Asn Gln His Ala Met Val Phe Phe Lys Lys Val Gln Gln  
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Asn Arg Glu Tyr Phe Ser Ile Ser Leu Leu Gly Arg Thr Lys Glu Leu  
 130 135 140

Ala Ser Glu Leu Lys Glu Asn Phe Ile Arg Phe Ser Lys Ser Leu Gly  
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Gln Val Gly Arg Ala Gly Asn Ala Ala Pro Arg Glu Asp Lys Asp Leu  
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Leu Lys Met Thr Ala Gln Thr Tyr Glu Leu Lys Glu Asp Lys Ser Tyr  
 50 55 60

Asn Val Thr Ala Val Arg Phe Arg Lys Lys Met Cys Glu Tyr Leu Thr  
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Met Thr Phe Val Pro Gly Ser Gln Pro Gly Glu Phe Thr Leu Gly Asn  
 85 90 95

Ile Lys Ser Tyr Pro Gly Leu Thr Ser Tyr Leu Val Arg Val Val Ser  
 100 105 110

Thr Asn Tyr Asn Gln His Ala Met Val Phe Phe Lys Lys Val Gln Gln  
 115 120 125

Asn Arg Glu Tyr Phe Ser Ile Ser Leu Leu Gly Arg Thr Lys Glu Leu  
 130 135 140

Ala Ser Glu Leu Lys Glu Asn Phe Ile Arg Phe Ser Lys Ser Leu Gly  
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 tctttgtctt c 71

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acttttgttc caggttccc                                                    79

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 <210> 16  
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 gttccgaagc cagctccttg gttctc 26  
  
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 nncttgaaga acacc 75  
  
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21

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18

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Gln Val Gly Arg Ala Gly Asn Ala Ala Pro Pro Val Asp Pro Glu Leu  
35 40 45

Leu Leu Leu Thr Ala Gln Thr Tyr Glu Leu Lys Glu Asp Lys Ser Tyr  
50 55 60

Asn Val Thr Ala Val Arg Phe Arg Lys Lys Met Cys Glu Tyr Leu Thr  
65 70 75 80

Met Thr Phe Val Pro Gly Ser Gln Pro Gly Glu Phe Thr Leu Gly Asn  
85 90 95

Ile Lys Ser Tyr Pro Gly Leu Thr Ser Tyr Leu Val Arg Val Val Ser  
100 105 110

Thr Asn Tyr Asn Gln His Ala Met Val Phe Phe Lys Lys Val Gln Gln  
115 120 125

Asn Arg Glu Tyr Phe Ser Ile Ser Leu Leu Gly Arg Thr Lys Glu Leu  
130 135 140

Ala Ser Glu Leu Lys Glu Asn Phe Ile Arg Phe Ser Lys Ser Leu Gly  
145 150 155 160

Leu Pro Glu Asn His Ile Val Phe Pro Val Pro Ile Asp Gln Cys Ile  
165 170 175

Asp Gly

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

Leu Leu Leu Thr Ala Gln Thr Tyr Glu Leu Lys Glu Asp Lys Ser Tyr  
50 55 60

Asp Val Thr Ala Val Arg Phe Arg Lys Lys Met Cys Glu Tyr Leu Thr  
65 70 75 80

Met Thr Phe Val Pro Gly Ser Gln Pro Gly Glu Phe Thr Leu Gly Asn  
85 90 95

Ile Glu Ser Tyr Pro Gly Leu Thr Ser Tyr Leu Val Arg Met Val Ser  
100 105 110

Thr Asn Tyr Asn Gln His Ala Met Val Phe Phe Lys Lys Val Gln Gln  
115 120 125

Asn Arg Glu Tyr Phe Ser Ile Ser Leu Leu Gly Arg Thr Lys Glu Leu  
130 135 140

Ala Ser Glu Leu Lys Glu Asn Phe Ile Arg Phe Ser Lys Ser Leu Gly  
145 150 155 160

Leu Pro Glu Asn His Ile Val Phe Pro Val Pro Ile Asp Gln Cys Ile  
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Asp Gly

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Gln Val Gly Arg Ala Gly Asn Ala Ala Pro Pro Val Asp Pro Glu Leu  
35 40 45

Leu Leu Leu Thr Ala Gln Thr Tyr Glu Leu Lys Glu Asp Lys Ser Tyr  
50 55 60

Asp Val Thr Ala Val Arg Phe Arg Lys Lys Met Cys Glu Tyr Leu Thr  
65 70 75 80

Met Thr Phe Val Pro Ser Ser Gln Pro Gly Glu Phe Thr Leu Gly Asn  
85 90 95

Ile Lys Ser Tyr Pro Gly Leu Thr Ser Tyr Leu Val Arg Val Val Ser  
100 105 110

Thr Asn Tyr Asn Gln His Ala Met Val Phe Phe Lys Lys Val Gln Gln  
115 120 125

Asn Arg Glu Tyr Phe Ser Ile Ser Leu Leu Gly Arg Thr Lys Glu Leu  
130 135 140

Ala Ser Glu Leu Lys Glu Asn Phe Ile Arg Phe Ser Lys Ser Leu Gly  
145 150 155 160

Leu Pro Glu Asn His Ile Val Phe Pro Val Pro Ile Asp Gln Cys Ile  
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Asp Gly

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Gln	Asp	Ser	Thr	Ser	Asp	Leu	Ile	Pro	Ala	Pro	Pro	Leu	Ser	Lys	Val
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		20						25					30		
Gln	Val	Gly	Arg	Ala	Gly	Asn	Ala	Ala	Pro	Pro	Met	Asp	Pro	Glu	Leu
		35					40					45			
Leu	Leu	Leu	Thr	Ala	Gln	Thr	Tyr	Glu	Leu	Lys	Glu	Asp	Lys	Ser	Tyr
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Asp	Val	Thr	Ala	Val	Arg	Phe	Arg	Lys	Lys	Met	Cys	Glu	Tyr	Leu	Thr
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			85						90					95	
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		100						105					110		
Thr	Asn	Tyr	Asn	Gln	His	Ala	Met	Val	Phe	Phe	Lys	Lys	Val	Gln	Gln
		115					120					125			
Asn	Arg	Glu	Tyr	Phe	Ser	Ile	Ser	Leu	Leu	Gly	Arg	Thr	Lys	Glu	Leu
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Ala	Ser	Glu	Leu	Lys	Glu	Asn	Phe	Ile	Arg	Phe	Ser	Lys	Ser	Leu	Gly
145					150					155				160	
Leu	Pro	Glu	Asn	His	Ile	Val	Phe	Pro	Val	Pro	Ile	Asp	Gln	Cys	Ile
				165					170					175	
Asp	Gly														

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Gln Asp Ser Thr Ser Asp Leu Ile Pro Ala Pro Pro Leu Ser Lys Val  
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Pro Leu Gln Gln Asn Phe Gln Asp Asn Gln Phe His Gly Lys Trp Tyr  
 20 25 30

Gln Val Gly Arg Ala Gly Asn Ala Ala Pro Pro Val Asp Pro Glu Leu  
 35 40 45

Leu Leu Leu Thr Ala Gln Thr Tyr Glu Leu Arg Glu Asp Lys Ser Tyr  
 50 55 60

Asp Val Thr Ala Val Arg Phe Arg Lys Lys Met Cys Glu Tyr Leu Thr  
 65 70 75 80

Met Thr Phe Val Pro Gly Ser Gln Pro Gly Glu Phe Thr Leu Gly Asn  
 85 90 95

Ile Lys Ser Tyr Pro Gly Leu Thr Ser Tyr Leu Val Arg Val Val Ser  
 100 105 110

Thr Asn Tyr Asn Gln His Ala Met Val Phe Phe Lys Lys Val Gln Gln  
 115 120 125

Asn Arg Glu Tyr Phe Ser Ile Ser Leu Leu Gly Arg Thr Lys Glu Leu  
 130 135 140

Ala Ser Glu Leu Lys Glu Asn Phe Ile Arg Phe Ser Lys Ser Leu Gly  
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Leu Pro Glu Asn His Ile Val Phe Pro Val Pro Ile Asp Gln Cys Ile  
 165 170 175

Asp Gly

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

Pro Leu Gln Gln Asn Phe Gln Asp Asn Gln Phe His Gly Lys Trp Tyr  
 20 25 30

Gln Val Gly Arg Ala Gly Asn Ala Ala Pro Pro Val Asp Pro Glu Leu  
 35 40 45

Leu Leu Leu Thr Ala Gln Thr Tyr Glu Leu Lys Glu Asp Lys Ser Tyr  
 50 55 60

Asp Val Thr Ala Val Arg Phe Arg Lys Lys Met Cys Glu Tyr Leu Thr  
 65 70 75 80

Met Thr Phe Val Pro Gly Phe Gln Pro Gly Glu Phe Thr Leu Gly Asn  
 85 90 95

Ile Lys Ser Tyr Pro Gly Leu Thr Ser Tyr Leu Val Arg Val Val Ser  
 100 105 110

Thr Asn Tyr Asn Gln His Ala Met Val Phe Phe Lys Lys Val Gln Gln  
 115 120 125

Asn Arg Glu Tyr Phe Ser Ile Ser Leu Leu Gly Arg Thr Lys Glu Leu  
 130 135 140

Ala Ser Glu Leu Lys Glu Asn Phe Ile Arg Phe Ser Lys Ser Leu Gly  
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Leu Pro Glu Asn His Ile Val Phe Pro Val Pro Ile Asp Gln Cys Ile  
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Gln Asp Ser Thr Ser Asp Leu Ile Pro Ala Pro Pro Leu Ser Lys Val  
 1 5 10 15

Pro Leu Gln Gln Asn Phe Gln Asp Asn Gln Phe His Gly Lys Trp Tyr  
 20 25 30

Gln Val Gly Arg Ala Gly Asn Ala Ala Pro Pro Val Asp Pro Glu Leu  
 35 40 45

Leu Leu Leu Thr Ala Gln Thr Tyr Glu Leu Lys Glu Asp Lys Ser Tyr  
 50 55 60

Asn Val Thr Ala Val Arg Phe Arg Lys Lys Met Cys Glu His Leu Thr  
 65 70 75 80

Met Thr Phe Val Pro Gly Ser Gln Pro Gly Glu Phe Thr Leu Gly Asn  
 85 90 95

Ile Lys Ser Tyr Pro Gly Ile Thr Ser Tyr Phe Val Arg Val Ala Ser  
 100 105 110

Thr Asn Tyr Asn Gln His Ala Met Val Phe Phe Lys Lys Val Gln Gln  
 115 120 125

Asn Arg Glu Tyr Phe Ser Ile Ser Leu Leu Gly Arg Thr Lys Glu Leu  
 130 135 140

Ala Ser Glu Leu Lys Glu Asn Phe Ile Arg Phe Ser Lys Ser Leu Gly  
 145 150 155 160

Leu Pro Glu Asn His Ile Val Phe Pro Val Pro Ile Asp Gln Cys Ile  
 165 170 175

Asp Gly