

SEQUENCE LISTING

<110> Spacecraft Seven, LLC
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<120> ENGINEERED PARKIN AND USES THEREOF

<130> ROPA-016/01W0 329592-2234

<150> US 63/027,866

<151> 2020-05-20

<150> US 63/027,868

<151> 2020-05-20

<160> 99

<170> PatentIn version 3.5

<210> 1

<211> 465

<212> PRT

<213> Homo sapiens

<400> 1

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

Ser	Ile	Val	His	Ile	Val	Gln	Arg	Pro	Trp	Arg	Lys	Gly	Gln	Glu	Met
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Asn	Ala	Thr	Gly	Gly	Asp	Asp	Pro	Arg	Asn	Ala	Ala	Gly	Gly	Cys	Glu
			85						90					95	

Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu Ser Ser Ser Val Leu
100 105 110

Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu His Thr Asp Ser Arg
115 120 125

Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly Arg Ser Ile Tyr Asn
130 135 140

Ser Phe Tyr Val Tyr Cys Lys Gly Pro Cys Gln Arg Val Gln Pro Gly
145 150 155 160

Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln Ala Thr Leu Thr Leu
165 170 175

Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu Ile Pro Asn Arg Met
180 185 190

Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly Thr Ser Ala Glu Phe
195 200 205

Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys Glu Thr Ser Val
210 215 220

Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile Thr Cys Ile Thr
225 230 235 240

Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln Cys Asn Ser Arg
245 250 255

His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys Val Thr Arg Leu
260 265 270

Asn Asp Arg Gln Phe Val His Asp Pro Gln Leu Gly Tyr Ser Leu Pro
275 280 285

Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu Leu His His Phe
290 295 300

Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr Gln Gln Tyr Gly Ala
305 310 315 320

Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu Cys Pro Arg Pro Gly
325 330 335

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

Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala Phe Cys Arg Glu Cys
355 360 365

Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala Val Phe Glu Ala Ser
370 375 380

Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg Ala Ala Glu Gln
385 390 395 400

Ala Arg Trp Glu Ala Ala Ser Lys Glu Thr Ile Lys Lys Thr Thr Lys
405 410 415

Pro Cys Pro Arg Cys His Val Pro Val Glu Lys Asn Gly Gly Cys Met
420 425 430

His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu Trp Cys Trp Asn
435 440 445

Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly Asp His Trp Phe Asp
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Val
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<210> 2

<211> 437

<212> PRT

<213> Homo sapiens

<400> 2

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20 25 30

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

Glu Leu Arg Asn Asp Trp Thr Val Gln Asn Cys Asp Leu Asp Gln Gln
50 55 60

Ser Ile Val His Ile Val Gln Arg Pro Trp Arg Lys Gly Gln Glu Met
65 70 75 80

Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala Ala Gly Gly Cys Glu
85 90 95

Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu Ser Ser Ser Val Leu
100 105 110

Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu His Thr Asp Ser Arg
115 120 125

Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly Arg Ser Ile Tyr Asn
130 135 140

Ser Phe Tyr Val Tyr Cys Lys Gly Pro Cys Gln Arg Val Gln Pro Gly
145 150 155 160

Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln Ala Thr Leu Thr Leu
165 170 175

Thr Gln Glu Phe Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys

180

185

190

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

Thr Cys Ile Thr Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln
 210 215 220

Cys Asn Ser Arg His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys
 225 230 235 240

Val Thr Arg Leu Asn Asp Arg Gln Phe Val His Asp Pro Gln Leu Gly
 245 250 255

Tyr Ser Leu Pro Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu
 260 265 270

Leu His His Phe Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr Gln
 275 280 285

Gln Tyr Gly Ala Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu Cys
 290 295 300

Pro Arg Pro Gly Cys Gly Ala Gly Leu Leu Pro Glu Pro Asp Gln Arg
 305 310 315 320

Lys Val Thr Cys Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala Phe
 325 330 335

Cys Arg Glu Cys Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala Val
 340 345 350

Phe Glu Ala Ser Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg
 355 360 365

Ala Ala Glu Gln Ala Arg Trp Glu Ala Ala Ser Lys Glu Thr Ile Lys
 370 375 380

Lys Thr Thr Lys Pro Cys Pro Arg Cys His Val Pro Val Glu Lys Asn
385 390 395 400

Gly Gly Cys Met His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu
405 410 415

Trp Cys Trp Asn Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly Asp
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His Trp Phe Asp Val
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<210> 3
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<212> PRT
<213> Homo sapiens

<400> 3

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Leu Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu His Thr Asp Ser
35 40 45

Arg Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly Arg Ser Ile Tyr
50 55 60

Asn Ser Phe Tyr Val Tyr Cys Lys Gly Pro Cys Gln Arg Val Gln Pro
65 70 75 80

Gly Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln Ala Thr Leu Thr
85 90 95

Leu Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu Ile Pro Asn Arg
100 105 110

Met Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly Thr Ser Ala Glu
115 120 125

Phe Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys Glu Thr Ser
130 135 140

Val Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile Thr Cys Ile
145 150 155 160

Thr Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln Cys Asn Ser
165 170 175

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

Leu Asn Asp Arg Gln Phe Val His Asp Pro Gln Leu Gly Tyr Ser Leu
195 200 205

Pro Cys Val Val Cys Leu Leu Pro Gly Met
210 215

<210> 4
<211> 274
<212> PRT
<213> Homo sapiens

<400> 4

Met Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly Thr Ser Ala Glu
1 5 10 15

Phe Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys Glu Thr Ser
20 25 30

Val Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile Thr Cys Ile
35 40 45

Thr Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln Cys Asn Ser

50

55

60

Arg His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys Val Thr Arg
65 70 75 80

Leu Asn Asp Arg Gln Phe Val His Asp Pro Gln Leu Gly Tyr Ser Leu
85 90 95

Pro Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu Leu His His
100 105 110

Phe Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr Gln Gln Tyr Gly
115 120 125

Ala Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu Cys Pro Arg Pro
130 135 140

Gly Cys Gly Ala Gly Leu Leu Pro Glu Pro Asp Gln Arg Lys Val Thr
145 150 155 160

Cys Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala Phe Cys Arg Glu
165 170 175

Cys Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala Val Phe Glu Ala
180 185 190

Ser Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg Ala Ala Glu
195 200 205

Gln Ala Arg Trp Glu Ala Ala Ser Lys Glu Thr Ile Lys Lys Thr Thr
210 215 220

Lys Pro Cys Pro Arg Cys His Val Pro Val Glu Lys Asn Gly Gly Cys
225 230 235 240

Met His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu Trp Cys Trp
245 250 255

Asn Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly Asp His Trp Phe
260 265 270

Asp Val

<210> 5
<211> 387
<212> PRT
<213> Homo sapiens

<400> 5

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

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

Glu Leu Arg Asn Asp Trp Thr Val Gln Asn Cys Asp Leu Asp Gln Gln
50 55 60

Ser Ile Val His Ile Val Gln Arg Pro Trp Arg Lys Gly Gln Glu Met
65 70 75 80

Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala Ala Gly Gly Cys Glu
85 90 95

Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu Ser Ser Ser Val Leu
100 105 110

Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu His Thr Asp Ser Arg
115 120 125

Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly Arg Ser Ile Tyr Asn
130 135 140

Ser Phe Tyr Val Tyr Cys Lys Gly Pro Cys Gln Arg Val Gln Pro Gly
145 150 155 160

Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln Ala Thr Leu Thr Leu
165 170 175

Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu Ile Pro Asn Arg Met
180 185 190

Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly Thr Ser Ala Glu Phe
195 200 205

Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys Glu Thr Ser Val
210 215 220

Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile Thr Cys Ile Thr
225 230 235 240

Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln Cys Asn Ser Arg
245 250 255

His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys Val Thr Arg Leu
260 265 270

Asn Asp Arg Gln Phe Val His Asp Pro Gln Leu Gly Tyr Ser Leu Pro
275 280 285

Cys Val Gly Thr Gly Asp Thr Val Val Leu Arg Gly Ala Leu Gly Gly
290 295 300

Phe Arg Arg Gly Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu Leu
305 310 315 320

His His Phe Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr Gln Gln
325 330 335

Tyr Gly Ala Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu Cys Pro
340 345 350

Arg Pro Gly Cys Gly Ala Gly Leu Leu Pro Glu Pro Asp Gln Arg Lys
355 360 365

Val Thr Cys Glu Gly Gly Asn Gly Leu Gly Cys Gly Tyr Gly Gln Arg
370 375 380

Arg Thr Lys
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<210> 6
<211> 316
<212> PRT
<213> Homo sapiens

<400> 6

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

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

Glu Leu Arg Asn Asp Trp Thr Val Gln Glu Phe Phe Phe Lys Cys Gly
50 55 60

Ala His Pro Thr Ser Asp Lys Glu Thr Ser Val Ala Leu His Leu Ile
65 70 75 80

Ala Thr Asn Ser Arg Asn Ile Thr Cys Ile Thr Cys Thr Asp Val Arg
85 90 95

Ser Pro Val Leu Val Phe Gln Cys Asn Ser Arg His Val Ile Cys Leu
100 105 110

Asp Cys Phe His Leu Tyr Cys Val Thr Arg Leu Asn Asp Arg Gln Phe
115 120 125

Val His Asp Pro Gln Leu Gly Tyr Ser Leu Pro Cys Val Ala Gly Cys
130 135 140

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

Glu Gln Tyr Asn Arg Tyr Gln Gln Tyr Gly Ala Glu Glu Cys Val Leu
165 170 175

Gln Met Gly Gly Val Leu Cys Pro Arg Pro Gly Cys Gly Ala Gly Leu
180 185 190

Leu Pro Glu Pro Asp Gln Arg Lys Val Thr Cys Glu Gly Gly Asn Gly
195 200 205

Leu Gly Cys Gly Phe Ala Phe Cys Arg Glu Cys Lys Glu Ala Tyr His
210 215 220

Glu Gly Glu Cys Ser Ala Val Phe Glu Ala Ser Gly Thr Thr Thr Gln
225 230 235 240

Ala Tyr Arg Val Asp Glu Arg Ala Ala Glu Gln Ala Arg Trp Glu Ala
245 250 255

Ala Ser Lys Glu Thr Ile Lys Lys Thr Thr Lys Pro Cys Pro Arg Cys
260 265 270

His Val Pro Val Glu Lys Asn Gly Gly Cys Met His Met Lys Cys Pro
275 280 285

Gln Pro Gln Cys Arg Leu Glu Trp Cys Trp Asn Cys Gly Cys Glu Trp
290 295 300

Asn Arg Val Cys Met Gly Asp His Trp Phe Asp Val

305

310

315

<210> 7

<211> 387

<212> PRT

<213> Homo sapiens

<400> 7

Met Ile Val Phe Val Arg Phe Asn Ser Ser His Gly Phe Pro Val Glu
1 5 10 15

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

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

Glu Leu Arg Asn Asp Trp Thr Val Gln Asn Cys Asp Leu Asp Gln Gln
50 55 60

Ser Ile Val His Ile Val Gln Arg Pro Trp Arg Lys Gly Gln Glu Met
65 70 75 80

Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala Ala Gly Gly Cys Glu
85 90 95

Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu Ser Ser Ser Val Leu
100 105 110

Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu His Thr Asp Ser Arg
115 120 125

Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly Arg Ser Ile Tyr Asn
130 135 140

Ser Phe Tyr Val Tyr Cys Lys Gly Pro Cys Gln Arg Val Gln Pro Gly
145 150 155 160

Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln Ala Thr Leu Thr Leu
165 170 175

Thr Gln Glu Phe Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys
180 185 190

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

Thr Cys Ile Thr Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln
210 215 220

Cys Asn Ser Arg His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys
225 230 235 240

Val Thr Arg Leu Asn Asp Arg Gln Phe Val His Asp Pro Gln Leu Gly
245 250 255

Tyr Ser Leu Pro Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu
260 265 270

Leu His His Phe Arg Ile Leu Gly Glu Glu Gln Phe Ala Phe Cys Arg
275 280 285

Glu Cys Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala Val Phe Glu
290 295 300

Ala Ser Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg Ala Ala
305 310 315 320

Glu Gln Ala Arg Trp Glu Ala Ala Ser Lys Glu Thr Ile Lys Lys Thr
325 330 335

Thr Lys Pro Cys Pro Arg Cys His Val Pro Val Glu Lys Asn Gly Gly
340 345 350

Cys Met His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu Trp Cys
355 360 365

Trp Asn Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly Asp His Trp
370 375 380

Phe Asp Val
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<210> 8
<211> 415
<212> PRT
<213> Homo sapiens

<400> 8

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

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

Glu Leu Arg Asn Asp Trp Thr Val Gln Asn Cys Asp Leu Asp Gln Gln
50 55 60

Ser Ile Val His Ile Val Gln Arg Pro Trp Arg Lys Gly Gln Glu Met
65 70 75 80

Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala Ala Gly Gly Cys Glu
85 90 95

Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu Ser Ser Ser Val Leu
100 105 110

Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu His Thr Asp Ser Arg
115 120 125

Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly Arg Ser Ile Tyr Asn

130

135

140

Ser Phe Tyr Val Tyr Cys Lys Gly Pro Cys Gln Arg Val Gln Pro Gly
 145 150 155 160

Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln Ala Thr Leu Thr Leu
 165 170 175

Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu Ile Pro Asn Arg Met
 180 185 190

Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly Thr Ser Ala Glu Phe
 195 200 205

Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys Glu Thr Ser Val
 210 215 220

Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile Thr Cys Ile Thr
 225 230 235 240

Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln Cys Asn Ser Arg
 245 250 255

His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys Val Thr Arg Leu
 260 265 270

Asn Asp Arg Gln Phe Val His Asp Pro Gln Leu Gly Tyr Ser Leu Pro
 275 280 285

Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu Leu His His Phe
 290 295 300

Arg Ile Leu Gly Glu Glu Gln Phe Ala Phe Cys Arg Glu Cys Lys Glu
 305 310 315 320

Ala Tyr His Glu Gly Glu Cys Ser Ala Val Phe Glu Ala Ser Gly Thr
 325 330 335

Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg Ala Ala Glu Gln Ala Arg
340 345 350

Trp Glu Ala Ala Ser Lys Glu Thr Ile Lys Lys Thr Thr Lys Pro Cys
355 360 365

Pro Arg Cys His Val Pro Val Glu Lys Asn Gly Gly Cys Met His Met
370 375 380

Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu Trp Cys Trp Asn Cys Gly
385 390 395 400

Cys Glu Trp Asn Arg Val Cys Met Gly Asp His Trp Phe Asp Val
405 410 415

<210> 9
<211> 1398
<212> DNA
<213> Homo sapiens

<400> 9
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tgacagacg tcaggagccc cgtcctgggtt ttccagtgc actcccgcca cgtgatttgc	780
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tgccatgtac cagtggaaaa aaatggaggc tgcatgcaca tgaagtgtcc gcagccccag	1320
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cactggttcg acgtgtag	1398

<210> 10

<211> 1398

<212> DNA

<213> Artificial Sequence

<220>

<223> Codon optimized polynucleotide

<400> 10

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ttgagagtga tcttcgctgg aaaggaactg agaaacgact ggactgtgca gaactgtgac	180
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agcctgacca gagtggacct cagctcctct gtcctcccgg gagactccgt gggactggca	360
gtcattctgc aactgacag ccgcaaggat tcccccttg cgggttcacc agctggacgg	420
tccatctaca actccgccta tgtgtactgc aagggaccct gccagagggt gcagccggga	480

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aagctcagag tgcagtgcag cacttgcaga caagccaccc tgaccctgac ccagggccca      540
tcctgctggg atgatgtcct gatccccaac cggatgtcag gggaatgcca aagccctcac      600
tgccctggaa cctcggccga gttcttcttc aaatgtggag cccacccac ctcggacaag      660
gaaacctcgg tggcccttca cctcattgcc accaactccc gcaacatcac ctgtatcact      720
tgactgatg ttcgctctcc ggtgctgggtg ttccagtgc actcccgaca cgtgatctgc      780
ctggactgct tccacctgta ctgtgtgacc agactgaagg acaggcagtt tgtccacgac      840
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tgccatgtgc ctgtggaaaa gaatggaggc tgcattgcaca tgaagtgtcc ccagccacag     1320
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cactggtttg atgtgtga                                     1398

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<210> 11
<211> 465
<212> PRT
<213> Artificial Sequence

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<220>
<223> Made in Lab - mutated parkin protein

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<400> 11

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Met Ile Val Phe Val Arg Phe Asn Ser Ser His Gly Phe Pro Val Glu
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```

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

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

Glu Leu Arg Asn Asp Trp Thr Val Gln Asn Cys Asp Leu Asp Gln Gln
50 55 60

Ser Ile Val His Ile Val Gln Arg Pro Trp Arg Lys Gly Gln Glu Met
65 70 75 80

Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala Ala Gly Gly Cys Glu
85 90 95

Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu Ser Ser Ser Val Leu
100 105 110

Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu His Thr Asp Ser Arg
115 120 125

Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly Arg Ser Ile Tyr Asn
130 135 140

Ser Ala Tyr Val Tyr Cys Lys Gly Pro Cys Gln Arg Val Gln Pro Gly
145 150 155 160

Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln Ala Thr Leu Thr Leu
165 170 175

Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu Ile Pro Asn Arg Met
180 185 190

Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly Thr Ser Ala Glu Phe
195 200 205

Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys Glu Thr Ser Val
210 215 220

Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile Thr Cys Ile Thr
225 230 235 240

Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln Cys Asn Ser Arg
245 250 255

His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys Val Thr Arg Leu
260 265 270

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

Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu Leu His His Phe
290 295 300

Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr Gln Gln Tyr Gly Ala
305 310 315 320

Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu Cys Pro Arg Pro Gly
325 330 335

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

Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala Phe Cys Arg Glu Cys
355 360 365

Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala Val Phe Glu Ala Ser
370 375 380

Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg Ala Ala Glu Gln
385 390 395 400

Ala Arg Ala Glu Ala Ala Ser Lys Glu Thr Ile Lys Lys Thr Thr Lys
405 410 415

Pro Cys Pro Arg Cys His Val Pro Val Glu Lys Asn Gly Gly Cys Met
420 425 430

His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu Trp Cys Trp Asn
435 440 445

Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly Asp His Trp Phe Asp
450 455 460

Val
465

<210> 12
<211> 465
<212> PRT
<213> Artificial Sequence

<220>
<223> Made in Lab - mutated Parkin protein

<400> 12

Met Ile Val Phe Val Arg Phe Asn Ser Ser His Gly Phe Pro Val Glu
1 5 10 15

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

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

Glu Leu Arg Asn Asp Trp Thr Val Gln Asn Cys Asp Leu Asp Gln Gln
50 55 60

Ser Ile Val His Ile Val Gln Arg Pro Trp Arg Lys Gly Gln Glu Met
65 70 75 80

Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala Ala Gly Gly Cys Glu
85 90 95

Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu Ser Ser Ser Val Leu
100 105 110

Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu His Thr Asp Ser Arg
115 120 125

Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly Arg Ser Ile Tyr Asn
130 135 140

Ser Phe Tyr Val Tyr Cys Lys Gly Pro Cys Gln Arg Val Gln Pro Gly
145 150 155 160

Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln Ala Thr Leu Thr Leu
165 170 175

Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu Ile Pro Asn Arg Met
180 185 190

Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly Thr Ser Ala Glu Phe
195 200 205

Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys Glu Thr Ser Val
210 215 220

Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile Thr Cys Ile Thr
225 230 235 240

Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln Cys Asn Ser Arg
245 250 255

His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys Val Thr Arg Leu
260 265 270

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

Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu Leu His His Phe
290 295 300

Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr Gln Gln Tyr Gly Ala
305 310 315 320

Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu Cys Pro Arg Pro Gly
325 330 335

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

Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala Phe Cys Arg Glu Cys
355 360 365

Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala Val Phe Glu Ala Ser
370 375 380

Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg Ala Ala Glu Gln
385 390 395 400

Ala Arg Ala Glu Ala Ala Ser Lys Glu Thr Ile Lys Lys Thr Thr Lys
405 410 415

Pro Cys Pro Arg Cys His Val Pro Val Glu Lys Asn Gly Gly Cys Met
420 425 430

His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu Trp Cys Trp Asn
435 440 445

Cys Gly Cys Glu Trp Asn Arg Val Ser Met Gly Asp His Trp Phe Asp
450 455 460

Val
465

<210> 13
<211> 465
<212> PRT
<213> Artificial Sequence

<220>

<223> Made in Lab - mutated Parkin protein

<400> 13

Met Ile Val Phe Val Arg Phe Asn Ser Ser His Gly Phe Pro Val Glu
1 5 10 15

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

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

Glu Leu Arg Asn Asp Trp Thr Val Gln Asn Cys Asp Leu Asp Gln Gln
50 55 60

Ser Ile Val His Ile Val Gln Arg Pro Trp Arg Lys Gly Gln Glu Met
65 70 75 80

Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala Ala Gly Gly Cys Glu
85 90 95

Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu Ser Ser Ser Val Leu
100 105 110

Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu His Thr Asp Ser Arg
115 120 125

Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly Arg Ser Ile Tyr Asn
130 135 140

Ser Phe Tyr Val Tyr Cys Lys Gly Pro Cys Gln Arg Val Gln Pro Gly
145 150 155 160

Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln Ala Thr Leu Thr Leu
165 170 175

Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu Ile Pro Asn Arg Met
180 185 190

Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly Thr Ser Ala Glu Phe
195 200 205

Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys Glu Thr Ser Val
210 215 220

Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile Thr Cys Ile Thr
225 230 235 240

Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln Cys Asn Ser Arg
245 250 255

His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys Val Thr Arg Leu
260 265 270

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

Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu Leu His His Phe
290 295 300

Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr Gln Gln Tyr Gly Ala
305 310 315 320

Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu Cys Pro Arg Pro Gly
325 330 335

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

Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala Phe Cys Arg Glu Cys
355 360 365

Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala Val Phe Glu Ala Ser
370 375 380

Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg Ala Ala Glu Gln
385 390 395 400

Ala Arg Ala Glu Ala Ala Ser Lys Glu Thr Ile Lys Lys Thr Thr Lys
405 410 415

Pro Cys Pro Arg Cys His Val Pro Val Glu Lys Asn Gly Gly Cys Met
420 425 430

His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu Trp Cys Trp Asn
435 440 445

Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly Asp His Trp Ala Asp
450 455 460

Val
465

<210> 14
<211> 465
<212> PRT
<213> Artificial Sequence

<220>
<223> Made in Lab - mutated Parkin protein

<400> 14

Met Ile Val Phe Val Arg Phe Asn Ser Ser His Gly Phe Pro Val Glu
1 5 10 15

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

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

Glu Leu Arg Asn Asp Trp Thr Val Gln Asn Cys Asp Leu Asp Gln Gln
50 55 60

Ser Ile Val His Ile Val Gln Arg Pro Trp Arg Lys Gly Gln Glu Met
65 70 75 80

Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala Ala Gly Gly Cys Glu
85 90 95

Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu Ser Ser Ser Val Leu
100 105 110

Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu His Thr Asp Ser Arg
115 120 125

Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly Arg Ser Ile Tyr Asn
130 135 140

Ser Ala Tyr Val Tyr Cys Lys Gly Pro Cys Gln Arg Val Gln Pro Gly
145 150 155 160

Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln Ala Thr Leu Thr Leu
165 170 175

Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu Ile Pro Asn Arg Met
180 185 190

Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly Thr Ser Ala Glu Phe
195 200 205

Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys Glu Thr Ser Val
210 215 220

Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile Thr Cys Ile Thr
225 230 235 240

Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln Cys Asn Ser Arg
245 250 255

His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys Val Thr Arg Leu
260 265 270

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

Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu Leu His His Phe
290 295 300

Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr Gln Gln Tyr Gly Ala
305 310 315 320

Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu Cys Pro Arg Pro Gly
325 330 335

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

Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala Phe Cys Arg Glu Cys
355 360 365

Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala Val Phe Glu Ala Ser
370 375 380

Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg Ala Ala Glu Gln
385 390 395 400

Ala Arg Ala Glu Ala Ala Ser Lys Glu Thr Ile Lys Lys Thr Thr Lys
405 410 415

Pro Cys Pro Arg Cys His Val Pro Val Glu Lys Asn Gly Gly Cys Met
420 425 430

His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu Trp Cys Trp Asn
435 440 445

Cys Gly Cys Glu Trp Asn Arg Val Ser Met Gly Asp His Trp Phe Asp
450 455 460

Val
465

<210> 15
<211> 465
<212> PRT
<213> Artificial Sequence

<220>
<223> Made in Lab - mutated Parkin protein

<400> 15

Met Ile Val Phe Val Arg Phe Asn Ser Ser His Gly Phe Pro Val Glu
1 5 10 15

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

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

Glu Leu Arg Asn Asp Trp Thr Val Gln Asn Cys Asp Leu Asp Gln Gln
50 55 60

Ser Ile Val His Ile Val Gln Arg Pro Trp Arg Lys Gly Gln Glu Met
65 70 75 80

Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala Ala Gly Gly Cys Glu
85 90 95

Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu Ser Ser Ser Val Leu
100 105 110

Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu His Thr Asp Ser Arg
115 120 125

Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly Arg Ser Ile Tyr Asn
130 135 140

Ser Ala Tyr Val Tyr Cys Lys Gly Pro Cys Gln Arg Val Gln Pro Gly
145 150 155 160

Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln Ala Thr Leu Thr Leu
165 170 175

Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu Ile Pro Asn Arg Met
180 185 190

Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly Thr Ser Ala Glu Phe
195 200 205

Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys Glu Thr Ser Val
210 215 220

Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile Thr Cys Ile Thr
225 230 235 240

Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln Cys Asn Ser Arg
245 250 255

His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys Val Thr Arg Leu
260 265 270

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

Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu Leu His His Phe
290 295 300

Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr Gln Gln Tyr Gly Ala
305 310 315 320

Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu Cys Pro Arg Pro Gly
325 330 335

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

Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala Phe Cys Arg Glu Cys
355 360 365

Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala Val Phe Glu Ala Ser
370 375 380

Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg Ala Ala Glu Gln
385 390 395 400

Ala Arg Ala Glu Ala Ala Ser Lys Glu Thr Ile Lys Lys Thr Thr Lys
405 410 415

Pro Cys Pro Arg Cys His Val Pro Val Glu Lys Asn Gly Gly Cys Met
420 425 430

His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu Trp Cys Trp Asn
435 440 445

Cys Gly Cys Glu Trp Asn Arg Val Ser Met Gly Asp His Trp Ala Asp
450 455 460

Val
465

<210> 16
<211> 390
<212> PRT
<213> Homo sapiens

<400> 16

Lys Gly Gln Glu Met Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala
1 5 10 15

Ala Gly Gly Cys Glu Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu
20 25 30

Ser Ser Ser Val Leu Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu

35

40

45

His Thr Asp Ser Arg Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly
 50 55 60

Arg Ser Ile Tyr Asn Ser Phe Tyr Val Tyr Cys Lys Gly Pro Cys Gln
 65 70 75 80

Arg Val Gln Pro Gly Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln
 85 90 95

Ala Thr Leu Thr Leu Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu
 100 105 110

Ile Pro Asn Arg Met Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly
 115 120 125

Thr Ser Ala Glu Phe Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp
 130 135 140

Lys Glu Thr Ser Val Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn
 145 150 155 160

Ile Thr Cys Ile Thr Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe
 165 170 175

Gln Cys Asn Ser Arg His Val Ile Cys Leu Asp Cys Phe His Leu Tyr
 180 185 190

Cys Val Thr Arg Leu Asn Asp Arg Gln Phe Val His Asp Pro Gln Leu
 195 200 205

Gly Tyr Ser Leu Pro Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys
 210 215 220

Glu Leu His His Phe Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr
 225 230 235 240

Gln Gln Tyr Gly Ala Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu
245 250 255

Cys Pro Arg Pro Gly Cys Gly Ala Gly Leu Leu Pro Glu Pro Asp Gln
260 265 270

Arg Lys Val Thr Cys Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala
275 280 285

Phe Cys Arg Glu Cys Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala
290 295 300

Val Phe Glu Ala Ser Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu
305 310 315 320

Arg Ala Ala Glu Gln Ala Arg Trp Glu Ala Ala Ser Lys Glu Thr Ile
325 330 335

Lys Lys Thr Thr Lys Pro Cys Pro Arg Cys His Val Pro Val Glu Lys
340 345 350

Asn Gly Gly Cys Met His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu
355 360 365

Glu Trp Cys Trp Asn Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly
370 375 380

Asp His Trp Phe Asp Val
385 390

<210> 17
<211> 325
<212> PRT
<213> Homo sapiens

<400> 17

Ser Ile Tyr Asn Ser Phe Tyr Val Tyr Cys Lys Gly Pro Cys Gln Arg
1 5 10 15

Val Gln Pro Gly Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln Ala
20 25 30

Thr Leu Thr Leu Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu Ile
35 40 45

Pro Asn Arg Met Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly Thr
50 55 60

Ser Ala Glu Phe Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys
65 70 75 80

Glu Thr Ser Val Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile
85 90 95

Thr Cys Ile Thr Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln
100 105 110

Cys Asn Ser Arg His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys
115 120 125

Val Thr Arg Leu Asn Asp Arg Gln Phe Val His Asp Pro Gln Leu Gly
130 135 140

Tyr Ser Leu Pro Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu
145 150 155 160

Leu His His Phe Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr Gln
165 170 175

Gln Tyr Gly Ala Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu Cys
180 185 190

Pro Arg Pro Gly Cys Gly Ala Gly Leu Leu Pro Glu Pro Asp Gln Arg
195 200 205

Lys Val Thr Cys Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala Phe
210 215 220

Cys Arg Glu Cys Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala Val
225 230 235 240

Phe Glu Ala Ser Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg
245 250 255

Ala Ala Glu Gln Ala Arg Trp Glu Ala Ala Ser Lys Glu Thr Ile Lys
260 265 270

Lys Thr Thr Lys Pro Cys Pro Arg Cys His Val Pro Val Glu Lys Asn
275 280 285

Gly Gly Cys Met His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu
290 295 300

Trp Cys Trp Asn Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly Asp
305 310 315 320

His Trp Phe Asp Val
325

<210> 18
<211> 390
<212> PRT
<213> Artificial Sequence

<220>
<223> Made in Lab - mutated Parkin protein

<400> 18

Lys Gly Gln Glu Met Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala
1 5 10 15

Ala Gly Gly Cys Glu Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu
20 25 30

Ser Ser Ser Val Leu Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu
35 40 45

His Thr Asp Ser Arg Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly
50 55 60

Arg Ser Ile Tyr Asn Ser Ala Tyr Val Tyr Cys Lys Gly Pro Cys Gln
65 70 75 80

Arg Val Gln Pro Gly Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln
85 90 95

Ala Thr Leu Thr Leu Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu
100 105 110

Ile Pro Asn Arg Met Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly
115 120 125

Thr Ser Ala Glu Phe Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp
130 135 140

Lys Glu Thr Ser Val Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn
145 150 155 160

Ile Thr Cys Ile Thr Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe
165 170 175

Gln Cys Asn Ser Arg His Val Ile Cys Leu Asp Cys Phe His Leu Tyr
180 185 190

Cys Val Thr Arg Leu Asn Asp Arg Gln Phe Val His Asp Pro Gln Leu
195 200 205

Gly Tyr Ser Leu Pro Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys
210 215 220

Glu Leu His His Phe Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr
225 230 235 240

Gln Gln Tyr Gly Ala Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu
245 250 255

Cys Pro Arg Pro Gly Cys Gly Ala Gly Leu Leu Pro Glu Pro Asp Gln
260 265 270

Arg Lys Val Thr Cys Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala
275 280 285

Phe Cys Arg Glu Cys Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala
290 295 300

Val Phe Glu Ala Ser Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu
305 310 315 320

Arg Ala Ala Glu Gln Ala Arg Ala Glu Ala Ala Ser Lys Glu Thr Ile
325 330 335

Lys Lys Thr Thr Lys Pro Cys Pro Arg Cys His Val Pro Val Glu Lys
340 345 350

Asn Gly Gly Cys Met His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu
355 360 365

Glu Trp Cys Trp Asn Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly
370 375 380

Asp His Trp Phe Asp Val
385 390

<210> 19
<211> 390
<212> PRT
<213> Artificial Sequence

<220>
<223> Made in Lab - mutated Parkin protein

<400> 19

Lys Gly Gln Glu Met Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala
1 5 10 15

Ala Gly Gly Cys Glu Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu
20 25 30

Ser Ser Ser Val Leu Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu
35 40 45

His Thr Asp Ser Arg Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly
50 55 60

Arg Ser Ile Tyr Asn Ser Phe Tyr Val Tyr Cys Lys Gly Pro Cys Gln
65 70 75 80

Arg Val Gln Pro Gly Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln
85 90 95

Ala Thr Leu Thr Leu Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu
100 105 110

Ile Pro Asn Arg Met Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly
115 120 125

Thr Ser Ala Glu Phe Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp
130 135 140

Lys Glu Thr Ser Val Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn
145 150 155 160

Ile Thr Cys Ile Thr Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe
165 170 175

Gln Cys Asn Ser Arg His Val Ile Cys Leu Asp Cys Phe His Leu Tyr
180 185 190

Cys Val Thr Arg Leu Lys Asp Arg Gln Phe Val His Asp Pro Gln Leu
195 200 205

Gly Tyr Ser Leu Pro Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys
210 215 220

Glu Leu His His Phe Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr
225 230 235 240

Gln Gln Tyr Gly Ala Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu
245 250 255

Cys Pro Arg Pro Gly Cys Gly Ala Gly Leu Leu Pro Glu Pro Asp Gln
260 265 270

Arg Lys Val Thr Cys Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala
275 280 285

Phe Cys Arg Glu Cys Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala
290 295 300

Val Phe Glu Ala Ser Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu
305 310 315 320

Arg Ala Ala Glu Gln Ala Arg Ala Glu Ala Ala Ser Lys Glu Thr Ile
325 330 335

Lys Lys Thr Thr Lys Pro Cys Pro Arg Cys His Val Pro Val Glu Lys
340 345 350

Asn Gly Gly Cys Met His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu
355 360 365

Glu Trp Cys Trp Asn Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly
370 375 380

Asp His Trp Ala Asp Val
385 390

<210> 20
<211> 390
<212> PRT
<213> Artificial Sequence

<220>
<223> Made in lab - mutated Parkin protein

<400> 20

Lys Gly Gln Glu Met Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala
1 5 10 15

Ala Gly Gly Cys Glu Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu
20 25 30

Ser Ser Ser Val Leu Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu
35 40 45

His Thr Asp Ser Arg Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly
50 55 60

Arg Ser Ile Tyr Asn Ser Ala Tyr Val Tyr Cys Lys Gly Pro Cys Gln
65 70 75 80

Arg Val Gln Pro Gly Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln
85 90 95

Ala Thr Leu Thr Leu Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu
100 105 110

Ile Pro Asn Arg Met Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly
115 120 125

Thr Ser Ala Glu Phe Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp
130 135 140

Lys Glu Thr Ser Val Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn
145 150 155 160

Ile Thr Cys Ile Thr Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe
165 170 175

Gln Cys Asn Ser Arg His Val Ile Cys Leu Asp Cys Phe His Leu Tyr
180 185 190

Cys Val Thr Arg Leu Lys Asp Arg Gln Phe Val His Asp Pro Gln Leu
195 200 205

Gly Tyr Ser Leu Pro Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys
210 215 220

Glu Leu His His Phe Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr
225 230 235 240

Gln Gln Tyr Gly Ala Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu
245 250 255

Cys Pro Arg Pro Gly Cys Gly Ala Gly Leu Leu Pro Glu Pro Asp Gln
260 265 270

Arg Lys Val Thr Cys Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala
275 280 285

Phe Cys Arg Glu Cys Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala
290 295 300

Val Phe Glu Ala Ser Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu
305 310 315 320

Arg Ala Ala Glu Gln Ala Arg Ala Glu Ala Ala Ser Lys Glu Thr Ile
325 330 335

Lys Lys Thr Thr Lys Pro Cys Pro Arg Cys His Val Pro Val Glu Lys
340 345 350

Asn Gly Gly Cys Met His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu
355 360 365

Glu Trp Cys Trp Asn Cys Gly Cys Glu Trp Asn Arg Val Ser Met Gly
370 375 380

Asp His Trp Phe Asp Val
385 390

<210> 21
<211> 390
<212> PRT
<213> Artificial Sequence

<220>
<223> Made in Lab - mutated Parkin protein

<400> 21

Lys Gly Gln Glu Met Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala
1 5 10 15

Ala Gly Gly Cys Glu Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu
20 25 30

Ser Ser Ser Val Leu Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu
35 40 45

His Thr Asp Ser Arg Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly
50 55 60

Arg Ser Ile Tyr Asn Ser Ala Tyr Val Tyr Cys Lys Gly Pro Cys Gln
65 70 75 80

Arg Val Gln Pro Gly Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln
85 90 95

Ala Thr Leu Thr Leu Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu
100 105 110

Ile Pro Asn Arg Met Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly
115 120 125

Thr Ser Ala Glu Phe Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp
130 135 140

Lys Glu Thr Ser Val Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn
145 150 155 160

Ile Thr Cys Ile Thr Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe
165 170 175

Gln Cys Asn Ser Arg His Val Ile Cys Leu Asp Cys Phe His Leu Tyr
180 185 190

Cys Val Thr Arg Leu Lys Asp Arg Gln Phe Val His Asp Pro Gln Leu
195 200 205

Gly Tyr Ser Leu Pro Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys
210 215 220

Glu Leu His His Phe Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr
225 230 235 240

Gln Gln Tyr Gly Ala Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu
245 250 255

Cys Pro Arg Pro Gly Cys Gly Ala Gly Leu Leu Pro Glu Pro Asp Gln
260 265 270

Arg Lys Val Thr Cys Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala
275 280 285

Phe Cys Arg Glu Cys Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala
290 295 300

Val Phe Glu Ala Ser Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu
305 310 315 320

Arg Ala Ala Glu Gln Ala Arg Ala Glu Ala Ala Ser Lys Glu Thr Ile
325 330 335

Lys Lys Thr Thr Lys Pro Cys Pro Arg Cys His Val Pro Val Glu Lys
340 345 350

Asn Gly Gly Cys Met His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu
355 360 365

Glu Trp Cys Trp Asn Cys Gly Cys Glu Trp Asn Arg Val Ser Met Gly
370 375 380

Asp His Trp Ala Asp Val
385 390

<210> 22
<211> 1176
<212> DNA
<213> Homo sapiens

<400> 22
atgaaaggctc aagaaatgaa tgcaactgga ggcgacgacc ccagaaacgc ggcgggaggc 60
tgtgagcggg agccccagag cttgactcgg gtggacctca gcagctcagt cctcccagga 120
gactctgtgg ggctggctgt cattctgcac actgacagca ggaaggactc accaccagct 180
ggaagtccag caggtagatc aatctacaac agcgcctatg tgtattgcaa aggcccctgt 240
caaagagtgc agccgggaaa actcagggtta cagtgcagca cctgcaggca ggcaacgctc 300
accttgaccc aggggtccatc ttgctgggat gatgttttaa ttccaaaccg gatgagtggg 360
gaatgccaat cccacactg ccctgggact agtgcagaat ttttctttaa atgtggagca 420
cacccacct ctgacaagga aacatcagta gctttgcacc tgatcgcaac aaatagtcgg 480
aacatcactt gcattacgtg cacagacgtc aggagccccg tcctggtttt ccagtgaac 540
tcccgccacg tgatttgctt agactgtttc cacttatact gtgtgacaag actcaatgat 600
cggcagtttg ttcacgaccc tcaacttggc tactccctgc cttgtgtggc tggctgtccc 660

aactccttga ttaaagagct ccatcacttc aggattctgg gagaagagca gtacaaccgg	720
taccagcagt atggtgcaga ggagtgtgtc ctgcagatgg ggggcgtgtt atgccccgc	780
cctggctgtg gagcggggct gctgccggag cctgaccaga ggaaagtcac ctgcgaaggg	840
ggcaatggcc tgggctgtgg gtttgccttc tgccgggaat gtaaagaagc gtaccatgaa	900
ggggagtgca gtgccgtatt tgaagcctca ggaacaacta ctcaggccta cagagtcgat	960
gaaagagccg ccgagcaggc tcgtgccgaa gcagcctcca aagaaaccat caagaaaacc	1020
accaagcccct gtccccgctg ccatgtacca gtggaaaaaa atggaggctg catgcacatg	1080
aagtgtccgc agccccagtg caggctcgag tgggtgctgga actgtggctg cgagtggaac	1140
cgcgtctgca tgggggacca ctggttcgac gtgtag	1176

<210> 23
 <211> 979
 <212> DNA
 <213> Homo sapiens

<400> 23	
atgaatctac aacagcgcct atgtgtattg caaaggcccc tgtcaaagag tgcagccggg	60
aaaactcagg gtacagtgca gcacctgcag gcaggcaacg ctcaccttga cccagggtcc	120
atcttgctgg gatgatgttt taattccaaa ccggatgagt ggtgaatgcc aatccccaca	180
ctgccctggg actagtgcag aatttttctt taaatgtgga gcacacccca cctctgacaa	240
ggaaacatca gtagctttgc acctgatcgc aacaaatagt cggaacatca cttgcattac	300
gtgcacagac gtcaggagcc ccgtcctggg tttccagtgc aactcccgcc acgtgatttg	360
cttagactgt ttccacttat actgtgtgac aagactcaat gatcggcagt ttgttcacga	420
ccctcaactt ggctactccc tgccttgtgt ggctggctgt cccaactcct tgattaaaga	480
gctccatcac ttcaggattc tgggagaaga gcagtacaac cggtaccagc agtatgggtgc	540
agaggagtgt gtcctgcaga tggggggcgt gttatgcccc cgccctggct gtggagcggg	600
gctgtgccc gagcctgacc agaggaaaagt cacctgcgaa gggggcaatg gcctgggctg	660
tgggtttgcc ttctgccggg aatgtaaaga agcgtaccat gaaggggagt gcagtgccgt	720
atttgaagcc tcaggaacaa ctactcaggc ctacagagtc gatgaaagag ccgccgagca	780

ggctcgtgcc gaagcagcct ccaaagaaac catcaagaaa accaccaagc cctgtccccg	840
ctgccatgta ccagtggaaa aaaatggagg ctgcatgcac atgaagtgtc cgcagcccca	900
gtgcaggctc gagtgggtgct ggaactgtgg ctgcgagtgg aaccgcgtct gcatggggga	960
ccactggttc gacgtgtag	979

<210> 24
 <211> 1176
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in Lab - Codon optimized Parkin fragment polynucleotide

<400> 24	
atgaaaggctc aagagatgaa cgccactggt ggagatgacc ccaggaatgc agctgggggc	60
tgtgaacggg aacctcagag cctgaccaga gtggacctca gctcctctgt cctcccggga	120
gactccgtgg gactggcagt cattctgcac actgacagcc gcaaggattc cccccctgcg	180
ggttcaccag ctggacggct catctacaac tccgcctatg tgtactgcaa gggaccctgc	240
cagaggggtgc agccgggaaa gctcagagtg cagtgcagca cttgcagaca agccaccctg	300
accctgaccc agggcccatc ctgctgggat gatgtcctga tccccaaccg gatgtcaggg	360
gaatgccaaa gccctcactg ccctggaacc tcggccgagt tcttcttcaa atgtggagcc	420
cacccacct cggaacaagga aacctcgggt gcccttcacc tcattgccac caactcccgc	480
aacatcacct gtatcacttg cactgatgtt cgctctccgg tgctgggtgtt ccagtgaac	540
tcccgacacg tgatctgcct ggactgcttc cacctgtact gtgtgaccag actgaatgac	600
aggcagtttg tccacgaccc ccaactgggc tactccttgc cttgtgtggc tggctgcccc	660
aactccctga tcaaggagtt gcaccacttc cggatcctgg gagaggaaca gtacaacaga	720
taccagcagt acggggcaga ggaatgtgtc ctccaaatgg ggggagtgtc gtgccccgg	780
cctggttgtg gagctggcct cctgccggaa cctgaccagc ggaagggtcac ttgaggggt	840
ggaaacggcc tgggctgtgg cttcgccctt tgctgggagt gcaaggaggc ctaccacgaa	900
ggagaatgct ccgcggtgtt tgaagcctca gggaccacca cacaagccta cagagtggat	960

gagagggcag cggagcaggc ccgcgccgaa gcggcctcca aggagactat caagaaaacc	1020
accaagccat gccctaggtg ccatgtgcct gtggaaaaga atggaggctg catgcacatg	1080
aagtgcctccc agccacagtg ccgccttgaa tgggtgctgga actgtggctg cgagtggaac	1140
agagtgtgta tgggggacca ctggtttgat gtgtga	1176

<210> 25
 <211> 979
 <212> DNA
 <213> Homo sapiens

<400> 25	
atgcatctac aactccgcct atgtgtactg caagggaccc tgccagaggg tgcagccggg	60
aaagctcaga gtgcagtgca gcacttgacg acaagccacc ctgaccctga cccagggccc	120
atcctgctgg gatgatgtcc tgatcccaaa ccggatgtca ggggaatgcc aaagccctca	180
ctgccctgga acctcggccg agttcttctt caaatgtgga gcccacccca cctcggacaa	240
ggaaacctcg gtggcccttc acctcattgc caccaactcc cgcaacatca cctgtatcac	300
ttgcactgat gttcgctctc cgggtgctgg gttccagtgc aactcccgac acgtgatctg	360
cctggactgc ttccacctgt actgtgtgac cagactgaat gacaggcagt ttgtccacga	420
cccccaactg ggctactcct tgccttgtgt ggctggctgc cccaactccc tgatcaagga	480
gttgaccacac ttccggatcc tgggagagga acagtacaac agataccagc agtacggggc	540
agaggaatgt gtcctcaaaa tgggggggagt gctgtgcccc cggcctgggt gtggagctgg	600
cctcctgccg gaacctgacc agcggaaggt cacttgcgag ggtggaaacg gcctgggctg	660
tggcttcgcc ttctgtcggg agtgcaagga ggcctaccac gaaggagaat gctccgcggt	720
gtttgaagcc tcagggacca ccacacaagc ctacagagtg gatgagaggg cagcggagca	780
ggcccgcgcc gaagcggcct ccaaggagac tatcaagaaa accaccaagc catgccctag	840
gtgccatgtg cctgtggaaa agaattggagg ctgcatgcac atgaagtgcc ccagccaca	900
gtgccgcctt gaatggtgct ggaactgtgg ctgagagtgg aacagagtgt gtatggggga	960
ccactggttt gatgtgtga	979

<210> 26
<211> 168
<212> DNA
<213> Adeno-associated virus

<400> 26
gcgcgctcgc tcgctcactg aggccgcccc ggcaaagccc gggcgtcggg cgacctttgg 60
tcgcccggcc tcagtgagcg agcgagcgcg cagagaggga gtggccaact ccatcactag 120
gggttccttg tagttaatga ttaacccgcc atgctactta tctacgta 168

<210> 27
<211> 168
<212> DNA
<213> Adeno-associated virus

<400> 27
tacgtagata agtagcatgg cgggttaatc attaactaca aggaaccctt agtgatggag 60
ttggccactc cctctctgcg cgctcgctcg ctactgagg ccgggcgacc aaaggctcgcc 120
cgacgcccgg gctttgcccc ggcggcctca gtgagcgagc gagcgcg 168

<210> 28
<211> 822
<212> DNA
<213> Artificial Sequence

<220>
<223> Made in Lab

<400> 28
gttaccagg ctggagtga gtggcacatt tctgctcact gcaacctcct cctccctggg 60
ttcaagcaat tctcctgcct cagcctccca agtagctgtg attataggtg cacaccacca 120
agcctggcta atttttatat cttagtaga gacgggagtc tcaccatgtt ggccaggcta 180
gtctctggca agccatggta aaatgtaact atttaaggct gctttaaatt agactaatag 240
cagagtggtc agactatact gaaagcttgg tgaatcacia ttaagtacct caaagaacta 300
ttcttggttg ccttattcct atgtaaataa ctgaaatctt tgtttttctt cctaaaaggg 360
gtcatgttga tttttactta caatgtattt taagtttgtc actctaaatg gttatgagca 420

agtttaagaa aaatcttcag caaatactac cttagattat gacccccaaaa cacatttact	480
tatgattatg ttgaaaacat agggctctggg gaaaaaggga tttaaaataa gaagaaaaag	540
aagacttggg acttaaaaag tcttttagag gccagctcac caacattcag aacacccagt	600
ctgtgttgca caatatgtta cttaggtata aatcaaggat tcatgtaatt ttgtcattcc	660
ttgcgtgata ttttaaaaaa cattctgtgt aaggatttta taaagctctc ttctaaaaat	720
acaaaaattt gtggggcctt gtagtcccag ctacttggga ggctgaggca ggaggatttc	780
ttgaactggg aggcagagct tgcagtgagc ccactgcatc ag	822

<210> 29
 <211> 253
 <212> DNA
 <213> Homo sapiens

<400> 29	
gcccagcacc ccaaggcggc caacgcaaaa actctccctc ctctcttcc tcaatctcgc	60
tctcgctctt tttttttttc gcaaaaggag gggagagggg gtaaaaaaat gctgcactgt	120
gcggcgaagc cgggtgagtga gcggcgcggg gccaatcagc gtgcgccgtt ccgaaagttg	180
ccttttatgg ctcgagcggc cgcgggcgcg ccctataaaa cccagcggcg cgacgcgcca	240
ccaccgccga gtc	253

<210> 30
 <211> 281
 <212> DNA
 <213> Gallus gallus

<400> 30	
ggtcgaggtg agccccacgt tctgcttcac tctccccatc tccccccct cccaccccc	60
aattttgtat ttattttatt tttaattatt ttgtgcagcg atgggggcgg gggggggggg	120
ggcgcgcgcc aggcggggcg gggcggggcg aggggcgggg cggggcgagg cggagaggtg	180
cggcggcagc caatcagagc ggcgcgctcc gaaagtttcc ttttatggcg aggcggcggc	240
ggcggcggcc ctataaaaag cgaagcgcgc ggcgggcggg a	281

<210> 31

<211> 220
<212> DNA
<213> Human betaherpesvirus 5

<400> 31
tggatgatgcg gttttggcag tacaccaatg ggcgtggata gcggtttgac tcacggggat 60
ttccaagtct ccacccatt gacgtcaatg ggagtttgtt ttggcaccaa aatcaacggg 120
actttccaaa atgtcgtaat aaccccgccc cgttgacgca aatgggcggg aggcgtgtac 180
ggtgggagggt ctatataagc agagctcggt tagtgaaccg 220

<210> 32
<211> 455
<212> DNA
<213> Homo sapiens

<400> 32
caacctttgg agctaagcca gcaatggtag aggggaagatt ctgcacgtcc cttccaggcg 60
gcctccccgt caccaccccc cccaacccgc ccgaccgga gctgagagta attcatacaa 120
aaggactcgc ccctgccttg gggaatccca gggaccgtcg ttaaactccc actaacgtag 180
aaccagaga tcgctgcgtt cccgccccct caccgccccg ctctcgtcat cactgagggtg 240
gagaatagca tgcgtgaggc tccggtgccc gtcagtgggc agagcgcaca tcgcccacag 300
tccccgagaa gttgggggga ggggtcggca attgaacggg tgcctagaga aggtggcgcg 360
gggtaaactg ggaaagtgat gtcgtgtact ggctccgcct ttttcccag ggtgggggag 420
aaccgtatat aagtgcagta gtcgccgtga acgtt 455

<210> 33
<211> 422
<212> DNA
<213> Homo sapiens

<400> 33
ctgcagaggg ccctgcgtat gaggcaagt gggttttagg accaggatga ggcgggggtg 60
gggtgcctac ctgacgaccg accccgaccc actggacaag caccacaacc ccattcccca 120
aattgcgcat cccctatcag agaggggggag gggaaacagg atgcggcgag gcgctgctgc 180
actgccagct tcagcaccgc ggacagtgcc ttcgccccg cctggcggcg cgcgccaccg 240

ccgcctcagc actgaaggcg cgctgacgtc actcgccggt cccccgcaaa ctcccccttcc	300
cggccacctt ggtcgctcc gcgccgccgc cggcccagcc ggaccgcacc acgcgaggcg	360
cgagataggg gggcacgggc gcgaccatct gcgctgcggc gccggcgact cagcgctgcc	420
tc	422

<210> 34
 <211> 281
 <212> DNA
 <213> Homo sapiens

<400> 34 acttgtggac aaagtttgct ctattccacc tcctccaggc cctccttggg tccatcaccc	60
caggggtgct ggggtccatcc cacccccagg cccacacagg cttgcagtat tgtgtgcggt	120
atggtcaggg cgtccgagag caggtttcgc agtgggaaggc aggcaggtgt tggggaggca	180
gttaccgggg caacgggaac agggcgtttt ggaggtggtt gccatgggga cctggatgct	240
gacgaaggct cgcgaggctg tgagcagcca cagtgccctg c	281

<210> 35
 <211> 293
 <212> DNA
 <213> Human betaherpesvirus 5

<400> 35 acttacggta aatggcccg cctggctgacc gcccaacgac ccccgcccat tgacgtcaat	60
aatgacgtat gttcccatag taacgccaat agggactttc cattgacgtc aatgggtgga	120
gtatttacgg taaactgccc acttggcagt acatcaagtg tatcatatgc caagtacgcc	180
ccctattgac gtcaatgacg gtaaatggcc cgcctggcat tatgcccagt acatgacctt	240
atgggacttt cctacttggc agtacatcta cgtattagtc atcgctatta cca	293

<210> 36
 <211> 953
 <212> DNA
 <213> Homo sapiens

<400> 36

cgcggtccgcc cgcgagcaca gagcctcgcc tttgccgatc cgccgcccgt ccacacccgc	60
cgccaggtaa gcccggccag ccgaccgggg catgcggccg cggcccttcg cccgtgcaga	120
gccgccgtct gggccgcagc ggggggcgca tggggcgga cgggaccgcc gtggggggcg	180
cgggagaagc ccctgggcct ccggagatgg gggacacccc acgccagttc gcaggcgcca	240
ggccgcgctc gggcgggcgc gctccggggg tgccgctctc ggggcggggg caaccggcgg	300
ggtctttgtc tgagccgggc tcttgccaat ggggatcgca cggtagggcg ggcgtagccc	360
ccgtcaggcc cggtaggggc tggggcgcca tgcgcgtgcg cgctggtcct ttgggcgcta	420
actgcgtgcg cgctgggaat tggcgctaata tgcgcgtgcg cgctgggact caatggcgct	480
aatcgcgct gcgttctggg gcccgggcgc ttgcgccact tcctgcccga gccgctggcg	540
cccgagggtg tggccgctgc gtgcgcgcgc gcgaccgggt cgctgtttga accgggcgga	600
ggcggggctg gcgcccgggt gggagggggg tggggcctgg cttcctgccg cgcgccgcgg	660
ggacgcctcc gaccagtgtt tgccttttat ggtaataacg cggccggccc ggcttccttt	720
gtccccaatc tgggcgcgcg ccggcgcccc ctggcggcct aaggactcgg cgcgccggaa	780
gtggccaggc cggcagcggc tgctcttggc ggccccgagg tgactatagc cttcttttgt	840
gtcttgatag ttgccagcc tctgctaacc atgttcatgc cttcttcttt ttcctacagc	900
tcctgggcaa cgtgctgggt attgtgctgt ctcatcattt tggcaaagaa ttc	953

<210> 37

<211> 1068

<212> DNA

<213> Artificial Sequence

<220>

<223> Made in Lab - Chicken beta-actin exon/intron and rabbit globin intron

<400> 37

gtcgtgcgc gctgccttcg ccccggtgcc cgctccgcc cgcctcgc cgcgccccc	60
cggctctgac tgaccgcgtt actcccacag gtgagcgggc gggacggccc ttctcctccg	120
ggctgtaatt agcgttgggt ttaatgacgg cttgtttctt ttctgtggct gcgtgaaagc	180
cttgaggggc tccgggaggg ccctttgtgc ggggggagcg gctcgggggg tgcgtgcgtg	240

tgtgtgtgctg tggggagcgc cgcgtgcggc tccgcgctgc ccggcggctg tgagcgctgc	300
gggcgcggcg cggggctttg tgcgtccgc agtgtgcgcg aggggagcgc ggccgggggc	360
ggtgccccgc ggtgcggggg gggctgcgag ggggaacaaag gctgcgtgcg ggggtgtgtgc	420
gtgggggggt gagcaggggg tgtgggcgcg tcggtcgggc tgcaaccccc cctgcacccc	480
cctccccgag ttgctgagca cggcccggct tcgggtgcgg ggctccgtac ggggcgtggc	540
gcggggctcg ccgtgccggg cgggggggtgg cggcaggtgg gggtgccggg cggggcgggg	600
ccgcctcggg ccggggaggg ctcgggggag gggcgcggcg gccccggag cggcggcggc	660
tgtcgaggcg cggcgagccg cagccattgc cttttatggt aatcgtgcga gagggcgag	720
ggacttcctt tgtcccaaatt ctgtgcggag ccgaaatctg ggaggcgccg ccgcaccccc	780
tctagcgggc gcggggcgaa gcgggtgcggc gccggcagga aggaaatggg cggggagggc	840
cttcgtgcgt cgccgcgccg ccgtcccctt ctccctctcc agcctcgggg ctgtccgcgg	900
ggggacggct gccttcgggg gggacggggc agggcgggggt tcggcttctg gcgtgtgacc	960
ggcggctcta gagcctctgc taaccatgtt catgccttct tctttttcct acagctcctg	1020
ggcaacgtgc tggttattgt gctgtctcat cattttggca aagaattc	1068

<210> 38
 <211> 126
 <212> DNA
 <213> Homo sapiens

<400> 38	
agtctgcggg gggcagcgga ggagtcgtgt cgtgcctgag agcgcagctg tgctcctggg	60
caccgcgcag tccgcccccg cggctcctgg ccagaccacc ctaggaccc cctgccccaa	120
gtcgca	126

<210> 39
 <211> 121
 <212> DNA
 <213> Human betaherpesvirus 5

<400> 39	
tcagatcgcc tggagaggcc atccacgctg ttttgacctc catagtggac accgggaccg	60

atccagcctc cgcgcccgga aacgggtgcat tggaacgcgg attccccgtg ccaagagtga	120
c	121

<210> 40
 <211> 512
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in Lab - adenovirus derived enhancer element

<400> 40	
ctcactctct tccgcatcgc tgtctgcgag ggccagctgt tgggctcgcg gttgaggaca	60
aactcttcgc ggtctttcca gtactcttgg atcgaaaacc cgtcggcctc cgaacgggtac	120
tccgccaccg agggacctga gcgagtcgc atcgaccgga tcggaaaacc tctcgagaaa	180
ggcgtctaac cagtcacagt cgcaaggtag gctgagcacc gtggcgggcg gcagcgggtg	240
gcggtcgggg ttgtttctgg cggagggtgct gctgatgatg taattaaaagt aggcggtctt	300
gagacggcgg atggtcgagg tgagggtggtg caggcttgag atccagctgt tggggtgagt	360
actccctctc aaaagcgggc attacttctg cgctaagatt gtcagtttcc aaaaacgagg	420
aggatttgat attcacctgg ccgatctgg ccatacactt gagtgacaat gacatccact	480
ttgcctttct ctccacaggt gtccactccc ag	512

<210> 41
 <211> 956
 <212> DNA
 <213> Homo sapiens

<400> 41	
ctttttcgca acgggtttgc cgccagaaca caggtaagtg ccgtgtgtgg ttcccgcggg	60
cctggcctct ttacgggtta tggcccttgc gtgccttgaa ttacttccac ctggctccag	120
tacgtgattc ttgatcccga gctggagcca ggggcgggccc ttgcgcttta ggagcccctt	180
cgccctgtgc ttgagttgag gcctggcctg ggcgctgggg ccgccgcgtg cgaatctggt	240
ggcaccttcg cgccgtgtct gctgctttcg ataagtctct agccatttaa aatttttgat	300

gacgtgctgc gacgcttttt ttctggcaag atagtcttgt aaatgcgggc caggatctgc	360
acactgggtat ttcgggttttt gggcccgcgg ccggcgacgg ggcccgtgcg tcccagcgca	420
catgttcggc gaggcggggc ctgcgagcgc ggccaccgag aatcggacgg gggtagtctc	480
aagctggccg gcctgctctg gtgcctggcc tcgcgccgcc gtgtatcgcc ccgccctggg	540
cggcaaggct ggcccggtcg gcaccagttg cgtgagcgga aagatggccg cttcccggcc	600
ctgctccagg gggctcaaaa tggaggacgc ggcgctcggg agagcgggcg ggtgagtcac	660
ccacacaaag gaaaagggcc tttccgtcct cagccgtcgc ttcattgtgac tccacggagt	720
accgggcgcc gtccaggcac ctcgattagt tctggagctt ttggagtacg tcgtctttag	780
gttgggggga ggggttttat gcgatggagt ttccccacac tgagtgggtg gagactgaag	840
ttaggccagc ttggcacttg atgtaattct ctttgaatt tggccttttt gagtttggat	900
cttggttcat tctcaagcct cagacagtgg ttcaaagttt ttttcttcca tttcag	956

<210> 42
 <211> 83
 <212> DNA
 <213> Homo sapiens

<400> 42	
tcagaagccc cgggctcgtc agtcaaaccg gttctctgtt tgactcggc agcacgggca	60
ggcaagtggc ccctagggtc ggg	83

<210> 43
 <211> 755
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in Lab - mutated woodchuck hepatitis regulatory element

<400> 43	
ttcctgttaa tcaacctctg gattacaaaa tttgtgaaag attgactggc attcttaact	60
atgttgctcc ttttacgcta tgtggatacg ctgctttaat gcctttgtat catgctattg	120
cttcccgtat ggctttcatt ttctcctcct tgtataaatc ctggttgctg tctctttatg	180
aggagtgtg gcccgtgtc aggcaacgtg gcgtgggtgt cactgtgttt gctgacgcaa	240

ccccactgg ttggggcatt gccaccacct gtcagctcct ttccgggact ttcgctttcc	300
ccctccctat tgccacggcg gaactcatcg ccgcctgcct tgcccgtgc tggacagggg	360
ctcggctgtt gggcactgac aattccgtgg tgttgctcggg gaagctgacg tcctttccgc	420
ggctgctcgc ctgtgttgcc acctggattc tgcgcgggac gtccttctgc tacgtccctt	480
cggccctcaa tccagcggac cttccttccc gcggcctgct gccggctctg cggcctcttc	540
cgctctttcg ctttcgccct cagacgagtc ggatctccct ttgggccgcc tccccgcca	600
tgtatctttt tcacctgtgc cttgtttttg cctgtgttcc gcgtcctact tttcaagcct	660
ccaagctgtg ctttgggcgg ctttggggca tggacataga tccctataaa gaatttggtt	720
catcttatca gttgttgaat tttcttcctt tggac	755

<210> 44
 <211> 12
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> CAAX motif

<400> 44	
tgtgtgataa tg	12

<210> 45
 <211> 810
 <212> DNA
 <213> Homo sapiens

<400> 45	
ctgttctcat cacatcatat caaggttata taccatcaat attgccacag atgttactta	60
gccttttaat atttctctaa tttagtgtat atgcaatgat agttctctga tttctgagat	120
tgagtttctc atgtgtaatg attatttaga gtttctcttt catctgttca aattttgtc	180
tagttttatt ttttactgat ttgtaagact tctttttata atctgcatat tacaattctc	240
tttactgggg tgttgcaa attttctgtc attctatggc ctgacttttc ttaatgggtt	300
tttaatttta aaaataagtc ttaatattca tgcaatctaa ttaacaatct tttctttgtg	360

gtaggactt tgagtcataa gaaatttttc tctacactga agtcatgatg gcatgcttct	420
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 <212> DNA
 <213> Hepatitis B virus

<400> 46	
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<211> 755
<212> DNA
<213> Artificial Sequence

<220>
<223> Made in Lab - HepB derived enhancer element

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<210> 48
<211> 94
<212> DNA
<213> Homo sapiens

<400> 48
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<210> 49
<211> 596
<212> DNA

<213> Woodchuck hepatitis virus

<400> 49

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<210> 50

<211> 387

<212> DNA

<213> Oryctolagus cuniculus

<400> 50

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<211> 251

<212> DNA

<213> Bos taurus

<400> 51
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<210> 52
 <211> 202
 <212> DNA
 <213> Homo sapiens

<400> 52
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<210> 53
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 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in Lab - Expression cassette

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<210> 54

<211> 4523

<212> DNA

<213> Artificial Sequence

<220>

<223> Made in Lab - Expression cassette

<400> 54

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<220>
<223> Made in Lab - Expression cassette

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cactgccagc ttcagcaccg cggacagtgc cttcgcccc gcctggcggc gcgcgccacc	720
gccgcctcag cactgaaggc gcgctgacgt cactcgccgg tccccgcaa actccccttc	780
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gcgagatagg ggggcacggg cgcgaccatc tgcgctgcgg cgccggcgac tcagcgctgc	900
ctcagtctgc ggtgggcagc ggaggagtcg tgtcgtgcct gagagcgag ctgtgctcct	960
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caagtcgcag gggaattcaa agcaagccgc caccatgcat ctacaactcc gcctatgtgt	1080
actgcaaggg accctgccag aggggtgcagc cgggaaagct cagagtgagc tgcagcactt	1140
gcagacaagc caccctgacc ctgacccagg gcccatcctg ctgggatgat gtcctgatcc	1200
ccaaccggat gtcaggggaa tgccaaagcc ctactgccc tggaacctcg gccgagttct	1260
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tgtaaataac tgaaatcttt gtttttcttc ctaaaagggg tcatgttgat ttttacttac	3480
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aaatactacc ttagattatg accccaaaac acatttactt atgattatgt tgaaaacata	3600
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cttttagagg ccagctcacc aacattcaga acaccagtc tgtgttgcac aatatgttac	3720
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gcagtgagcc cactgcatca gtacgtagat aagtagcatg gcgggttaat cattaactac	3960
aaggaacccc tagtgatgga gttggccact ccctctctgc gcgctcgctc gctcactgag	4020

gccgggcgac caaaggctgc ccgacgcccg ggctttgccc gggcggcctc agtgagcgag 4080
cgagcgcgca gcctaattaa ggcc 4104

<210> 59
<211> 735
<212> PRT
<213> Adeno-associated virus 2
<400> 59

Met Ala Ala Asp Gly Tyr Leu Pro Asp Trp Leu Glu Asp Thr Leu Ser
1 5 10 15

Glu Gly Ile Arg Gln Trp Trp Lys Leu Lys Pro Gly Pro Pro Pro Pro
20 25 30

Lys Pro Ala Glu Arg His Lys Asp Asp Ser Arg Gly Leu Val Leu Pro
35 40 45

Gly Tyr Lys Tyr Leu Gly Pro Phe Asn Gly Leu Asp Lys Gly Glu Pro
50 55 60

Val Asn Glu Ala Asp Ala Ala Ala Leu Glu His Asp Lys Ala Tyr Asp
65 70 75 80

Arg Gln Leu Asp Ser Gly Asp Asn Pro Tyr Leu Lys Tyr Asn His Ala
85 90 95

Asp Ala Glu Phe Gln Glu Arg Leu Lys Glu Asp Thr Ser Phe Gly Gly
100 105 110

Asn Leu Gly Arg Ala Val Phe Gln Ala Lys Lys Arg Val Leu Glu Pro
115 120 125

Leu Gly Leu Val Glu Glu Pro Val Lys Thr Ala Pro Gly Lys Lys Arg
130 135 140

Pro Val Glu His Ser Pro Val Glu Pro Asp Ser Ser Ser Gly Thr Gly
145 150 155 160

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

Gly Asp Ala Asp Ser Val Pro Asp Pro Gln Pro Leu Gly Gln Pro Pro
180 185 190

Ala Ala Pro Ser Gly Leu Gly Thr Asn Thr Met Ala Thr Gly Ser Gly
195 200 205

Ala Pro Met Ala Asp Asn Asn Glu Gly Ala Asp Gly Val Gly Asn Ser
210 215 220

Ser Gly Asn Trp His Cys Asp Ser Thr Trp Met Gly Asp Arg Val Ile
225 230 235 240

Thr Thr Ser Thr Arg Thr Trp Ala Leu Pro Thr Tyr Asn Asn His Leu
245 250 255

Tyr Lys Gln Ile Ser Ser Gln Ser Gly Ala Ser Asn Asp Asn His Tyr
260 265 270

Phe Gly Tyr Ser Thr Pro Trp Gly Tyr Phe Asp Phe Asn Arg Phe His
275 280 285

Cys His Phe Ser Pro Arg Asp Trp Gln Arg Leu Ile Asn Asn Asn Trp
290 295 300

Gly Phe Arg Pro Lys Arg Leu Asn Phe Lys Leu Phe Asn Ile Gln Val
305 310 315 320

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

Thr Ser Thr Val Gln Val Phe Thr Asp Ser Glu Tyr Gln Leu Pro Tyr
340 345 350

Val Leu Gly Ser Ala His Gln Gly Cys Leu Pro Pro Phe Pro Ala Asp
355 360 365

Val Phe Met Val Pro Gln Tyr Gly Tyr Leu Thr Leu Asn Asn Gly Ser
370 375 380

Gln Ala Val Gly Arg Ser Ser Phe Tyr Cys Leu Glu Tyr Phe Pro Ser
385 390 395 400

Gln Met Leu Arg Thr Gly Asn Asn Phe Thr Phe Ser Tyr Thr Phe Glu
405 410 415

Asp Val Pro Phe His Ser Ser Tyr Ala His Ser Gln Ser Leu Asp Arg
420 425 430

Leu Met Asn Pro Leu Ile Asp Gln Tyr Leu Tyr Tyr Leu Ser Arg Thr
435 440 445

Asn Thr Pro Ser Gly Thr Thr Thr Gln Ser Arg Leu Gln Phe Ser Gln
450 455 460

Ala Gly Ala Ser Asp Ile Arg Asp Gln Ser Arg Asn Trp Leu Pro Gly
465 470 475 480

Pro Cys Tyr Arg Gln Gln Arg Val Ser Lys Thr Ser Ala Asp Asn Asn
485 490 495

Asn Ser Glu Tyr Ser Trp Thr Gly Ala Thr Lys Tyr His Leu Asn Gly
500 505 510

Arg Asp Ser Leu Val Asn Pro Gly Pro Ala Met Ala Ser His Lys Asp
515 520 525

Asp Glu Glu Lys Phe Phe Pro Gln Ser Gly Val Leu Ile Phe Gly Lys
530 535 540

Gln Gly Ser Glu Lys Thr Asn Val Asp Ile Glu Lys Val Met Ile Thr
545 550 555 560

Asp Glu Glu Glu Ile Arg Thr Thr Asn Pro Val Ala Thr Glu Gln Tyr
565 570 575

Gly Ser Val Ser Thr Asn Leu Gln Arg Gly Asn Arg Gln Ala Ala Thr
580 585 590

Ala Asp Val Asn Thr Gln Gly Val Leu Pro Gly Met Val Trp Gln Asp
595 600 605

Arg Asp Val Tyr Leu Gln Gly Pro Ile Trp Ala Lys Ile Pro His Thr
610 615 620

Asp Gly His Phe His Pro Ser Pro Leu Met Gly Gly Phe Gly Leu Lys
625 630 635 640

His Pro Pro Pro Gln Ile Leu Ile Lys Asn Thr Pro Val Pro Ala Asn
645 650 655

Pro Ser Thr Thr Phe Ser Ala Ala Lys Phe Ala Ser Phe Ile Thr Gln
660 665 670

Tyr Ser Thr Gly Gln Val Ser Val Glu Ile Glu Trp Glu Leu Gln Lys
675 680 685

Glu Asn Ser Lys Arg Trp Asn Pro Glu Ile Gln Tyr Thr Ser Asn Tyr
690 695 700

Asn Lys Ser Val Asn Val Asp Phe Thr Val Asp Thr Asn Gly Val Tyr
705 710 715 720

Ser Glu Pro Arg Pro Ile Gly Thr Arg Tyr Leu Thr Arg Asn Leu
725 730 735

<210> 60

<211> 736

<212> PRT

<213> Adeno-associated virus 9

<400> 60

Met Ala Ala Asp Gly Tyr Leu Pro Asp Trp Leu Glu Asp Asn Leu Ser
1 5 10 15

Glu Gly Ile Arg Glu Trp Trp Ala Leu Lys Pro Gly Ala Pro Gln Pro
20 25 30

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

Gly Tyr Lys Tyr Leu Gly Pro Gly Asn Gly Leu Asp Lys Gly Glu Pro
50 55 60

Val Asn Ala Ala Asp Ala Ala Ala Leu Glu His Asp Lys Ala Tyr Asp
65 70 75 80

Gln Gln Leu Lys Ala Gly Asp Asn Pro Tyr Leu Lys Tyr Asn His Ala
85 90 95

Asp Ala Glu Phe Gln Glu Arg Leu Lys Glu Asp Thr Ser Phe Gly Gly
100 105 110

Asn Leu Gly Arg Ala Val Phe Gln Ala Lys Lys Arg Leu Leu Glu Pro
115 120 125

Leu Gly Leu Val Glu Glu Ala Ala Lys Thr Ala Pro Gly Lys Lys Arg
130 135 140

Pro Val Glu Gln Ser Pro Gln Glu Pro Asp Ser Ser Ala Gly Ile Gly
145 150 155 160

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

Gly Asp Thr Glu Ser Val Pro Asp Pro Gln Pro Ile Gly Glu Pro Pro
180 185 190

Ala Ala Pro Ser Gly Val Gly Ser Leu Thr Met Ala Ser Gly Gly Gly
195 200 205

Ala Pro Val Ala Asp Asn Asn Glu Gly Ala Asp Gly Val Gly Ser Ser
210 215 220

Ser Gly Asn Trp His Cys Asp Ser Gln Trp Leu Gly Asp Arg Val Ile
225 230 235 240

Thr Thr Ser Thr Arg Thr Trp Ala Leu Pro Thr Tyr Asn Asn His Leu
245 250 255

Tyr Lys Gln Ile Ser Asn Ser Thr Ser Gly Gly Ser Ser Asn Asp Asn
260 265 270

Ala Tyr Phe Gly Tyr Ser Thr Pro Trp Gly Tyr Phe Asp Phe Asn Arg
275 280 285

Phe His Cys His Phe Ser Pro Arg Asp Trp Gln Arg Leu Ile Asn Asn
290 295 300

Asn Trp Gly Phe Arg Pro Lys Arg Leu Asn Phe Lys Leu Phe Asn Ile
305 310 315 320

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

Asn Leu Thr Ser Thr Val Gln Val Phe Thr Asp Ser Asp Tyr Gln Leu
340 345 350

Pro Tyr Val Leu Gly Ser Ala His Glu Gly Cys Leu Pro Pro Phe Pro
355 360 365

Ala Asp Val Phe Met Ile Pro Gln Tyr Gly Tyr Leu Thr Leu Asn Asp
370 375 380

Gly Ser Gln Ala Val Gly Arg Ser Ser Phe Tyr Cys Leu Glu Tyr Phe

385		390		395		400									
Pro	Ser	Gln	Met	Leu	Arg	Thr	Gly	Asn	Asn	Phe	Gln	Phe	Ser	Tyr	Glu
			405						410					415	
Phe	Glu	Asn	Val	Pro	Phe	His	Ser	Ser	Tyr	Ala	His	Ser	Gln	Ser	Leu
			420					425					430		
Asp	Arg	Leu	Met	Asn	Pro	Leu	Ile	Asp	Gln	Tyr	Leu	Tyr	Tyr	Leu	Ser
		435					440					445			
Lys	Thr	Ile	Asn	Gly	Ser	Gly	Gln	Asn	Gln	Gln	Thr	Leu	Lys	Phe	Ser
	450					455					460				
Val	Ala	Gly	Pro	Ser	Asn	Met	Ala	Val	Gln	Gly	Arg	Asn	Tyr	Ile	Pro
465					470					475					480
Gly	Pro	Ser	Tyr	Arg	Gln	Gln	Arg	Val	Ser	Thr	Thr	Val	Thr	Gln	Asn
				485					490					495	
Asn	Asn	Ser	Glu	Phe	Ala	Trp	Pro	Gly	Ala	Ser	Ser	Trp	Ala	Leu	Asn
			500					505					510		
Gly	Arg	Asn	Ser	Leu	Met	Asn	Pro	Gly	Pro	Ala	Met	Ala	Ser	His	Lys
		515					520					525			
Glu	Gly	Glu	Asp	Arg	Phe	Phe	Pro	Leu	Ser	Gly	Ser	Leu	Ile	Phe	Gly
	530					535					540				
Lys	Gln	Gly	Thr	Gly	Arg	Asp	Asn	Val	Asp	Ala	Asp	Lys	Val	Met	Ile
545					550					555					560
Thr	Asn	Glu	Glu	Glu	Ile	Lys	Thr	Thr	Asn	Pro	Val	Ala	Thr	Glu	Ser
				565					570					575	
Tyr	Gly	Gln	Val	Ala	Thr	Asn	His	Gln	Ser	Ala	Gln	Ala	Gln	Ala	Gln
			580					585					590		

Thr Gly Trp Val Gln Asn Gln Gly Ile Leu Pro Gly Met Val Trp Gln
595 600 605

Asp Arg Asp Val Tyr Leu Gln Gly Pro Ile Trp Ala Lys Ile Pro His
610 615 620

Thr Asp Gly Asn Phe His Pro Ser Pro Leu Met Gly Gly Phe Gly Met
625 630 635 640

Lys His Pro Pro Pro Gln Ile Leu Ile Lys Asn Thr Pro Val Pro Ala
645 650 655

Asp Pro Pro Thr Ala Phe Asn Lys Asp Lys Leu Asn Ser Phe Ile Thr
660 665 670

Gln Tyr Ser Thr Gly Gln Val Ser Val Glu Ile Glu Trp Glu Leu Gln
675 680 685

Lys Glu Asn Ser Lys Arg Trp Asn Pro Glu Ile Gln Tyr Thr Ser Asn
690 695 700

Tyr Tyr Lys Ser Asn Asn Val Glu Phe Ala Val Asn Thr Glu Gly Val
705 710 715 720

Tyr Ser Glu Pro Arg Pro Ile Gly Thr Arg Tyr Leu Thr Arg Asn Leu
725 730 735

<210> 61
<211> 743
<212> PRT
<213> Artificial Sequence

<220>
<223> Synthetic construct - AAV9 variant

<400> 61

Met Ala Ala Asp Gly Tyr Leu Pro Asp Trp Leu Glu Asp Asn Leu Ser
1 5 10 15

Glu Gly Ile Arg Glu Trp Trp Ala Leu Lys Pro Gly Ala Pro Gln Pro
20 25 30

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

Gly Tyr Lys Tyr Leu Gly Pro Gly Asn Gly Leu Asp Lys Gly Glu Pro
50 55 60

Val Asn Ala Ala Asp Ala Ala Ala Leu Glu His Asp Lys Ala Tyr Asp
65 70 75 80

Gln Gln Leu Lys Ala Gly Asp Asn Pro Tyr Leu Lys Tyr Asn His Ala
85 90 95

Asp Ala Glu Phe Gln Glu Arg Leu Lys Glu Asp Thr Ser Phe Gly Gly
100 105 110

Asn Leu Gly Arg Ala Val Phe Gln Ala Lys Lys Arg Leu Leu Glu Pro
115 120 125

Leu Gly Leu Val Glu Glu Ala Ala Lys Thr Ala Pro Gly Lys Lys Arg
130 135 140

Pro Val Glu Gln Ser Pro Gln Glu Pro Asp Ser Ser Ala Gly Ile Gly
145 150 155 160

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

Gly Asp Thr Glu Ser Val Pro Asp Pro Gln Pro Ile Gly Glu Pro Pro
180 185 190

Ala Ala Pro Ser Gly Val Gly Ser Leu Thr Met Ala Ser Gly Gly Gly
195 200 205

Ala Pro Val Ala Asp Asn Asn Glu Gly Ala Asp Gly Val Gly Ser Ser

210

215

220

Ser Gly Asn Trp His Cys Asp Ser Gln Trp Leu Gly Asp Arg Val Ile
 225 230 235 240

Thr Thr Ser Thr Arg Thr Trp Ala Leu Pro Thr Tyr Asn Asn His Leu
 245 250 255

Tyr Lys Gln Ile Ser Asn Ser Thr Ser Gly Gly Ser Ser Asn Asp Asn
 260 265 270

Ala Tyr Phe Gly Tyr Ser Thr Pro Trp Gly Tyr Phe Asp Phe Asn Arg
 275 280 285

Phe His Cys His Phe Ser Pro Arg Asp Trp Gln Arg Leu Ile Asn Asn
 290 295 300

Asn Trp Gly Phe Arg Pro Lys Arg Leu Asn Phe Lys Leu Phe Asn Ile
 305 310 315 320

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

Asn Leu Thr Ser Thr Val Gln Val Phe Thr Asp Ser Asp Tyr Gln Leu
 340 345 350

Pro Tyr Val Leu Gly Ser Ala His Glu Gly Cys Leu Pro Pro Phe Pro
 355 360 365

Ala Asp Val Phe Met Ile Pro Gln Tyr Gly Tyr Leu Thr Leu Asn Asp
 370 375 380

Gly Ser Gln Ala Val Gly Arg Ser Ser Phe Tyr Cys Leu Glu Tyr Phe
 385 390 395 400

Pro Ser Gln Met Leu Arg Thr Gly Asn Asn Phe Gln Phe Ser Tyr Glu
 405 410 415

Phe Glu Asn Val Pro Phe His Ser Ser Tyr Ala His Ser Gln Ser Leu
420 425 430

Asp Arg Leu Met Asn Pro Leu Ile Asp Gln Tyr Leu Tyr Tyr Leu Ser
435 440 445

Arg Thr Ile Asn Gly Ser Gly Gln Asn Gln Gln Thr Leu Lys Phe Ser
450 455 460

Val Ala Gly Pro Ser Asn Met Ala Val Gln Gly Arg Asn Tyr Ile Pro
465 470 475 480

Gly Pro Ser Tyr Arg Gln Gln Arg Val Ser Thr Thr Val Thr Gln Asn
485 490 495

Asn Asn Ser Glu Phe Ala Trp Pro Gly Ala Ser Ser Trp Ala Leu Asn
500 505 510

Gly Arg Asn Ser Leu Met Asn Pro Gly Pro Ala Met Ala Ser His Lys
515 520 525

Glu Gly Glu Asp Arg Phe Phe Pro Leu Ser Gly Ser Leu Ile Phe Gly
530 535 540

Lys Gln Gly Thr Gly Arg Asp Asn Val Asp Ala Asp Lys Val Met Ile
545 550 555 560

Thr Asn Glu Glu Glu Ile Lys Thr Thr Asn Pro Val Ala Thr Glu Ser
565 570 575

Tyr Gly Gln Val Ala Thr Asn His Gln Ser Ala Gln Thr Leu Ala Val
580 585 590

Pro Phe Lys Ala Gln Ala Gln Thr Gly Trp Val Gln Asn Gln Gly Ile
595 600 605

Leu Pro Gly Met Val Trp Gln Asp Arg Asp Val Tyr Leu Gln Gly Pro

610

615

620

Ile Trp Ala Lys Ile Pro His Thr Asp Gly Asn Phe His Pro Ser Pro
 625 630 635 640

Leu Met Gly Gly Phe Gly Met Lys His Pro Pro Pro Gln Ile Leu Ile
 645 650 655

Lys Asn Thr Pro Val Pro Ala Asp Pro Pro Thr Ala Phe Asn Lys Asp
 660 665 670

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

Glu Ile Glu Trp Glu Leu Gln Lys Glu Asn Ser Lys Arg Trp Asn Pro
 690 695 700

Glu Ile Gln Tyr Thr Ser Asn Tyr Tyr Lys Ser Asn Asn Val Glu Phe
 705 710 715 720

Ala Val Asn Thr Glu Gly Val Tyr Ser Glu Pro Arg Pro Ile Gly Thr
 725 730 735

Arg Tyr Leu Thr Arg Asn Leu
 740

<210> 62
 <211> 7
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Peptide insert

<400> 62

Thr Leu Ala Val Pro Phe Lys
 1 5

<210> 63

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

<220>
<223> Peptide insert

<400> 63

Lys Phe Pro Val Ala Leu Thr
1 5

<210> 64
<211> 110
<212> PRT
<213> Homo sapiens

<400> 64

Met Ala Val Arg Gln Ala Leu Gly Arg Gly Leu Gln Leu Gly Arg Ala
1 5 10 15

Leu Leu Leu Arg Phe Thr Gly Lys Pro Gly Arg Ala Tyr Gly Leu Gly
20 25 30

Arg Pro Gly Pro Ala Ala Gly Cys Val Arg Gly Glu Arg Pro Gly Trp
35 40 45

Ala Ala Gly Pro Gly Ala Glu Pro Arg Arg Val Gly Leu Gly Leu Pro
50 55 60

Asn Arg Leu Arg Phe Phe Arg Gln Ser Val Ala Gly Leu Ala Ala Arg
65 70 75 80

Leu Gln Arg Gln Phe Val Val Arg Ala Trp Gly Cys Ala Gly Pro Cys
85 90 95

Gly Arg Ala Val Phe Leu Ala Phe Gly Leu Gly Leu Gly Leu
100 105 110

<210> 65
<211> 94

<212> PRT
<213> Homo sapiens

<400> 65

Met Ala Val Arg Gln Ala Leu Gly Arg Gly Leu Gln Leu Gly Arg Ala
1 5 10 15

Leu Leu Leu Arg Phe Thr Gly Lys Pro Gly Arg Ala Tyr Gly Leu Gly
20 25 30

Arg Pro Gly Pro Ala Ala Gly Cys Val Arg Gly Glu Arg Pro Gly Trp
35 40 45

Ala Ala Gly Pro Gly Ala Glu Pro Arg Arg Val Gly Leu Gly Leu Pro
50 55 60

Asn Arg Leu Arg Phe Phe Arg Gln Ser Val Ala Gly Leu Ala Ala Arg
65 70 75 80

Leu Gln Arg Gln Phe Val Val Arg Ala Trp Gly Cys Ala Gly
85 90

<210> 66
<211> 34
<212> PRT
<213> Homo sapiens

<400> 66

Met Ala Val Arg Gln Ala Leu Gly Arg Gly Leu Gln Leu Gly Arg Ala
1 5 10 15

Leu Leu Leu Arg Phe Thr Gly Lys Pro Gly Arg Ala Tyr Gly Leu Gly
20 25 30

Arg Pro

<210> 67
<211> 16

<212> PRT
<213> Homo sapiens

<400> 67

Pro Cys Gly Arg Ala Val Phe Leu Ala Phe Gly Leu Gly Leu Gly Leu
1 5 10 15

<210> 68
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Made in Lab - muted PINK1 protein

<400> 68

Pro Cys Gly Arg Ala Val Phe Leu Ala Met Gly Leu Gly Leu Gly Leu
1 5 10 15

<210> 69
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Made in Lab - muted PINK1 protein

<400> 69

Pro Cys Gly Arg Ala Val Phe Leu Ala Ala Gly Leu Gly Leu Gly Leu
1 5 10 15

<210> 70
<211> 110
<212> PRT
<213> Homo sapiens

<400> 70

Met Ala Val Arg Gln Ala Leu Gly Arg Gly Leu Gln Leu Gly Arg Ala
1 5 10 15

Leu Leu Leu Arg Phe Thr Gly Lys Pro Gly Arg Ala Tyr Gly Leu Gly
20 25 30

Arg Pro Gly Pro Ala Ala Gly Cys Val Arg Gly Glu Arg Pro Gly Trp
35 40 45

Ala Ala Gly Pro Gly Ala Glu Pro Arg Arg Val Gly Leu Gly Leu Pro
50 55 60

Asn Arg Leu Arg Phe Phe Arg Gln Ser Val Ala Gly Leu Ala Ala Arg
65 70 75 80

Leu Gln Arg Gln Phe Val Val Arg Ala Trp Gly Cys Ala Gly Pro Cys
85 90 95

Gly Arg Ala Val Phe Leu Ala Phe Gly Leu Gly Leu Gly Leu
100 105 110

<210> 71
<211> 110
<212> PRT
<213> Artificial Sequence

<220>
<223> Made in Lab - muted PINK1 protein

<400> 71

Met Ala Val Arg Gln Ala Leu Gly Arg Gly Leu Gln Leu Gly Arg Ala
1 5 10 15

Leu Leu Leu Arg Phe Thr Gly Lys Pro Gly Arg Ala Tyr Gly Leu Gly
20 25 30

Arg Pro Gly Pro Ala Ala Gly Cys Val Arg Gly Glu Arg Pro Gly Trp
35 40 45

Ala Ala Gly Pro Gly Ala Glu Pro Arg Arg Val Gly Leu Gly Leu Pro
50 55 60

Asn Arg Leu Arg Phe Phe Arg Gln Ser Val Ala Gly Leu Ala Ala Arg
65 70 75 80

Leu Gln Arg Gln Phe Val Val Arg Ala Trp Gly Cys Ala Gly Pro Cys
85 90 95

Gly Arg Ala Val Phe Leu Ala Met Gly Leu Gly Leu Gly Leu
100 105 110

<210> 72
<211> 110
<212> PRT
<213> Artificial Sequence

<220>
<223> Made in Lab - muted PINK1 protein

<400> 72

Met Ala Val Arg Gln Ala Leu Gly Arg Gly Leu Gln Leu Gly Arg Ala
1 5 10 15

Leu Leu Leu Arg Phe Thr Gly Lys Pro Gly Arg Ala Tyr Gly Leu Gly
20 25 30

Arg Pro Gly Pro Ala Ala Gly Cys Val Arg Gly Glu Arg Pro Gly Trp
35 40 45

Ala Ala Gly Pro Gly Ala Glu Pro Arg Arg Val Gly Leu Gly Leu Pro
50 55 60

Asn Arg Leu Arg Phe Phe Arg Gln Ser Val Ala Gly Leu Ala Ala Arg
65 70 75 80

Leu Gln Arg Gln Phe Val Val Arg Ala Trp Gly Cys Ala Gly Pro Cys
85 90 95

Gly Arg Ala Val Phe Leu Ala Ala Gly Leu Gly Leu Gly Leu
100 105 110

<210> 73
<211> 325

<212> PRT

<213> Artificial Sequence

<220>

<223> Made in Lab - mutated Parkin protein

<400> 73

Ser Ile Tyr Asn Ser Ala Tyr Val Tyr Cys Lys Gly Pro Cys Gln Arg
1 5 10 15

Val Gln Pro Gly Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln Ala
20 25 30

Thr Leu Thr Leu Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu Ile
35 40 45

Pro Asn Arg Met Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly Thr
50 55 60

Ser Ala Glu Phe Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys
65 70 75 80

Glu Thr Ser Val Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile
85 90 95

Thr Cys Ile Thr Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln
100 105 110

Cys Asn Ser Arg His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys
115 120 125

Val Thr Arg Leu Asn Asp Arg Gln Phe Val His Asp Pro Gln Leu Gly
130 135 140

Tyr Ser Leu Pro Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu
145 150 155 160

Leu His His Phe Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr Gln
165 170 175

Gln Tyr Gly Ala Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu Cys
180 185 190

Pro Arg Pro Gly Cys Gly Ala Gly Leu Leu Pro Glu Pro Asp Gln Arg
195 200 205

Lys Val Thr Cys Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala Phe
210 215 220

Cys Arg Glu Cys Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala Val
225 230 235 240

Phe Glu Ala Ser Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg
245 250 255

Ala Ala Glu Gln Ala Arg Ala Glu Ala Ala Ser Lys Glu Thr Ile Lys
260 265 270

Lys Thr Thr Lys Pro Cys Pro Arg Cys His Val Pro Val Glu Lys Asn
275 280 285

Gly Gly Cys Met His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu
290 295 300

Trp Cys Trp Asn Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly Asp
305 310 315 320

His Trp Phe Asp Val
325

<210> 74

<211> 390

<212> PRT

<213> Artificial Sequence

<220>

<223> Made in Lab - mutated Parkin protein

<400> 74

Lys Gly Gln Glu Met Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala
1 5 10 15

Ala Gly Gly Cys Glu Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu
20 25 30

Ser Ser Ser Val Leu Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu
35 40 45

His Thr Asp Ser Arg Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly
50 55 60

Arg Ser Ile Tyr Asn Ser Ala Tyr Val Tyr Cys Lys Gly Pro Cys Gln
65 70 75 80

Arg Val Gln Pro Gly Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln
85 90 95

Ala Thr Leu Thr Leu Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu
100 105 110

Ile Pro Asn Arg Met Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly
115 120 125

Thr Ser Ala Glu Phe Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp
130 135 140

Lys Glu Thr Ser Val Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn
145 150 155 160

Ile Thr Cys Ile Thr Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe
165 170 175

Gln Cys Asn Ser Arg His Val Ile Cys Leu Asp Cys Phe His Leu Tyr
180 185 190

Cys Val Thr Arg Leu Asn Asp Arg Gln Phe Val His Asp Pro Gln Leu
195 200 205

Gly Tyr Ser Leu Pro Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys
210 215 220

Glu Leu His His Phe Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr
225 230 235 240

Gln Gln Tyr Gly Ala Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu
245 250 255

Cys Pro Arg Pro Gly Cys Gly Ala Gly Leu Leu Pro Glu Pro Asp Gln
260 265 270

Arg Lys Val Thr Cys Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala
275 280 285

Phe Cys Arg Glu Cys Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala
290 295 300

Val Phe Glu Ala Ser Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu
305 310 315 320

Arg Ala Ala Glu Gln Ala Arg Ala Glu Ala Ala Ser Lys Glu Thr Ile
325 330 335

Lys Lys Thr Thr Lys Pro Cys Pro Arg Cys His Val Pro Val Glu Lys
340 345 350

Asn Gly Gly Cys Met His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu
355 360 365

Glu Trp Cys Trp Asn Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly
370 375 380

Asp His Trp Phe Asp Val
385 390

<210> 75
<211> 500
<212> PRT
<213> Artificial Sequence

<220>
<223> Made in Lab - fusion protein

<400> 75

Met Ala Val Arg Gln Ala Leu Gly Arg Gly Leu Gln Leu Gly Arg Ala
1 5 10 15

Leu Leu Leu Arg Phe Thr Gly Lys Pro Gly Arg Ala Tyr Gly Leu Gly
20 25 30

Arg Pro Gly Pro Ala Ala Gly Cys Val Arg Gly Glu Arg Pro Gly Trp
35 40 45

Ala Ala Gly Pro Gly Ala Glu Pro Arg Arg Val Gly Leu Gly Leu Pro
50 55 60

Asn Arg Leu Arg Phe Phe Arg Gln Ser Val Ala Gly Leu Ala Ala Arg
65 70 75 80

Leu Gln Arg Gln Phe Val Val Arg Ala Trp Gly Cys Ala Gly Pro Cys
85 90 95

Gly Arg Ala Val Phe Leu Ala Phe Gly Leu Gly Leu Gly Leu Lys Gly
100 105 110

Gln Glu Met Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala Ala Gly
115 120 125

Gly Cys Glu Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu Ser Ser
130 135 140

Ser Val Leu Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu His Thr
145 150 155 160

Asp Ser Arg Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly Arg Ser
165 170 175

Ile Tyr Asn Ser Ala Tyr Val Tyr Cys Lys Gly Pro Cys Gln Arg Val
180 185 190

Gln Pro Gly Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln Ala Thr
195 200 205

Leu Thr Leu Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu Ile Pro
210 215 220

Asn Arg Met Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly Thr Ser
225 230 235 240

Ala Glu Phe Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys Glu
245 250 255

Thr Ser Val Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile Thr
260 265 270

Cys Ile Thr Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln Cys
275 280 285

Asn Ser Arg His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys Val
290 295 300

Thr Arg Leu Asn Asp Arg Gln Phe Val His Asp Pro Gln Leu Gly Tyr
305 310 315 320

Ser Leu Pro Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu Leu
325 330 335

His His Phe Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr Gln Gln
340 345 350

Tyr Gly Ala Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu Cys Pro
355 360 365

Arg Pro Gly Cys Gly Ala Gly Leu Leu Pro Glu Pro Asp Gln Arg Lys
370 375 380

Val Thr Cys Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala Phe Cys
385 390 395 400

Arg Glu Cys Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala Val Phe
405 410 415

Glu Ala Ser Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg Ala
420 425 430

Ala Glu Gln Ala Arg Ala Glu Ala Ala Ser Lys Glu Thr Ile Lys Lys
435 440 445

Thr Thr Lys Pro Cys Pro Arg Cys His Val Pro Val Glu Lys Asn Gly
450 455 460

Gly Cys Met His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu Trp
465 470 475 480

Cys Trp Asn Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly Asp His
485 490 495

Trp Phe Asp Val
500

<210> 76
<211> 435
<212> PRT
<213> Artificial Sequence

<220>
<223> Made in Lab - fusion protein

<400> 76

Met Ala Val Arg Gln Ala Leu Gly Arg Gly Leu Gln Leu Gly Arg Ala
1 5 10 15

Leu Leu Leu Arg Phe Thr Gly Lys Pro Gly Arg Ala Tyr Gly Leu Gly
20 25 30

Arg Pro Gly Pro Ala Ala Gly Cys Val Arg Gly Glu Arg Pro Gly Trp
35 40 45

Ala Ala Gly Pro Gly Ala Glu Pro Arg Arg Val Gly Leu Gly Leu Pro
50 55 60

Asn Arg Leu Arg Phe Phe Arg Gln Ser Val Ala Gly Leu Ala Ala Arg
65 70 75 80

Leu Gln Arg Gln Phe Val Val Arg Ala Trp Gly Cys Ala Gly Pro Cys
85 90 95

Gly Arg Ala Val Phe Leu Ala Phe Gly Leu Gly Leu Gly Leu Ser Ile
100 105 110

Tyr Asn Ser Ala Tyr Val Tyr Cys Lys Gly Pro Cys Gln Arg Val Gln
115 120 125

Pro Gly Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln Ala Thr Leu
130 135 140

Thr Leu Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu Ile Pro Asn
145 150 155 160

Arg Met Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly Thr Ser Ala
165 170 175

Glu Phe Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys Glu Thr
180 185 190

Ser Val Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile Thr Cys
195 200 205

Ile Thr Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln Cys Asn
210 215 220

Ser Arg His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys Val Thr
225 230 235 240

Arg Leu Asn Asp Arg Gln Phe Val His Asp Pro Gln Leu Gly Tyr Ser
245 250 255

Leu Pro Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu Leu His
260 265 270

His Phe Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr Gln Gln Tyr
275 280 285

Gly Ala Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu Cys Pro Arg
290 295 300

Pro Gly Cys Gly Ala Gly Leu Leu Pro Glu Pro Asp Gln Arg Lys Val
305 310 315 320

Thr Cys Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala Phe Cys Arg
325 330 335

Glu Cys Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala Val Phe Glu
340 345 350

Ala Ser Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg Ala Ala
355 360 365

Glu Gln Ala Arg Ala Glu Ala Ala Ser Lys Glu Thr Ile Lys Lys Thr
370 375 380

Thr Lys Pro Cys Pro Arg Cys His Val Pro Val Glu Lys Asn Gly Gly
385 390 395 400

Cys Met His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu Trp Cys
405 410 415

Trp Asn Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly Asp His Trp
420 425 430

Phe Asp Val
435

<210> 77
<211> 1503
<212> DNA
<213> Artificial Sequence

<220>
<223> Made in Lab - polynucleotide encoding fusion protein

<400> 77
atggcggtgc gacaggcgct gggccgcggc ctgcagctgg gtcgagcgct gctgctgcgc 60
ttcacgggca agccccggccg ggcctacggc ttggggcggc cgggcccggc ggcgggctgt 120
gtccgcgggg agcgtccagg ctggggccgca ggaccgggcg cggagcctcg cagggtcggg 180
ctcgggctcc ctaaccgtct ccgcttcttc cgccagtcgg tggccgggct ggcggcgcgg 240
ttgcagcggc agttcgtggt gcgggcctgg ggctgcgcgg gcccttgagg ccgggcagtc 300
tttctggcct tcgggctagg gctgggcctc aaaggtaag aaatgaatgc aactggaggc 360
gacgacccca gaaacgcggc gggaggctgt gagcgggagc cccagagctt gactcgggtg 420
gacctcagca gctcagtcct cccaggagac tctgtggggc tggctgtcat tctgcacact 480
gacagcagga aggactcacc accagctgga agtccagcag gtagatcaat ctacaacagc 540
gcctatgtgt attgcaaagg cccctgtcaa agagtgcagc cgggaaaact cagggtacag 600
tgcagcacct gcaggcaggc aacgctcacc ttgaccagg gtccatcttg ctgggatgat 660
gttttaattc caaaccgat gagtggtgaa tgccaatccc cacactgccc tgggactagt 720
gcagaatfff tctttaaatg tggagcacac cccacctctg acaaggaaac atcagtagct 780
ttgcacctga tcgaacaaa tagtcggaac atcacttgca ttacgtgcac agacgtcagg 840
agccccgtcc tgggtttcca gtgcaactcc cgccacgtga tttgcttaga ctgtttccac 900

ttatactgtg tgacaagact caatgatcgg cagtttgttc acgaccctca acttggtac	960
tccctgcctt gtgtggctgg ctgtcccaac tccttgatta aagagctcca tcacttcagg	1020
attctgggag aagagcagta caaccggtac cagcagtatg gtgcagagga gtgtgtcctg	1080
cagatggggg gcgtgttatg cccccgccct ggctgtggag cggggctgct gccggagcct	1140
gaccagagga aagtcacctg cgaagggggc aatggcctgg gctgtgggtt tgccttctgc	1200
cgggaatgta aagaagcgta ccatgaaggg gagtgcagtg ccgtatttga agcctcagga	1260
acaactactc aggcctacag agtcgatgaa agagccgccg agcaggctcg tgccgaagca	1320
gcctccaaag aaaccatcaa gaaaaccacc aagccctgtc cccgctgcca tgtaccagtg	1380
gaaaaaaaaatg gaggctgcat gcacatgaag tgtccgcagc cccagtgcag gctcgagtgg	1440
tgctggaact gtggctgcga gtggaaccgc gtctgcatgg gggaccactg gttcgacgtg	1500
tag	1503

<210> 78

<211> 1503

<212> DNA

<213> Artificial Sequence

<220>

<223> Made in Lab - codon optimized polynucleotide encoding fusion protein

<400> 78

atggctgtgc ggcaggcact gggtcgggga ttgcaattgg gaagagcatt gcttctcaga	60
tttactggaa aaccaggaag agcatacggg ttgggtcgcc ctgggtcccgc cgctgggtgc	120
gtacgaggtg aacggccagg ttgggctgcg ggccccgggtg ctgagccaag aagagtaggg	180
ttgggattgc ccaatcgcct taggttcttc cggcagagcg tggctggttt ggcagctaga	240
ctccagaggc agttttagt gagggcctgg ggctgtgcag gcccatgcgg acgagccgta	300
tttttggtt tcggacttgg gttgggcctc aaagggtcaag agatgaacgc cactggtgga	360
gatgacccca ggaatgcagc tgggggctgt gaacgggaac ctgagagcct gaccagagtg	420
gacctcagct cctctgtcct cccgggagac tccgtgggac tggcagtcac tctgcacact	480

gacagccgca aggattcccc ccctgcgggt tcaccagctg gacgggccat ctacaactcc	540
gcctatgtgt actgcaaggg accctgccag aggggtgcagc cgggaaaagct cagagtgcag	600
tgcagcactt gcagacaagc caccctgacc ctgacccagg gcccatcctg ctgggatgat	660
gtcctgatcc ccaaccggat gtcaggggaa tgccaaagcc ctcactgccc tggaacctcg	720
gccgagttct tcttcaaatg tggagcccac cccacctcgg acaaggaaac ctcggtggcc	780
cttcacctca ttgccaccaa ctcccgaac atcacctgta tcacttgcac tgatgttcgc	840
tctccggtgc tgggtgtcca gtgcaactcc cgacacgtga tctgcctgga ctgcttcac	900
ctgtactgtg tgaccagact gaatgacagg cagtttgtcc acgaccccca actgggctac	960
tccttgcctt gtgtggctgg ctgccccaac tccctgatca aggagttgca ccacttccgg	1020
atcctgggag aggaacagta caacagatac cagcagtagc gggcagagga atgtgtcctc	1080
caaatggggg gagtgctgtg cccccggcct ggttgtggag ctggcctcct gccggaacct	1140
gaccagcgga aggtcacttg cgagggtgga aacggcctgg gctgtggctt cgccttctgt	1200
cgggagtgca aggaggccta ccacgaagga gaatgctccg cgggtgttga agcctcaggg	1260
accaccacac aagcctacag agtggatgag agggcagcgg agcaggcccc cgccgaagcg	1320
gcctccaagg agactatcaa gaaaaccacc aagccatgcc ctaggtgcca tgtgcctgtg	1380
gaaaagaatg gaggctgcat gcacatgaag tgccccagc cacagtgccg ccttgaatgg	1440
tgctggaact gtggctgcga gtggaacaga gtgtgtatgg gggaccactg gtttcatgtg	1500
tga	1503

<210> 79
 <211> 1306
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in Lab - polynucleotide encoding fusion protein

<400> 79	
atggcgggtgc gacaggcgct gggccgcggc ctgcagctgg gtcgagcgct gctgctgcgc	60
ttcacgggca agccccggcg ggcctacggc ttggggcggc cgggcccggc ggccgggctgt	120

gtccgcgggg agcgtccagg ctgggccgca ggaccgggcg cggagcctcg cagggtcggg	180
ctcgggctcc ctaaccgtct ccgcttcttc cgccagtcgg tggccgggct ggccggcgcg	240
ttgcagcggc agttcgtggt gcgggcctgg ggctgcgcgg gcccttgagg ccgggcagtc	300
tttctggcct tcgggctagg gctgggcctc aatctacaac agcgcctatg tgtattgcaa	360
aggccccctgt caaagagtgc agccgggaaa actcagggtg cagtgcagca cctgcaggca	420
ggcaacgctc accttgaccc aggggtccatc ttgctgggat gatgttttaa ttccaaaccg	480
gatgagtggg gaatgccaat cccacactg ccctgggact agtgcagaat ttttctttaa	540
atgtggagca caccacacct ctgacaagga aacatcagta gctttgcacc tgatcgcaac	600
aaatagtcgg aacatcactt gcattacgtg cacagacgtc aggagccccg tcctggtttt	660
ccagtgaac tcccgccacg tgatttgctt agactgtttc cacttatact gtgtgacaag	720
actcaatgat cggcagtttg ttcacgaccc tcaacttggc tactccctgc cttgtgtggc	780
tggctgtccc aactccttga ttaaagagct ccatcacttc aggattctgg gagaagagca	840
gtacaaccgg taccagcagt atgggtgcaga ggagtgtgtc ctgcagatgg ggggcgtgtt	900
atgccccgc cctggctgtg gagcggggct gctgccggag cctgaccaga ggaaagtcac	960
ctgcgaaggg ggcaatggcc tgggctgtgg gtttgccttc tgccgggaat gtaaagaagc	1020
gtaccatgaa ggggagtgca gtgccgtatt tgaagcctca ggaacaacta ctcaggccta	1080
cagagtcgat gaaagagccg ccgagcaggc tcgtgccgaa gcagcctcca aagaaaccat	1140
caagaaaacc accaagccct gtccccgctg ccatgtacca gtggaaaaaa atggaggctg	1200
catgcacatg aagtgtccgc agccccagtg caggctcgag tgggtgctgga actgtggctg	1260
cgagtggaac cgcgtctgca tgggggacca ctggttcgac gtgtag	1306

<210> 80

<211> 1306

<212> DNA

<213> Artificial Sequence

<220>

<223> Made in Lab - codon optimized polynucleotide encoding fusion protein

<400> 80
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tttactggaa aaccaggaag agcatacggg ttgggtcgcc ctgggtcccgc cgctgggtgc 120
gtacgaggtg aacggccagg ttgggctgcg ggcccgggtg ctgagccaag aagagtaggg 180
ttgggattgc ccaatcgctt taggttcttc cggcagagcg tggctggttt ggcagctaga 240
ctccagaggc agtttgtagt gagggcctgg ggctgtgcag gcccatgcgg acgagccgta 300
tttttggtt tcggacttgg gttgggcctc catctacaac tccgcctatg tgtactgcaa 360
gggaccctgc cagaggggtgc agccgggaaa gctcagagtg cagtgcagca cttgcagaca 420
agccaccctg accctgaccc agggcccatc ctgctgggat gatgtcctga tccccaaccg 480
gatgtcaggg gaatgccaaa gccctcactg ccctggaacc tcggccgagt tcttcttcaa 540
atgtggagcc caccacacct cggacaagga aacctcggtg gcccttcacc tcattgccac 600
caactccgc aacatcacct gtatcacttg cactgatgtt cgctctccgg tgctgggtgtt 660
ccagtgaac tcccgacacg tgatctgcct ggactgcttc cacctgtact gtgtgaccag 720
actgaatgac aggcagtttg tccacgaccc ccaactgggc tactccttgc cttgtgtggc 780
tggctgcccc aactccctga tcaaggagtt gcaccacttc cggatcctgg gagaggaaca 840
gtacaacaga taccagcagt acggggcaga ggaatgtgtc ctccaaatgg ggggagtgct 900
gtgcccccg cctggtttgt gagctggcct cctgccggaa cctgaccagc ggaaggtcac 960
ttgcgagggg ggaaacggcc tgggctgtgg cttcgccttc tgtcgggagt gcaaggaggc 1020
ctaccacgaa ggagaatgct ccgcggtgtt tgaagcctca gggaccacca cacaagccta 1080
cagagtggat gagagggcag cggagcaggc ccgcgccgaa gcggcctcca aggagactat 1140
caagaaaacc accaagccat gccctaggtg ccatgtgcct gtggaaaaga atggaggctg 1200
catgcacatg aagtgtcccc agccacagtg ccgccttgaa tggctgctgga actgtggctg 1260
cgagtggaac agagtgtgta tgggggacca ctggtttgat gtgtga 1306

<210> 81

<211> 1503

<212> DNA

<213> Artificial Sequence

<220>

<223> Made in Lab - polynucleotide encoding fusion protein

<400> 81

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ttcacgggca agccccggccg ggcctacggc ttggggcggc cgggcccggc ggccgggctgt	120
gtccgcgggg agcgtccagg ctgggcccga ggaccgggcg cggagcctcg cagggtcggg	180
ctcgggctcc ctaaccgtct ccgcttcttc cgccagtcgg tggccgggct ggccggcgcgg	240
ttgcagcggc agttcgtggt gcgggcctgg ggctgcgcgg gcccttgagg ccgggcagtc	300
tttctggcca tggggctagg gctgggcctc aaagggtcaag aaatgaatgc aactggaggc	360
gacgacccca gaaacgcggc gggaggctgt gagcgggagc cccagagctt gactcgggtg	420
gacctcagca gctcagtcct cccaggagac tctgtggggc tggctgtcat tctgcacact	480
gacagcagga aggactcacc accagctgga agtccagcag gtagatcaat ctacaacagc	540
gcctatgtgt attgcaaagg cccctgtcaa agagtgcagc cgggaaaact cagggtacag	600
tgcagcacct gcaggcaggc aacgctcacc ttgaccagg gtccatcttg ctgggatgat	660
gttttaattc caaaccggat gagtggtgaa tgccaatccc cacactgccc tgggactagt	720
gcagaatfff tctttaaatg tggagcacac cccacctctg acaaggaaac atcagtagct	780
ttgcacctga tcgcaacaaa tagtcggaac atcacttgca ttacgtgcac agacgtcagg	840
agccccgtcc tgggttttcca gtgcaactcc cgccacgtga tttgcttaga ctgtttccac	900
ttatactgtg tgacaagact caatgatcgg cagtttggtc acgaccctca acttggctac	960
tccctgcctt gtgtggctgg ctgtcccaac tccttgatta aagagctcca tcacttcagg	1020
attctgggag aagagcagta caaccggtac cagcagtatg gtgcagagga gtgtgtcctg	1080
cagatggggg gcgtgttatg cccccgccct ggctgtggag cggggctgct gccggagcct	1140
gaccagagga aagtcacctg cgaagggggc aatggcctgg gctgtgggtt tgccttctgc	1200
cgggaatgta aagaagcgta ccatgaaggg gagtgcagtg ccgtatgtga agcctcagga	1260
acaactactc aggcctacag agtcgatgaa agagccgccg agcaggctcg tgccgaagca	1320
gcctccaaag aaaccatcaa gaaaaccacc aagccctgtc cccgctgcca tgtaccagt	1380

gaaaaaaaaatg gaggctgcat gcacatgaag tgtccgcagc cccagtgcag gctcgagtgg	1440
tgctggaact gtggctgcga gtggaaccgc gtctgcatgg gggaccactg gttcgacgtg	1500
tag	1503

<210> 82
 <211> 1503
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in Lab - codon optimized polynucleotide encoding fusion protein

<400> 82	
atggctgtgc ggcaggcact gggtcgggga ttgcaattgg gaagagcatt gcttctcaga	60
tttactggaa aaccaggaag agcatacggg ttgggtcgcc ctgggtccgc cgctgggtgc	120
gtacgaggtg aacggccagg ttgggctgcg ggcccgggtg ctgagccaag aagagtaggg	180
ttgggattgc ccaatcgctt taggttcttc cggcagagcg tggctggttt ggcagctaga	240
ctccagaggc agtttgtagt gagggccttg ggctgtgcag gcccatgcgg acgagccgta	300
tttttggtta tgggacttgg gttgggcctc aaaggtcaag agatgaacgc cactggtgga	360
gatgacccca ggaatgcagc tgggggctgt gaacgggaac ctgagagcct gaccagagtg	420
gacctcagct cctctgtcct cccgggagac tccgtgggac tggcagtcac tctgcacact	480
gacagccgca aggattcccc ccctgcgggt tcaccagctg gacggtccat ctacaactcc	540
gcctatgtgt actgcaaggg accctgccag aggggtgcagc cgggaaagct cagagtgcag	600
tgcagcactt gcagacaagc caccctgacc ctgaccaggg gcccatcctg ctgggatgat	660
gtcctgatcc ccaaccggat gtcaggggaa tgccaaagcc ctactgccc tggaacctcg	720
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<220>
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<223> Made in Lab - Expression cassette

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<210> 89
<211> 500
<212> PRT
<213> Artificial Sequence

<220>
<223> Made in Lab - fusion protein

<400> 89

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20 25 30

Arg Pro Gly Pro Ala Ala Gly Cys Val Arg Gly Glu Arg Pro Gly Trp
35 40 45

Ala Ala Gly Pro Gly Ala Glu Pro Arg Arg Val Gly Leu Gly Leu Pro
50 55 60

Asn Arg Leu Arg Phe Phe Arg Gln Ser Val Ala Gly Leu Ala Ala Arg
65 70 75 80

Leu Gln Arg Gln Phe Val Val Arg Ala Trp Gly Cys Ala Gly Pro Cys
85 90 95

Gly Arg Ala Val Phe Leu Ala Met Gly Leu Gly Leu Gly Leu Lys Gly
100 105 110

Gln Glu Met Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala Ala Gly
115 120 125

Gly Cys Glu Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu Ser Ser
130 135 140

Ser Val Leu Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu His Thr
145 150 155 160

Asp Ser Arg Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly Arg Ser
165 170 175

Ile Tyr Asn Ser Ala Tyr Val Tyr Cys Lys Gly Pro Cys Gln Arg Val
180 185 190

Gln Pro Gly Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln Ala Thr
195 200 205

Leu Thr Leu Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu Ile Pro
210 215 220

Asn Arg Met Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly Thr Ser
225 230 235 240

Ala Glu Phe Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys Glu
245 250 255

Thr Ser Val Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile Thr
260 265 270

Cys Ile Thr Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln Cys
275 280 285

Asn Ser Arg His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys Val
290 295 300

Thr Arg Leu Asn Asp Arg Gln Phe Val His Asp Pro Gln Leu Gly Tyr
305 310 315 320

Ser Leu Pro Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu Leu
325 330 335

His His Phe Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr Gln Gln
340 345 350

Tyr Gly Ala Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu Cys Pro

355

360

365

Arg Pro Gly Cys Gly Ala Gly Leu Leu Pro Glu Pro Asp Gln Arg Lys
 370 375 380

Val Thr Cys Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala Phe Cys
 385 390 395 400

Arg Glu Cys Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala Val Phe
 405 410 415

Glu Ala Ser Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg Ala
 420 425 430

Ala Glu Gln Ala Arg Ala Glu Ala Ala Ser Lys Glu Thr Ile Lys Lys
 435 440 445

Thr Thr Lys Pro Cys Pro Arg Cys His Val Pro Val Glu Lys Asn Gly
 450 455 460

Gly Cys Met His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu Trp
 465 470 475 480

Cys Trp Asn Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly Asp His
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Trp Phe Asp Val
 500

<210> 90

<211> 465

<212> PRT

<213> Artificial Sequence

<220>

<223> Made in Lab - mutated Parkin protein

<400> 90

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

Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys Glu Thr Ser Val
210 215 220

Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile Thr Cys Ile Thr
225 230 235 240

Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln Cys Asn Ser Arg
245 250 255

His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys Val Thr Arg Leu
260 265 270

Asn Asp Arg Gln Phe Val His Asp Pro Gln Leu Gly Tyr Ser Leu Pro
275 280 285

Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu Leu His His Phe
290 295 300

Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr Gln Gln Tyr Gly Ala
305 310 315 320

Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu Cys Pro Arg Pro Gly
325 330 335

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

Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala Phe Cys Arg Glu Cys
355 360 365

Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala Val Phe Glu Ala Ser
370 375 380

Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg Ala Ala Glu Gln
385 390 395 400

Ala Arg Trp Glu Ala Ala Ser Lys Glu Thr Ile Lys Lys Thr Thr Lys

405

410

415

Pro Cys Pro Arg Cys His Val Pro Val Glu Lys Asn Gly Gly Phe Met
 420 425 430

His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu Trp Cys Trp Asn
 435 440 445

Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly Asp His Trp Phe Asp
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Val
 465

<210> 91
 <211> 4494
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in Lab - Expression cassette

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<211> 5457

<212> DNA

<213> Artificial Sequence

<220>

<223> Made in Lab - Expression cassette

<400> 92

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<210> 93
<211> 465
<212> PRT
<213> Artificial Sequence

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<220>
<223> Made in Lab - mutated Parkin protein

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<400> 93

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

```

```

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

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```

Glu Leu Arg Asn Asp Trp Thr Val Gln Asn Cys Asp Leu Asp Gln Gln
          50          55          60

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Ser Ile Val His Ile Val Gln Arg Pro Trp Arg Lys Gly Gln Glu Met
65           70           75          80

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Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala Ala Gly Gly Cys Glu
85 90 95

Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu Ser Ser Ser Val Leu
100 105 110

Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu His Thr Asp Ser Arg
115 120 125

Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly Arg Ser Ile Tyr Asn
130 135 140

Ser Phe Tyr Val Tyr Cys Lys Gly Pro Cys Gln Arg Val Gln Pro Gly
145 150 155 160

Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln Ala Thr Leu Thr Leu
165 170 175

Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu Ile Pro Asn Arg Met
180 185 190

Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly Thr Ser Ala Glu Phe
195 200 205

Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys Glu Thr Ser Val
210 215 220

Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile Thr Cys Ile Thr
225 230 235 240

Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln Cys Asn Ser Arg
245 250 255

His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys Val Thr Arg Leu
260 265 270

Lys Asp Arg Gln Phe Val His Asp Pro Gln Leu Gly Tyr Ser Leu Pro

275

280

285

Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu Leu His His Phe
 290 295 300

Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr Gln Gln Tyr Gly Ala
 305 310 315 320

Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu Cys Pro Arg Pro Gly
 325 330 335

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

Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala Phe Cys Arg Glu Cys
 355 360 365

Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala Val Phe Glu Ala Ser
 370 375 380

Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg Ala Ala Glu Gln
 385 390 395 400

Ala Arg Ala Glu Ala Ala Ser Lys Glu Thr Ile Lys Lys Thr Thr Lys
 405 410 415

Pro Cys Pro Arg Cys His Val Pro Val Glu Lys Asn Gly Gly Cys Met
 420 425 430

His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu Trp Cys Trp Asn
 435 440 445

Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly Asp His Trp Ala Asp
 450 455 460

Val
 465

<210> 94
<211> 3180
<212> DNA
<213> Artificial Sequence

<220>
<223> Made in Lab - Expression cassette

<400> 94
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gggttccttg tagttaatga ttaacccgcc atgctactta tctacgtact ctggagacgc 180
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<210> 95
 <211> 325
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Made in Lab - mutated Parkin protein

<400> 95

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

Thr Leu Thr Leu Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu Ile
 35 40 45

Pro Asn Arg Met Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly Thr
 50 55 60

Ser Ala Glu Phe Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys
 65 70 75 80

Glu Thr Ser Val Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile
 85 90 95

Thr Cys Ile Thr Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln
100 105 110

Cys Asn Ser Arg His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys
115 120 125

Val Thr Arg Leu Asn Asp Arg Gln Phe Val His Asp Pro Gln Leu Gly
130 135 140

Tyr Ser Leu Pro Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu
145 150 155 160

Leu His His Phe Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr Gln
165 170 175

Gln Tyr Gly Ala Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu Cys
180 185 190

Pro Arg Pro Gly Cys Gly Ala Gly Leu Leu Pro Glu Pro Asp Gln Arg
195 200 205

Lys Val Thr Cys Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala Phe
210 215 220

Cys Arg Glu Cys Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala Val
225 230 235 240

Phe Glu Ala Ser Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg
245 250 255

Ala Ala Glu Gln Ala Arg Ala Glu Ala Ala Ser Lys Glu Thr Ile Lys
260 265 270

Lys Thr Thr Lys Pro Cys Pro Arg Cys His Val Pro Val Glu Lys Asn
275 280 285

Gly Gly Cys Met His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu

290

295

300

Trp Cys Trp Asn Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly Asp
 305 310 315 320

His Trp Ala Asp Val
 325

<210> 96
 <211> 3702
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> Made in Lab - Expression cassette

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<210> 97
 <211> 500
 <212> PRT
 <213> Artificial Sequence

<220>

<223> Made in Lab - mutated Parkin protein

<400> 97

Met Ala Val Arg Gln Ala Leu Gly Arg Gly Leu Gln Leu Gly Arg Ala
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Leu Leu Leu Arg Phe Thr Gly Lys Pro Gly Arg Ala Tyr Gly Leu Gly
20 25 30

Arg Pro Gly Pro Ala Ala Gly Cys Val Arg Gly Glu Arg Pro Gly Trp
35 40 45

Ala Ala Gly Pro Gly Ala Glu Pro Arg Arg Val Gly Leu Gly Leu Pro
50 55 60

Asn Arg Leu Arg Phe Phe Arg Gln Ser Val Ala Gly Leu Ala Ala Arg
65 70 75 80

Leu Gln Arg Gln Phe Val Val Arg Ala Trp Gly Cys Ala Gly Pro Cys
85 90 95

Gly Arg Ala Val Phe Leu Ala Phe Gly Leu Gly Leu Gly Leu Lys Gly
100 105 110

Gln Glu Met Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala Ala Gly
115 120 125

Gly Cys Glu Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu Ser Ser
130 135 140

Ser Val Leu Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu His Thr
145 150 155 160

Asp Ser Arg Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly Arg Ser
165 170 175

Ile Tyr Asn Ser Phe Tyr Val Tyr Cys Lys Gly Pro Cys Gln Arg Val

180

185

190

Gln Pro Gly Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln Ala Thr
 195 200 205

Leu Thr Leu Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu Ile Pro
 210 215 220

Asn Arg Met Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly Thr Ser
 225 230 235 240

Ala Glu Phe Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys Glu
 245 250 255

Thr Ser Val Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile Thr
 260 265 270

Cys Ile Thr Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln Cys
 275 280 285

Asn Ser Arg His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys Val
 290 295 300

Thr Arg Leu Asn Asp Arg Gln Phe Val His Asp Pro Gln Leu Gly Tyr
 305 310 315 320

Ser Leu Pro Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu Leu
 325 330 335

His His Phe Arg Ile Leu Gly Glu Glu Gln Tyr Asn Arg Tyr Gln Gln
 340 345 350

Tyr Gly Ala Glu Glu Cys Val Leu Gln Met Gly Gly Val Leu Cys Pro
 355 360 365

Arg Pro Gly Cys Gly Ala Gly Leu Leu Pro Glu Pro Asp Gln Arg Lys
 370 375 380

Val Thr Cys Glu Gly Gly Asn Gly Leu Gly Cys Gly Phe Ala Phe Cys
385 390 395 400

Arg Glu Cys Lys Glu Ala Tyr His Glu Gly Glu Cys Ser Ala Val Phe
405 410 415

Glu Ala Ser Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg Ala
420 425 430

Ala Glu Gln Ala Arg Trp Glu Ala Ala Ser Lys Glu Thr Ile Lys Lys
435 440 445

Thr Thr Lys Pro Cys Pro Arg Cys His Val Pro Val Glu Lys Asn Gly
450 455 460

Gly Cys Met His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu Trp
465 470 475 480

Cys Trp Asn Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly Asp His
485 490 495

Trp Ala Asp Val
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<210> 98
<211> 3702
<212> DNA
<213> Artificial Sequence

<220>
<223> Made in Lab - Expression cassette

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<400> 99

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```

```

Leu Leu Leu Arg Phe Thr Gly Lys Pro Gly Arg Ala Tyr Gly Leu Gly
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```

```

Arg Pro Gly Pro Ala Ala Gly Cys Val Arg Gly Glu Arg Pro Gly Trp
          35          40          45

```

```

Ala Ala Gly Pro Gly Ala Glu Pro Arg Arg Val Gly Leu Gly Leu Pro
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```

```

Asn Arg Leu Arg Phe Phe Arg Gln Ser Val Ala Gly Leu Ala Ala Arg
65          70          75          80

```

```

Leu Gln Arg Gln Phe Val Val Arg Ala Trp Gly Cys Ala Gly Pro Cys
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```

Gly Arg Ala Val Phe Leu Ala Met Gly Leu Gly Leu Gly Leu Lys Gly
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Gln Glu Met Asn Ala Thr Gly Gly Asp Asp Pro Arg Asn Ala Ala Gly
115 120 125

Gly Cys Glu Arg Glu Pro Gln Ser Leu Thr Arg Val Asp Leu Ser Ser
130 135 140

Ser Val Leu Pro Gly Asp Ser Val Gly Leu Ala Val Ile Leu His Thr
145 150 155 160

Asp Ser Arg Lys Asp Ser Pro Pro Ala Gly Ser Pro Ala Gly Arg Ser
165 170 175

Ile Tyr Asn Ser Phe Tyr Val Tyr Cys Lys Gly Pro Cys Gln Arg Val
180 185 190

Gln Pro Gly Lys Leu Arg Val Gln Cys Ser Thr Cys Arg Gln Ala Thr
195 200 205

Leu Thr Leu Thr Gln Gly Pro Ser Cys Trp Asp Asp Val Leu Ile Pro
210 215 220

Asn Arg Met Ser Gly Glu Cys Gln Ser Pro His Cys Pro Gly Thr Ser
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Ala Glu Phe Phe Phe Lys Cys Gly Ala His Pro Thr Ser Asp Lys Glu
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Thr Ser Val Ala Leu His Leu Ile Ala Thr Asn Ser Arg Asn Ile Thr
260 265 270

Cys Ile Thr Cys Thr Asp Val Arg Ser Pro Val Leu Val Phe Gln Cys
275 280 285

Asn Ser Arg His Val Ile Cys Leu Asp Cys Phe His Leu Tyr Cys Val

290

295

300

Thr Arg Leu Asn Asp Arg Gln Phe Val His Asp Pro Gln Leu Gly Tyr
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Ser Leu Pro Cys Val Ala Gly Cys Pro Asn Ser Leu Ile Lys Glu Leu
 325 330 335

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

Glu Ala Ser Gly Thr Thr Thr Gln Ala Tyr Arg Val Asp Glu Arg Ala
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Ala Glu Gln Ala Arg Trp Glu Ala Ala Ser Lys Glu Thr Ile Lys Lys
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Thr Thr Lys Pro Cys Pro Arg Cys His Val Pro Val Glu Lys Asn Gly
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Gly Cys Met His Met Lys Cys Pro Gln Pro Gln Cys Arg Leu Glu Trp
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Cys Trp Asn Cys Gly Cys Glu Trp Asn Arg Val Cys Met Gly Asp His
 485 490 495

Trp Ala Asp Val
500