

2371116.TXT  
SEQUENCE LISTING

<110> Helmholtz Zentrum München - Deutsches Forschungszentrum für Gesundheit und Umwelt (GmbH)

<120> vectors and methods for generating vector-free induced pluripotent stem (iPS) cells using site-specific recombination

<130> P1575 PCT

<150> EP 08 00 4946.3

<151> 2008-03-17

<150> EP 08 00 5378.8

<151> 2008-03-20

<160> 25

<170> PatentIn version 3.3

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

Trp Lys Leu Leu Ser Glu Thr Glu Lys Arg Pro Phe Ile Asp Glu Ala  
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Lys Arg Leu Arg Ala Leu His Met Lys Glu His Pro Asp Tyr Lys Tyr  
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Arg Pro Arg Arg Lys Thr Lys Thr Leu Met Lys Lys Asp Lys Tyr Thr  
 115 120 125

Leu Pro Gly Gly Leu Leu Ala Pro Gly Gly Asn Ser Met Ala Ser Gly  
 130 135 140

Val Gly Val Gly Ala Gly Leu Gly Ala Gly Val Asn Gln Arg Met Asp  
 145 150 155 160

Ser Tyr Ala His Met Asn Gly Trp Ser Asn Gly Ser Tyr Ser Met Met  
 165 170 175

Gln Glu Gln Leu Gly Tyr Pro Gln His Pro Gly Leu Asn Ala His Gly  
 180 185 190

Ala Ala Gln Met Gln Pro Met His Arg Tyr Asp Val Ser Ala Leu Gln  
 195 200 205

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

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

Leu Arg Ala Leu His Met Lys Glu His Pro Asp Tyr Lys Tyr Arg Pro  
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Arg Arg Lys Thr Lys Thr Leu Met Lys Lys Asp Lys Tyr Thr Leu Pro  
115 120 125

Gly Gly Leu Leu Ala Pro Gly Gly Asn Ser Met Ala Ser Gly Val Gly  
130 135 140

Val Gly Ala Gly Leu Gly Ala Gly Val Asn Gln Arg Met Asp Ser Tyr  
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Ala His Met Asn Gly Trp Ser Asn Gly Ser Tyr Ser Met Met Gln Asp  
165 170 175

Gln Leu Gly Tyr Pro Gln His Pro Gly Leu Asn Ala His Gly Ala Ala  
180 185 190

Gln Met Gln Pro Met His Arg Tyr Asp Val Ser Ala Leu Gln Tyr Asn  
195 200 205

Ser Met Thr Ser Ser Gln Thr Tyr Met Asn Gly Ser Pro Thr Tyr Ser  
210 215 220

Met Ser Tyr Ser Gln Gln Gly Thr Pro Gly Met Ala Leu Gly Ser Met  
225 230 235 240

Gly Ser Val Val Lys Ser Glu Ala Ser Ser Ser Pro Pro Val Val Thr  
245 250 255

Ser Ser Ser His Ser Arg Ala Pro Cys Gln Ala Gly Asp Leu Arg Asp  
260 265 270

Met Ile Ser Met Tyr Leu Pro Gly Ala Glu Val Pro Glu Pro Ala Ala  
275 280 285



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Gln Lys Met Arg Thr Val Phe Ser Gln Ala Gln Leu Cys Ala Leu Lys  
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Asp Arg Phe Gln Lys Gln Lys Tyr Leu Ser Leu Gln Gln Met Gln Glu  
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Gln Asn Gln Arg Met Lys Cys Lys Arg Trp Gln Lys Asn Gln Trp Leu  
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Lys Thr Ser Asn Gly Leu Ile Gln Lys Gly Ser Ala Pro Val Glu Tyr  
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Pro Ser Ile His Cys Ser Tyr Pro Gln Gly Tyr Leu Val Asn Ala Ser  
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Gly Ser Leu Ser Met Trp Gly Ser Gln Thr Trp Thr Asn Pro Thr Trp  
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Ser Ser Gln Thr Trp Thr Asn Pro Thr Trp Asn Asn Gln Thr Trp Thr  
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Asn Pro Thr Trp Ser Ser Gln Ala Trp Thr Ala Gln Ser Trp Asn Gly  
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Gln Pro Trp Asn Ala Ala Pro Leu His Asn Phe Gly Glu Asp Phe Leu  
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Gln Pro Tyr Val Gln Leu Gln Gln Asn Phe Ser Ala Ser Asp Leu Glu  
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Val Asn Leu Glu Ala Thr Arg Glu Ser His Ala His Phe Ser Thr Pro  
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Asn Ser Asn Gly Val Thr Gln Lys Ala Ser Ala Pro Thr Tyr Pro Ser  
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gctgccaaga gggccaagtt ggacagtggc agggctcctga agcagatcag caacaaccgc 1020  
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<210> 14  
<211> 454  
<212> PRT  
<213> mus musculus

<400> 14

Leu Asp Phe Leu Trp Ala Leu Glu Thr Pro Gln Thr Ala Thr Thr Met  
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Pro Leu Asn Val Asn Phe Thr Asn Arg Asn Tyr Asp Leu Asp Tyr Asp  
20 25 30

Ser Val Gln Pro Tyr Phe Ile Cys Asp Glu Glu Glu Asn Phe Tyr His  
35 40 45

Gln Gln Gln Gln Ser Glu Leu Gln Pro Pro Ala Pro Ser Glu Asp Ile  
50 55 60

Trp Lys Lys Phe Glu Leu Leu Pro Thr Pro Pro Leu Ser Pro Ser Arg  
65 70 75 80

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

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Asn Asn Arg Lys Cys Ser Ser Pro Arg Ser Ser Asp Thr Glu Glu Asn  
355 360 365

Asp Lys Arg Arg Thr His Asn Val Leu Glu Arg Gln Arg Arg Asn Glu  
370 375 380

Leu Lys Arg Ser Phe Phe Ala Leu Arg Asp Gln Ile Pro Glu Leu Glu  
385 390 395 400

Asn Asn Glu Lys Ala Pro Lys Val Val Ile Leu Lys Lys Ala Thr Ala  
405 410 415

Tyr Ile Leu Ser Ile Gln Ala Asp Glu His Lys Leu Thr Ser Glu Lys  
420 425 430

Asp Leu Leu Arg Lys Arg Arg Glu Gln Leu Lys His Lys Leu Glu Gln  
435 440 445

Leu Arg Asn Ser Gly Ala  
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<210> 15  
<211> 1320  
<212> DNA  
<213> homo sapiens

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cagcccccg cgcccagcga ggatatctgg aagaaattcg agctgctgcc caccgcccc 180  
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atggtgaccg agctgctggg aggagacatg gtgaaccaga gtttcatctg cgaccgagac 360  
gacgagacct tcatcaaaaa catcatcatc caggactgta tgtggagcgg cttctcggcc 420  
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gacagcagct cgcccgaagtc ctgcgcctcg caagactcca gcgccttctc tccgtcctcg 660  
gatttctctg tctcctcgac ggagtcctcc ccgcagggca gcccagagcc cctggtgctc 720  
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cacgtctcca cacatcagca caactacgca gcgcctccct ccactcggaa ggactatcct 960  
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 atccccgagtg tggaatacaa tgaaaaggcc cccaaggtag ttatccttaa aaaagccaca 1200  
 gcatacatcc tgtccgtcca agcagaggag caaaagctca tttctgaaga ggacttggtg 1260  
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<210> 16  
 <211> 454  
 <212> PRT  
 <213> homo sapiens

<400> 16

Leu Asp Phe Phe Arg Val Val Glu Asn Gln Gln Pro Pro Ala Thr Met  
 1 5 10 15

Pro Leu Asn Val Ser Phe Thr Asn Arg Asn Tyr Asp Leu Asp Tyr Asp  
 20 25 30

Ser Val Gln Pro Tyr Phe Tyr Cys Asp Glu Glu Glu Asn Phe Tyr Gln  
 35 40 45

Gln Gln Gln Gln Ser Glu Leu Gln Pro Pro Ala Pro Ser Glu Asp Ile  
 50 55 60

Trp Lys Lys Phe Glu Leu Leu Pro Thr Pro Pro Leu Ser Pro Ser Arg  
 65 70 75 80

Arg Ser Gly Leu Cys Ser Pro Ser Tyr Val Ala Val Thr Pro Phe Ser  
 85 90 95

Leu Arg Gly Asp Asn Asp Gly Gly Gly Ser Phe Ser Thr Ala Asp  
 100 105 110

Gln Leu Glu Met Val Thr Glu Leu Leu Gly Gly Asp Met Val Asn Gln  
 115 120 125

Ser Phe Ile Cys Asp Pro Asp Asp Glu Thr Phe Ile Lys Asn Ile Ile  
 130 135 140

Ile Gln Asp Cys Met Trp Ser Gly Phe Ser Ala Ala Ala Lys Leu Val  
 145 150 155 160

Ser Glu Lys Leu Ala Ser Tyr Gln Ala Ala Arg Lys Asp Ser Gly Ser  
 165 170 175

Pro Asn Pro Ala Arg Gly His Ser Val Cys Ser Thr Ser Ser Leu Tyr  
 180 185 190

Leu Gln Asp Leu Ser Ala Ala Ala Ser Glu Cys Ile Asp Pro Ser Val  
 195 200 205



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Val Phe Pro Tyr Pro Leu Asn Asp Ser Ser Ser Pro Lys Ser Cys Ala  
210 215 220

Ser Gln Asp Ser Ser Ala Phe Ser Pro Ser Ser Asp Ser Leu Leu Ser  
225 230 235 240

Ser Thr Glu Ser Ser Pro Gln Gly Ser Pro Glu Pro Leu Val Leu His  
245 250 255

Glu Glu Thr Pro Pro Thr Thr Ser Ser Asp Ser Glu Glu Glu Gln Glu  
260 265 270

Asp Glu Glu Glu Ile Asp Val Val Ser Val Glu Lys Arg Gln Ala Pro  
275 280 285

Gly Lys Arg Ser Glu Ser Gly Ser Pro Ser Ala Gly Gly His Ser Lys  
290 295 300

Pro Pro His Ser Pro Leu Val Leu Lys Arg Cys His Val Ser Thr His  
305 310 315 320

Gln His Asn Tyr Ala Ala Pro Pro Ser Thr Arg Lys Asp Tyr Pro Ala  
325 330 335

Ala Lys Arg Val Lys Leu Asp Ser Val Arg Val Leu Arg Gln Ile Ser  
340 345 350

Asn Asn Arg Lys Cys Thr Ser Pro Arg Ser Ser Asp Thr Glu Glu Asn  
355 360 365

Val Lys Arg Arg Thr His Asn Val Leu Glu Arg Gln Arg Arg Asn Glu  
370 375 380

Leu Lys Arg Ser Phe Phe Ala Leu Arg Asp Gln Ile Pro Glu Leu Glu  
385 390 395 400

Asn Asn Glu Lys Ala Pro Lys Val Val Ile Leu Lys Lys Ala Thr Ala  
405 410 415

Tyr Ile Leu Ser Val Gln Ala Glu Glu Gln Lys Leu Ile Ser Glu Glu  
420 425 430

Asp Leu Leu Arg Lys Arg Arg Glu Gln Leu Lys His Lys Leu Glu Gln  
435 440 445

Leu Arg Asn Ser Cys Ala  
450

<210> 17  
<211> 1425

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<212> DNA  
 <213> mus musculus

<400> 17  
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 cacatgaagc gacttcccc acttcccggc cgcccctacg acctggcggc gacggtggcc 180  
 acagacctgg agagtggcgg agctgggtgca gcttgacgca gtaacaaccc ggccctccta 240  
 gcccggaggg agaccgagga gttcaacgac ctctggacc tagactttat cttttccaac 300  
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 tcgtcttccc cggcgagcag cggccctgcc agcgcgccct ccacctgcag cttcagctat 420  
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 aacagcagg actgtcacc tggcctgcct ctccccccag gattccatcc ccatccgggg 1020  
 gccaactacc ctcttttct gccagaccag atgcagtcac aagtcccctc tctccattat 1080  
 caagagctca tgccaccggg ttcctgcctg ccagaggagc ccaagccaaa gaggggaaga 1140  
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 cactaccgca aacacacagg gcaccggccc ttctcagtgc agaagtgtga cagggccttt 1380  
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<210> 18  
 <211> 474  
 <212> PRT  
 <213> mus musculus

<400> 18

Met Ala Val Ser Asp Ala Leu Leu Pro Ser Phe Ser Thr Phe Ala Ser  
 1 5 10 15

Gly Pro Ala Gly Arg Glu Lys Thr Leu Arg Pro Ala Gly Ala Pro Thr  
 20 25 30

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

2371116.TXT

Gln Leu Pro Thr Arg Thr Thr Pro Thr Leu Ser Pro Glu Glu Leu Leu  
305 310 315 320

Asn Ser Arg Asp Cys His Pro Gly Leu Pro Leu Pro Pro Gly Phe His  
325 330 335

Pro His Pro Gly Ala Asn Tyr Pro Pro Phe Leu Pro Asp Gln Met Gln  
340 345 350

Ser Gln Val Pro Ser Leu His Tyr Gln Glu Leu Met Pro Pro Gly Ser  
355 360 365

Cys Leu Pro Glu Glu Pro Lys Pro Lys Arg Gly Arg Arg Ser Trp Pro  
370 375 380

Arg Lys Arg Thr Ala Thr His Thr Cys Asp Tyr Ala Gly Cys Gly Lys  
385 390 395 400

Thr Tyr Thr Lys Ser Ser His Leu Lys Ala His Leu Arg Thr His Thr  
405 410 415

Gly Glu Lys Pro Tyr His Cys Asp Trp Asp Gly Cys Gly Trp Lys Phe  
420 425 430

Ala Arg Ser Asp Glu Leu Thr Arg His Tyr Arg Lys His Thr Gly His  
435 440 445

Arg Pro Phe Gln Cys Gln Lys Cys Asp Arg Ala Phe Ser Arg Ser Asp  
450 455 460

His Leu Ala Leu His Met Lys Arg His Phe  
465 470

<210> 19  
<211> 1413  
<212> DNA  
<213> homo sapiens

<400> 19  
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cacatgaagc gacttcccc agtgcttccc ggccgcccct atgacctggc ggcggcgacc 180  
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cccctacctc ggagagagac cgaggagttc aacgatctcc tggacctgga ctttattctc 300  
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tgggacggct gtggatggaa attcgccgc tcagatgaac tgaccaggca ctaccgtaaa 1320
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<210> 20  
 <211> 469  
 <212> PRT  
 <213> homo sapiens

<400> 20

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

Asn Arg Trp Arg Glu Glu Leu Ser His Met Lys Arg Leu Pro Pro Val  
35 40 45

Leu Pro Gly Arg Pro Tyr Asp Leu Ala Ala Ala Thr Val Ala Thr Asp  
50 55 60

Leu Glu Ser Gly Gly Ala Gly Ala Ala Cys Gly Gly Ser Asn Leu Ala  
65 70 75 80

Pro Leu Pro Arg Arg Glu Thr Glu Glu Phe Asn Asp Leu Leu Asp Leu  
85 90 95

Asp Phe Ile Leu Ser Asn Ser Leu Thr His Pro Pro Glu Ser Val Ala  
100 105 110

Ala Thr Val Ser Ser Ser Ala Ser Ala Ser Ser Ser Ser Ser Pro Ser  
115 120 125

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Ser Ser Gly Pro Ala Ser Ala Pro Ser Thr Cys Ser Phe Thr Tyr Pro  
130 135 140

Ile Arg Ala Gly Asn Asp Pro Gly Val Ala Pro Gly Gly Thr Gly Gly  
145 150 155 160

Gly Leu Leu Tyr Gly Arg Glu Ser Ala Pro Pro Pro Thr Ala Pro Phe  
165 170 175

Asn Leu Ala Asp Ile Asn Asp Val Ser Pro Ser Gly Gly Phe Val Ala  
180 185 190

Glu Leu Leu Arg Pro Glu Leu Asp Pro Val Tyr Ile Pro Pro Gln Gln  
195 200 205

Pro Gln Pro Pro Gly Gly Gly Leu Met Gly Lys Phe Val Leu Lys Ala  
210 215 220

Ser Leu Ser Ala Pro Gly Ser Glu Tyr Gly Ser Pro Ser Val Ile Ser  
225 230 235 240

Val Ser Lys Gly Ser Pro Asp Gly Ser His Pro Val Val Val Ala Pro  
245 250 255

Tyr Asn Gly Gly Pro Pro Arg Thr Cys Pro Lys Ile Lys Gln Glu Ala  
260 265 270

Val Ser Ser Cys Thr His Leu Gly Ala Gly Pro Pro Leu Ser Asn Gly  
275 280 285

His Arg Pro Ala Ala His Asp Phe Pro Leu Gly Arg Gln Leu Pro Ser  
290 295 300

Arg Thr Thr Pro Thr Leu Gly Leu Glu Glu Val Leu Ser Ser Arg Asp  
305 310 315 320

Cys His Pro Ala Leu Pro Leu Pro Pro Gly Phe His Pro His Pro Gly  
325 330 335

Pro Asn Tyr Pro Ser Phe Leu Pro Asp Gln Met Gln Pro Gln Val Pro  
340 345 350

Pro Leu His Tyr Gln Glu Leu Met Pro Pro Gly Ser Cys Met Pro Glu  
355 360 365

Glu Pro Lys Pro Lys Arg Gly Arg Arg Ser Trp Pro Arg Lys Arg Thr  
370 375 380

Ala Thr His Thr Cys Asp Tyr Ala Gly Cys Gly Lys Thr Tyr Thr Lys  
385 390 395 400

2371116.TXT

Ser Ser His Leu Lys Ala His Leu Arg Thr His Thr Gly Glu Lys Pro  
405 410 415

Tyr His Cys Asp Trp Asp Gly Cys Gly Trp Lys Phe Ala Arg Ser Asp  
420 425 430

Glu Leu Thr Arg His Tyr Arg Lys His Thr Gly His Arg Pro Phe Gln  
435 440 445

Cys Gln Lys Cys Asp Arg Ala Phe Ser Arg Ser Asp His Leu Ala Leu  
450 455 460

His Met Lys Arg His  
465

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<211> 630  
<212> DNA  
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gccggcatct gtaagtgggt caacgtgcmc atggggttcg gcttcctgtc tatgaccgcc 180  
cgcgctgggg tcgcgctcga cccccggtg gacgtctttg tgcaccagag caagctgcac 240  
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gccaaggggtc tggaatccat ccgtgtcact ggccctgggt gtgtgttctg tattgggagt 360  
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cctgccctgc tcccagaagc ccagaattga 630

<210> 22  
<211> 209  
<212> PRT  
<213> mus musculus

<400> 22

Met Gly Ser Val Ser Asn Gln Gln Phe Ala Gly Gly Cys Ala Lys Ala  
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Ala Glu Lys Ala Pro Glu Glu Ala Pro Pro Asp Ala Ala Arg Ala Ala  
20 25 30

Asp Glu Pro Gln Leu Leu His Gly Ala Gly Ile Cys Lys Trp Phe Asn  
35 40 45

2371116.TXT

Val Arg Met Gly Phe Gly Phe Leu Ser Met Thr Ala Arg Ala Gly Val  
50 55 60

Ala Leu Asp Pro Pro Val Asp Val Phe Val His Gln Ser Lys Leu His  
65 70 75 80

Met Glu Gly Phe Arg Ser Leu Lys Glu Gly Glu Ala Val Glu Phe Thr  
85 90 95

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

Gly Gly Val Phe Cys Ile Gly Ser Glu Arg Arg Pro Lys Gly Lys Asn  
115 120 125

Met Gln Lys Arg Arg Ser Lys Gly Asp Arg Cys Tyr Asn Cys Gly Gly  
130 135 140

Leu Asp His His Ala Lys Glu Cys Lys Leu Pro Pro Gln Pro Lys Lys  
145 150 155 160

Cys His Phe Cys Gln Ser Ile Asn His Met Val Ala Ser Cys Pro Leu  
165 170 175

Lys Ala Gln Gln Gly Pro Ser Ser Gln Gly Lys Pro Ala Tyr Phe Arg  
180 185 190

Glu Glu Glu Glu Glu Ile His Ser Pro Ala Leu Leu Pro Glu Ala Gln  
195 200 205

Asn

<210> 23  
<211> 630  
<212> DNA  
<213> homo sapiens

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gcgggcatct gtaagtgggt caacgtgcgc atggggttcg gcttcctgtc catgaccgcc 180  
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gccaagggtc tggaatccat ccgtgtcacc ggacctgggt gagtattctg tattgggagt 360  
gagaggcggc caaaaggaaa gagcatgcag aagcgcagat caaaaggaga caggtgctac 420  
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cctaccctgc tcccggaggc acagaattga 630

<210> 24  
<211> 209  
<212> PRT  
<213> homo sapiens  
<400> 24

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Asp Glu Pro Gln Leu Leu His Gly Ala Gly Ile Cys Lys Trp Phe Asn  
35 40 45

Val Arg Met Gly Phe Gly Phe Leu Ser Met Thr Ala Arg Ala Gly Val  
50 55 60

Ala Leu Asp Pro Pro Val Asp Val Phe Val His Gln Ser Lys Leu His  
65 70 75 80

Met Glu Gly Phe Arg Ser Leu Lys Glu Gly Glu Ala Val Glu Phe Thr  
85 90 95

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

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