

SEQUENCE LISTING

<110> NantCell

<120> Targeted Neoepitope Vectors And Methods Therefor

<130> 102538.0033PCT

<150> US 62/489,102

<151> 2017-04-24

<160> 18

<170> PatentIn version 3.5

<210> 1

<211> 993

<212> DNA

<213> Artificial Sequence

<220>

<223> MHC-I nucleic acid for MHC-I presentation

<400> 1

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gcccaggtaa tggttgga aa atgtgctctg gcctaccagc tgtatgcagc cgccgcagtg	180
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actggcggcc aggcagcagc cgcaaacatc ctggctgtgt ctttcgcacc tctggtgcaa	300
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taccagcaca tcacgaatth tgagtgggtgc atttccatac tggttgaact gacgcgcctg	420
gagggtgcag ctgccgctta ttacacagtg ttcgatcggg acaacaatcg ggtctctttt	480
gctaattgctg tgggtgctggc cgctgccgct cacagcggac tggtcacttt ccaagccttt	540
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gatctggccg ctttggaaga cgtctccgcc aactgtctca ctgagaccct ggaggacaag	660
aatgaagggtg tggccgctgc cgctgtcctg tcattcgtgg gccagacgag ggtgttgatg	720
atcaacgggg aagaagttga agaaacagaa ctgatgggtg ccgctgccgc agagggtgtcc	780
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<210> 2

<211> 1221

<212> DNA

<213> Artificial Sequence

<220>

<223> MHC-I nucleic acid for MHC-I presentation (Ubiquitin, cleavable)

<400> 2

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cagcgcctta tttttgcagg taagcagctg gaagacggaa ggaccctgag cgactataat	180
atccagaaaag aaagcacact ccacctcgtg ctcaggctcc gcgggggcag ggataaaatc	240
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atcagtgagg aggacttgta a	1221

<210> 3
 <211> 1215
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> MHC-I nucleic acid for MHC-I presentation (Ubiquitin,
 non-cleavable)

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gccgctgtcc tgtcattcgt gggccagacg aggggtgtga tgatcaacgg ggaagaagtt	960
gaagaaacag aactgatggg tgccgctgcc gcagagggtgt ccggactcga gcagctggaa	1020
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SequenceListing_102538_0033PCT_ST25

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gaggaggact tgtaa 1215

<210> 4
<211> 330
<212> PRT
<213> Artificial Sequence

<220>
<223> MHC-I polypeptide for MHC-I presentation

<400> 4

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1 5 10 15

Leu Glu Ala Leu Val Arg Asp Val Cys Ile Ala Ala Ala Ala Cys Val
20 25 30

Asp Cys Leu Asp Arg Thr Asn Thr Ala Gln Val Met Val Gly Lys Cys
35 40 45

Ala Leu Ala Tyr Gln Leu Tyr Ala Ala Ala Ala Val Val Lys Ala Tyr
50 55 60

Leu Pro Val Asn Glu Ser Phe Ala Phe Thr Ala Asp Leu Arg Ser Asn
65 70 75 80

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

Pro Leu Val Gln Leu Ser Lys Asn Asp Asn Gly Thr Pro Asp Ser Val
100 105 110

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

Trp Cys Ile Ser Ile Leu Val Glu Leu Thr Arg Leu Glu Gly Ala Ala
130 135 140

SequenceListing_102538_0033PCT_ST25

Ala Ala Tyr Tyr Thr Val Phe Asp Arg Asp Asn Asn Arg Val Ser Phe
145 150 155 160

Ala Asn Ala Val Val Leu Ala Ala Ala Ala His Ser Gly Leu Val Thr
165 170 175

Phe Gln Ala Phe Ile Asp Val Met Ser Arg Glu Thr Thr Asp Thr Asp
180 185 190

Thr Ala Asp Ala Ala Ala Ala Leu Asp Leu Ala Ala Leu Glu Asp Val
195 200 205

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

Ala Ala Ala Ala Val Leu Ser Phe Val Gly Gln Thr Arg Val Leu Met
225 230 235 240

Ile Asn Gly Glu Glu Val Glu Glu Thr Glu Leu Met Gly Ala Ala Ala
245 250 255

Ala Glu Val Ser Gly Leu Glu Gln Leu Glu Ser Ile Ile Asn Phe Glu
260 265 270

Lys Leu Thr Glu Trp Thr Ser Ser Asn Val Ala Ala Ala Ala Met Thr
275 280 285

Glu Gln Gln Trp Asn Phe Ala Gly Ile Glu Ala Ala Ala Ser Ala Ile
290 295 300

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

Glu Gln Lys Leu Ile Ser Glu Glu Asp Leu
325 330

<210> 5
<211> 406

SequenceListing_102538_0033PCT_ST25

<212> PRT

<213> Artificial Sequence

<220>

<223> MHC-I polypeptide for MHC-I presentation (Ubiquitin, cleavable)

<400> 5

Met Gln Ile Phe Val Lys Thr Leu Thr Gly Lys Thr Ile Thr Leu Glu
1 5 10 15

Val Glu Pro Ser Asp Thr Ile Glu Asn Val Lys Ala Lys Ile Gln Asp
20 25 30

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

Gln Leu Glu Asp Gly Arg Thr Leu Ser Asp Tyr Asn Ile Gln Lys Glu
50 55 60

Ser Thr Leu His Leu Val Leu Arg Leu Arg Gly Gly Arg Asp Lys Ile
65 70 75 80

Thr Gln Tyr Glu Lys Ser Leu Tyr Tyr Cys Ser Phe Leu Glu Ala Leu
85 90 95

Val Arg Asp Val Cys Ile Ala Ala Ala Cys Val Asp Cys Leu Asp
100 105 110

Arg Thr Asn Thr Ala Gln Val Met Val Gly Lys Cys Ala Leu Ala Tyr
115 120 125

Gln Leu Tyr Ala Ala Ala Ala Val Val Lys Ala Tyr Leu Pro Val Asn
130 135 140

Glu Ser Phe Ala Phe Thr Ala Asp Leu Arg Ser Asn Thr Gly Gly Gln
145 150 155 160

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

SequenceListing_102538_0033PCT_ST25

Leu Ser Lys Asn Asp Asn Gly Thr Pro Asp Ser Val Gly Ala Ala Ala
180 185 190

Ala Gln Ser Asn Tyr Gln His Ile Thr Asn Phe Glu Trp Cys Ile Ser
195 200 205

Ile Leu Val Glu Leu Thr Arg Leu Glu Gly Ala Ala Ala Ala Tyr Tyr
210 215 220

Thr Val Phe Asp Arg Asp Asn Asn Arg Val Ser Phe Ala Asn Ala Val
225 230 235 240

Val Leu Ala Ala Ala Ala His Ser Gly Leu Val Thr Phe Gln Ala Phe
245 250 255

Ile Asp Val Met Ser Arg Glu Thr Thr Asp Thr Asp Thr Ala Asp Ala
260 265 270

Ala Ala Ala Leu Asp Leu Ala Ala Leu Glu Asp Val Ser Ala Asn Cys
275 280 285

Leu Thr Glu Thr Leu Glu Asp Lys Asn Glu Gly Val Ala Ala Ala Ala
290 295 300

Val Leu Ser Phe Val Gly Gln Thr Arg Val Leu Met Ile Asn Gly Glu
305 310 315 320

Glu Val Glu Glu Thr Glu Leu Met Gly Ala Ala Ala Ala Glu Val Ser
325 330 335

Gly Leu Glu Gln Leu Glu Ser Ile Ile Asn Phe Glu Lys Leu Thr Glu
340 345 350

Trp Thr Ser Ser Asn Val Ala Ala Ala Ala Met Thr Glu Gln Gln Trp
355 360 365

Asn Phe Ala Gly Ile Glu Ala Ala Ala Ser Ala Ile Gln Gly Asn Val
370 375 380

SequenceListing_102538_0033PCT_ST25

Thr Ser Ile His Ser Leu Leu Asp Ala Ala Ala Glu Gln Lys Leu
385 390 395 400

Ile Ser Glu Glu Asp Leu
405

<210> 6
<211> 404
<212> PRT
<213> Artificial Sequence

<220>
<223> MHC-I polypeptide for MHC-I presentation (Ubiquitin,
non-cleavable)

<400> 6

Met Gln Ile Phe Val Lys Thr Leu Thr Gly Lys Thr Ile Thr Leu Glu
1 5 10 15

Val Glu Pro Ser Asp Thr Ile Glu Asn Val Lys Ala Lys Ile Gln Asp
20 25 30

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

Gln Leu Glu Asp Gly Arg Thr Leu Ser Asp Tyr Asn Ile Gln Lys Glu
50 55 60

Ser Thr Leu His Leu Val Leu Arg Leu Arg Gly Asp Lys Ile Thr Gln
65 70 75 80

Tyr Glu Lys Ser Leu Tyr Tyr Cys Ser Phe Leu Glu Ala Leu Val Arg
85 90 95

Asp Val Cys Ile Ala Ala Ala Ala Cys Val Asp Cys Leu Asp Arg Thr
100 105 110

Asn Thr Ala Gln Val Met Val Gly Lys Cys Ala Leu Ala Tyr Gln Leu
115 120 125

Tyr Ala Ala Ala Ala Val Val Lys Ala Tyr Leu Pro Val Asn Glu Ser

SequenceListing_102538_0033PCT_ST25

130

135

140

Phe Ala Phe Thr Ala Asp Leu Arg Ser Asn Thr Gly Gly Gln Ala Ala
 145 150 155 160

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

Lys Asn Asp Asn Gly Thr Pro Asp Ser Val Gly Ala Ala Ala Ala Gln
 180 185 190

Ser Asn Tyr Gln His Ile Thr Asn Phe Glu Trp Cys Ile Ser Ile Leu
 195 200 205

Val Glu Leu Thr Arg Leu Glu Gly Ala Ala Ala Ala Tyr Tyr Thr Val
 210 215 220

Phe Asp Arg Asp Asn Asn Arg Val Ser Phe Ala Asn Ala Val Val Leu
 225 230 235 240

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

Val Met Ser Arg Glu Thr Thr Asp Thr Asp Thr Ala Asp Ala Ala Ala
 260 265 270

Ala Leu Asp Leu Ala Ala Leu Glu Asp Val Ser Ala Asn Cys Leu Thr
 275 280 285

Glu Thr Leu Glu Asp Lys Asn Glu Gly Val Ala Ala Ala Ala Val Leu
 290 295 300

Ser Phe Val Gly Gln Thr Arg Val Leu Met Ile Asn Gly Glu Glu Val
 305 310 315 320

Glu Glu Thr Glu Leu Met Gly Ala Ala Ala Ala Glu Val Ser Gly Leu
 325 330 335

Glu Gln Leu Glu Ser Ile Ile Asn Phe Glu Lys Leu Thr Glu Trp Thr

SequenceListing_102538_0033PCT_ST25

340

345

350

Ser Ser Asn Val Ala Ala Ala Ala Met Thr Glu Gln Gln Trp Asn Phe
355 360 365

Ala Gly Ile Glu Ala Ala Ala Ser Ala Ile Gln Gly Asn Val Thr Ser
370 375 380

Ile His Ser Leu Leu Asp Ala Ala Ala Ala Glu Gln Lys Leu Ile Ser
385 390 395 400

Glu Glu Asp Leu

<210> 7

<211> 1218

<212> DNA

<213> Artificial Sequence

<220>

<223> MHC-I nucleic acid for MHC-II presentation (lysosomal target)

<400> 7

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gatgtgtgta taggcccagg gccgggggtgt gttgattgcc tcgacaggac aaataccgcc	180
caggtaatgg ttggcaa atg cgcactcgca tatcaactct acggaccagg acccggcgtg	240
gtaaaggctt atctgccagt taacgagagc ttgaccttca ccgcagacct gcgctccaat	300
actggtggtc aaggggcccg accaggtaat atcctcgccg tgagcttcgc ccctctggtc	360
cagctgagta aaaatgacaa tgggtactcct gatagtgtag gcggacccgg tccgggtcag	420
tccaattacc agcacattac caatttcgaa tgggtgcatca gtatactgggt tgaattgacc	480
agactcgagg ggggcccagg cccaggctac tacactgttt tcgatcgca caataatcgg	540
gtagcttcg ctaatgcagt agtgctgggc cccgggcccag ggactccgg tctgggtgacg	600
ttccaggcct tcatcgatgt aatgagccgc gagactacgg acaccgacac cgctgatggc	660
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gatggtgact ataaggacca cgacatcatg ctcatcccaa tcgctgtcgg aggtgctctg	1140
gccggtctcg tattgatcgt tctgatcgt tatttgatcg ggaggaagag gagtcacgca	1200
ggctaccaga ctatctag	1218

<210> 8

<211> 1203

<212> DNA

<213> Artificial Sequence

<220>

<223> MHC-I nucleic acid for MHC-II presentation (recycling endosome target)

<400> 8

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aagatcacc agtatgaaaa atccttgtat tattgtagct ttctggaagc cctggtgcga	120
gatgtgtgta taggcccagg gccggggtgt gttgattgcc tcgacaggac aaataccgcc	180
caggtaatgg ttggcaaatg cgcactcgca tatcaactct acggaccagg acccggcgtg	240
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cagctgagta aaaatgacaa tgggtactcct gatagtgtag gcggacccgg tccgggtcag	420
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ttccaggcct tcatcgtatg aatgagccgc gagactacgg acaccgacac cgctgatggc	660
cccgggcctg gtctggatct tgcagccctg gaggatgtgt ccgctaactg tttgactgag	720

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ccagggcccg gcgaggttag cggcctggaa cagctggaga gtattatcaa ttttgaaaag	900
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gatggtgact ataaggacca cgacatcatg ctcatcccaa tcgctgtcgg aggtgctctg	1140
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taa	1203

<210> 9

<211> 1215

<212> DNA

<213> Artificial Sequence

<220>

<223> MHC-I nucleic acid for MHC-II presentation (sorting endosome target)

<400> 9

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aagatcacc agtatgaaaa atccttgtat tattgtagct ttctggaagc cctggtgcga	120
gatgtgtgta taggcccagg gccggggtgt gttgattgcc tcgacaggac aaataccgcc	180
caggtaatgg ttggcaaatg cgcactcgca tatcaactct acggaccagg acccggcgtg	240
gtaaaggctt atctgccagt taacgagagc ttgaccttca ccgcagacct gcgctccaat	300
actggtggtc aaggggccgg accaggtaat atcctcgccg tgagcttcgc ccctctggtc	360
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agactcgagg ggggcccagg cccaggctac tacactgttt tcgatcgcgca caataatcgg	540
gtagcttcg ctaatgcagt agtgctgggc cccgggccag ggcaactccg tctggtgacg	600
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SequenceListing_102538_0033PCT_ST25

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cagacaaggg tgttgatgat caatggagaa gaggtggaag agaccgaatt gatgggaggc      840
ccaggggccc gcgaggttag cggcctggaa cagctggaga gtattatcaa ttttgaaaag      900
ctgaccgagt ggacaagctc caatgtaggc ggacctggac ccgggatgac agagcagcag      960
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cacagcctgc tcgacgacta caaagacgac gacgacaagg gcagtgacta taaggacat      1080
gatggtgact ataaggacca cgacatcatg ctcatcccaa tcgctgtcgg aggtgctctg     1140
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caggacatcc tgtga                                                         1215

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<210> 10
 <211> 405
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> MHC-I polypeptide for MHC-II presentation (lysosomal target)
 <400> 10

Met Leu Leu Leu Pro Phe Gln Leu Leu Ala Val Leu Phe Pro Gly Gly
 1 5 10 15

Asn Ser Glu Asp Lys Ile Thr Gln Tyr Glu Lys Ser Leu Tyr Tyr Cys
 20 25 30

Ser Phe Leu Glu Ala Leu Val Arg Asp Val Cys Ile Gly Pro Gly Pro
 35 40 45

Gly Cys Val Asp Cys Leu Asp Arg Thr Asn Thr Ala Gln Val Met Val
 50 55 60

Gly Lys Cys Ala Leu Ala Tyr Gln Leu Tyr Gly Pro Gly Pro Gly Val
 65 70 75 80

Val Lys Ala Tyr Leu Pro Val Asn Glu Ser Phe Ala Phe Thr Ala Asp

SequenceListing_102538_0033PCT_ST25

85

90

95

Leu Arg Ser Asn Thr Gly Gly Gln Gly Pro Gly Pro Gly Asn Ile Leu
100 105 110

Ala Val Ser Phe Ala Pro Leu Val Gln Leu Ser Lys Asn Asp Asn Gly
115 120 125

Thr Pro Asp Ser Val Gly Gly Pro Gly Pro Gly Gln Ser Asn Tyr Gln
130 135 140

His Ile Thr Asn Phe Glu Trp Cys Ile Ser Ile Leu Val Glu Leu Thr
145 150 155 160

Arg Leu Glu Gly Gly Pro Gly Pro Gly Tyr Tyr Thr Val Phe Asp Arg
165 170 175

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

Pro Gly His Ser Gly Leu Val Thr Phe Gln Ala Phe Ile Asp Val Met
195 200 205

Ser Arg Glu Thr Thr Asp Thr Asp Thr Ala Asp Gly Pro Gly Pro Gly
210 215 220

Leu Asp Leu Ala Ala Leu Glu Asp Val Ser Ala Asn Cys Leu Thr Glu
225 230 235 240

Thr Leu Glu Asp Lys Asn Glu Gly Val Gly Pro Gly Pro Gly Val Leu
245 250 255

Ser Phe Val Gly Gln Thr Arg Val Leu Met Ile Asn Gly Glu Glu Val
260 265 270

Glu Glu Thr Glu Leu Met Gly Gly Pro Gly Pro Gly Glu Val Ser Gly
275 280 285

Leu Glu Gln Leu Glu Ser Ile Ile Asn Phe Glu Lys Leu Thr Glu Trp

SequenceListing_102538_0033PCT_ST25

290

295

300

Thr Ser Ser Asn Val Gly Gly Pro Gly Pro Gly Met Thr Glu Gln Gln
305 310 315 320

Trp Asn Phe Ala Gly Ile Glu Ala Ala Ala Ser Ala Ile Gln Gly Asn
325 330 335

Val Thr Ser Ile His Ser Leu Leu Asp Asp Tyr Lys Asp Asp Asp Asp
340 345 350

Lys Gly Ser Asp Tyr Lys Asp His Asp Gly Asp Tyr Lys Asp His Asp
355 360 365

Ile Met Leu Ile Pro Ile Ala Val Gly Gly Ala Leu Ala Gly Leu Val
370 375 380

Leu Ile Val Leu Ile Ala Tyr Leu Ile Gly Arg Lys Arg Ser His Ala
385 390 395 400

Gly Tyr Gln Thr Ile
405

<210> 11

<211> 400

<212> PRT

<213> Artificial Sequence

<220>

<223> MHC-I polypeptide for MHC-II presentation (recycling endosome target)

<400> 11

Met Leu Leu Leu Pro Phe Gln Leu Leu Ala Val Leu Phe Pro Gly Gly
1 5 10 15

Asn Ser Glu Asp Lys Ile Thr Gln Tyr Glu Lys Ser Leu Tyr Tyr Cys
20 25 30

Ser Phe Leu Glu Ala Leu Val Arg Asp Val Cys Ile Gly Pro Gly Pro
35 40 45

SequenceListing_102538_0033PCT_ST25

Gly Cys Val Asp Cys Leu Asp Arg Thr Asn Thr Ala Gln Val Met Val
50 55 60

Gly Lys Cys Ala Leu Ala Tyr Gln Leu Tyr Gly Pro Gly Pro Gly Val
65 70 75 80

Val Lys Ala Tyr Leu Pro Val Asn Glu Ser Phe Ala Phe Thr Ala Asp
85 90 95

Leu Arg Ser Asn Thr Gly Gly Gln Gly Pro Gly Pro Gly Asn Ile Leu
100 105 110

Ala Val Ser Phe Ala Pro Leu Val Gln Leu Ser Lys Asn Asp Asn Gly
115 120 125

Thr Pro Asp Ser Val Gly Gly Pro Gly Pro Gly Gln Ser Asn Tyr Gln
130 135 140

His Ile Thr Asn Phe Glu Trp Cys Ile Ser Ile Leu Val Glu Leu Thr
145 150 155 160

Arg Leu Glu Gly Gly Pro Gly Pro Gly Tyr Tyr Thr Val Phe Asp Arg
165 170 175

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

Pro Gly His Ser Gly Leu Val Thr Phe Gln Ala Phe Ile Asp Val Met
195 200 205

Ser Arg Glu Thr Thr Asp Thr Asp Thr Ala Asp Gly Pro Gly Pro Gly
210 215 220

Leu Asp Leu Ala Ala Leu Glu Asp Val Ser Ala Asn Cys Leu Thr Glu
225 230 235 240

Thr Leu Glu Asp Lys Asn Glu Gly Val Gly Pro Gly Pro Gly Val Leu
245 250 255

SequenceListing_102538_0033PCT_ST25

Ser Phe Val Gly Gln Thr Arg Val Leu Met Ile Asn Gly Glu Glu Val
260 265 270

Glu Glu Thr Glu Leu Met Gly Gly Pro Gly Pro Gly Glu Val Ser Gly
275 280 285

Leu Glu Gln Leu Glu Ser Ile Ile Asn Phe Glu Lys Leu Thr Glu Trp
290 295 300

Thr Ser Ser Asn Val Gly Gly Pro Gly Pro Gly Met Thr Glu Gln Gln
305 310 315 320

Trp Asn Phe Ala Gly Ile Glu Ala Ala Ala Ser Ala Ile Gln Gly Asn
325 330 335

Val Thr Ser Ile His Ser Leu Leu Asp Asp Tyr Lys Asp Asp Asp Asp
340 345 350

Lys Gly Ser Asp Tyr Lys Asp His Asp Gly Asp Tyr Lys Asp His Asp
355 360 365

Ile Met Leu Ile Pro Ile Ala Val Gly Gly Ala Leu Ala Gly Leu Val
370 375 380

Leu Ile Val Leu Ile Ala Tyr Leu Ile Gly Arg Lys Arg Cys Phe Cys
385 390 395 400

<210> 12

<211> 404

<212> PRT

<213> Artificial Sequence

<220>

<223> MHC-I polypeptide for MHC-II presentation (sorting endosome target)

<400> 12

Met Leu Leu Leu Pro Phe Gln Leu Leu Ala Val Leu Phe Pro Gly Gly
1 5 10 15

SequenceListing_102538_0033PCT_ST25

Asn Ser Glu Asp Lys Ile Thr Gln Tyr Glu Lys Ser Leu Tyr Tyr Cys
20 25 30

Ser Phe Leu Glu Ala Leu Val Arg Asp Val Cys Ile Gly Pro Gly Pro
35 40 45

Gly Cys Val Asp Cys Leu Asp Arg Thr Asn Thr Ala Gln Val Met Val
50 55 60

Gly Lys Cys Ala Leu Ala Tyr Gln Leu Tyr Gly Pro Gly Pro Gly Val
65 70 75 80

Val Lys Ala Tyr Leu Pro Val Asn Glu Ser Phe Ala Phe Thr Ala Asp
85 90 95

Leu Arg Ser Asn Thr Gly Gly Gln Gly Pro Gly Pro Gly Asn Ile Leu
100 105 110

Ala Val Ser Phe Ala Pro Leu Val Gln Leu Ser Lys Asn Asp Asn Gly
115 120 125

Thr Pro Asp Ser Val Gly Gly Pro Gly Pro Gly Gln Ser Asn Tyr Gln
130 135 140

His Ile Thr Asn Phe Glu Trp Cys Ile Ser Ile Leu Val Glu Leu Thr
145 150 155 160

Arg Leu Glu Gly Gly Pro Gly Pro Gly Tyr Tyr Thr Val Phe Asp Arg
165 170 175

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

Pro Gly His Ser Gly Leu Val Thr Phe Gln Ala Phe Ile Asp Val Met
195 200 205

Ser Arg Glu Thr Thr Asp Thr Asp Thr Ala Asp Gly Pro Gly Pro Gly
210 215 220

SequenceListing_102538_0033PCT_ST25

Leu Asp Leu Ala Ala Leu Glu Asp Val Ser Ala Asn Cys Leu Thr Glu
225 230 235 240

Thr Leu Glu Asp Lys Asn Glu Gly Val Gly Pro Gly Pro Gly Val Leu
245 250 255

Ser Phe Val Gly Gln Thr Arg Val Leu Met Ile Asn Gly Glu Glu Val
260 265 270

Glu Glu Thr Glu Leu Met Gly Gly Pro Gly Pro Gly Glu Val Ser Gly
275 280 285

Leu Glu Gln Leu Glu Ser Ile Ile Asn Phe Glu Lys Leu Thr Glu Trp
290 295 300

Thr Ser Ser Asn Val Gly Gly Pro Gly Pro Gly Met Thr Glu Gln Gln
305 310 315 320

Trp Asn Phe Ala Gly Ile Glu Ala Ala Ala Ser Ala Ile Gln Gly Asn
325 330 335

Val Thr Ser Ile His Ser Leu Leu Asp Asp Tyr Lys Asp Asp Asp Asp
340 345 350

Lys Gly Ser Asp Tyr Lys Asp His Asp Gly Asp Tyr Lys Asp His Asp
355 360 365

Ile Met Leu Ile Pro Ile Ala Val Gly Gly Ala Leu Ala Gly Leu Val
370 375 380

Leu Ile Val Leu Ile Ala Tyr Leu Ile Gly Lys Lys His Cys Ser Tyr
385 390 395 400

Gln Asp Ile Leu

<210> 13
<211> 2712
<212> DNA

SequenceListing_102538_0033PCT_ST25

<213> Artificial Sequence

<220>

<223> MHC-II nucleic acid for MHC-II presentation (lysosomal target)

<400> 13

atgctgctgc tgcccttcca gttgctggct gtcctctttc ccggcggcaa ctccgaggca	60
ctgcaggcct accacctgga tcctcaatgc tggggcgtga acgtgcagcc ctactccggg	120
agccctgcca atgtcgcagt ttatacagct ttggtagagc ctcatggcag aatcatgggt	180
ctcgatcttc cagacggcgg gcatctcacg ggccctggtc cgggtgatac cgatgaagct	240
gaggatccag agaaaatgct tgccaacttt gagtccggaa agcataagta tcgacagaca	300
gccatgttta ccgccaccat gccaccagcc gtcgagagac tggctagatc ctacctgagg	360
agacctgctg tgggtgtacgg ccaggcccg ggcaggcggg atctgttgca gaacacagct	420
ctcgaagtct tcatggcaaa tcgcacttct gttatgttca actttcctga acaagccacg	480
gtgaagaaag tggatatattc ctttcccagg gttggggctcg gcacaagcta tgggctcccc	540
caagcagggc caggaccagg gaagattgag ccgatatga tgtcaatgga acatagcttc	600
gaaacggcat cccatgacgg agaggctggc ccctccccag aagtgttgca gggccctgga	660
cctggcaagg ttctgatggc atccacttcc tacttgccct ccagggtcac tgagatgttt	720
aaccagggaa gggcatttgc agcagtcaga ttgccttttt gtggacacaa aaacatctgt	780
agcctgacaa caatccagaa gattccacga ctgctcgtag gacctggacc tggcatgccc	840
gcagccgagt tggcactcag cgccttcctc gtcctcgtct ttttgtgggt gcattctttg	900
cgccgccttc tcgaatgctt ctatgtatct gtattctcta acgccgcat ccatgttgta	960
caatactgtt tcggcctcgt gtactacggc cctggccccg gactcctcga gtcctgcac	1020
tgcccacttg gtcactgtca tctgtgttcc gagccgatgt tcacgtttgt gtacccaca	1080
attttccac tcagagagac tcctatggct gggcttcacc agcggcgaac gtccatcggc	1140
ttcgtggcct attgtggccc aggcccaggc gcccattttc gccttggtgc aaaggaaaag	1200
atgccgtggg acagcatcaa actgaccttc gaggcaaccg gacctaggca catgagcttc	1260
tatgtgcgca ccacaagggt ttctaccctc agccagtggg cactgggtaa tggaattcca	1320
gtgggccctg gaccgggagg taggacacag caaatgctca ttcccgttg gcaacaggtt	1380

SequenceListing_102538_0033PCT_ST25

acacctatgg ctccagccgc cgccacattg acattcgagg gcatggccgg atctcagagg	1440
ctgggcgact ggggaaagat gattccccac agcaaccatt acaactccgt tgggccaggc	1500
cctggtgaac ttcagctcgt ccagttggag ggcgggggcg gcagcgggac atatagagtc	1560
gggaacgccc aaccatcact cgccgattgt ctggacgccg gggatcttgc ccagcgcctc	1620
agagagcatg gcgccgaagt gcccacagaa cctaaagagg gaccaggacc cggcgagctt	1680
gaaaagttcc gcaagtctga ggagggtgaag caacgggccc cgcggggcag tgccgccagc	1740
tcaccagcag acgtccagag cctgaagaag gccatgtcct ctctgcagaa tgacagggac	1800
cggctgctca aggaactgaa gaatctgggc cccggccctg ggggcaaaca cgaccgggat	1860
ctgctgattg ggaccgctaa gcacggtctg aatcgaactg attactacat catgaatgga	1920
cctcagctct catttctcga cgcatacaga aactacgccc agcataaacg aactgacaca	1980
caggctcctg gcagtggacc cggccctgga attctcgagg tggacaaaag cggccctatt	2040
actctcttgg tgcagggaca catggaggga gaggtctggg ggctgtctac tcatccatac	2100
ctgcccatac gcgccaccgt tagtgatgac aaaactctca gaatttgga cttgtccccg	2160
tccggcccag gtcctggtat gtcaccgct cggcttttgc tccaaggct gctctgtctt	2220
cagggcagga ccactagtta ttcaacagcc gcagtactgc ccaatccaat cccaaacccc	2280
gagatttggtt ataataagtt gtttatcaat aacgagtggc acgacgccgt cggcccgggc	2340
cctggggaag ttagtggtct ggaacagctg gaatctatca ttaatttcga gaaactgaca	2400
gaatggactt ccagcaacgt cgggggacca ggtcctggaa tgacagagca gcagtggaat	2460
tttgccgga ttgaggccgc tgcattctgcc atccaaggaa atgtgacatc cattcactcc	2520
ctcctcgatg attacaagga cgacgacgac aagggaagtg actacaaaga ccacgacggg	2580
gactacaagg accacgacat tatgctgac cccatcgccg tgggcggggc cctggccggc	2640
ctcgtgctga tcgtccttat cgcctacctc atcggcagga agaggagtca cgcaggctac	2700
cagactatct ag	2712

<210> 14

<211> 2697

<212> DNA

<213> Artificial Sequence

SequenceListing_102538_0033PCT_ST25

<220>

<223> MHC-II nucleic acid for MHC-II presentation (recycling endosome target)

<400> 14

atgctgctgc tgcccttcca gttgctggct gtcctctttc ccggcggcaa ctccgaggca	60
ctgcaggcct accacctgga tcctcaatgc tggggcgtga acgtgcagcc ctactccggg	120
agccctgcca atgtcgcagt ttatacagct ttggtagagc ctcattggcag aatcatgggt	180
ctcgatcttc cagacggcgg gcatctcacg ggccctggtc cgggtgatac cgatgaagct	240
gaggatccag agaaaatgct tgccaacttt gagtccggaa agcataagta tcgacagaca	300
gccatgttta ccgccaccat gccaccagcc gtcgagagac tggctagatc ctacctgagg	360
agacctgctg tgggtgtacgg ccaggcccg ggcaggcggg atctgttgca gaacacagct	420
ctcgaagtct tcatggcaaa tcgcacttct gttatgttca actttcctga acaagccacg	480
gtgaagaaag tggatatattc ctttcccagg gttggggctcg gcacaagcta tgggctcccc	540
caagcagggc caggaccagg gaagattgag ccgatatga tgtcaatgga acatagcttc	600
gaaacggcat cccatgacgg agaggctggc ccctccccag aagtgttgca gggccctgga	660
cctggcaagg ttctgatggc atccacttcc tacttgccct ccagggtcac tgagatgttt	720
aaccagggaa gggcatttgc agcagtcaga ttgccttttt gtggacacaa aaacatctgt	780
agcctgacaa caatccagaa gattccacga ctgctcgtag gacctggacc tggcatgccc	840
gcagccgagt tggcactcag cgccttcctc gtcctcgtct ttttgtgggt gcattctttg	900
cgccgccttc tcgaatgctt ctatgtatct gtattctcta acgccgcat ccatgttgta	960
caatactgtt tcggcctcgt gtactacggc cctggccccg gactcctcga gtcctgcac	1020
tgcccacttg gtcactgtca tctgtgttcc gagccgatgt tcacgtttgt gtaccccaca	1080
attttccac tcagagagac tcctatggct gggcttcacc agcggcgaac gtccatcggc	1140
ttcgtggcct attgtggccc aggcccaggc gccattttc gccttggtgc aaaggaaaag	1200
atgccgtggg acagcatcaa actgaccttc gaggcaaccg gacctaggca catgagcttc	1260
tatgtgcgca ccacaaaggg ttctaccctc agccagtggc cactgggtaa tggaattcca	1320
gtgggcccctg gaccgggagg taggacacag caaatgctca ttcccgttg gcaacaggtt	1380
acacctatgg ctccagccgc cgccacattg acattcgagg gcatggccgg atctcagagg	1440

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ctgggcgact ggggaaagat gattccccac agcaaccatt acaactccgt tgggccaggc	1500
cctggtgaac ttcagctcgt ccagttggag ggcgggggcg gcagcgggac atatagagtc	1560
gggaacgccc aaccatcact cgccgattgt ctggacgccg gggatcttgc ccagcgcctc	1620
agagagcatg gcgccgaagt gcccacagaa cctaaagagg gaccaggacc cggcgagctt	1680
gaaaagttcc gcaagtctga ggagggtgaag caacgggccc cggccccag tgccgccagc	1740
tcaccagcag acgtccagag cctgaagaag gccatgtcct ctctgcagaa tgacagggac	1800
cggctgctca aggaactgaa gaatctgggc cccggccctg ggggcaaaca cgaccgggat	1860
ctgctgattg ggaccgctaa gcacggtctg aatcgaactg attactacat catgaatgga	1920
cctcagctct catttctcga cgcatacaga aactacgccc agcataaacg aactgacaca	1980
caggctcctg gcagtggacc cggccctgga attctcgagg tggacaaaag cggccctatt	2040
actctcttgg tgcagggaca catggaggga gaggtctggg ggctgtctac tcatccatac	2100
ctgcccatac gcgccaccgt tagtgatgac aaaactctca gaatttgga cttgtccccg	2160
tccggcccag gtcctggtat gctcaccgct cggcttttgc tcccaaggct gctctgtctt	2220
cagggcagga ccactagtta ttcaacagcc gcagtactgc ccaatccaat cccaaacccc	2280
gagatttggt ataataagtt gtttatcaat aacgagtggc acgacgccgt cggcccgggc	2340
cctggggaag ttagtggtct ggaacagctg gaatctatca ttaatttcga gaaactgaca	2400
gaatggactt ccagcaacgt cgggggacca ggtcctggaa tgacagagca gcagtggaat	2460
tttgccgga ttgaggccgc tgcattctgcc atccaaggaa atgtgacatc cattcactcc	2520
ctcctcgatg attacaagga cgacgacgac aagggaagtg actacaaaga ccacgacggg	2580
gactacaagg accacgacat tatgctgata cccatcgccg tgggcggggc cctggccggc	2640
ctcgtgctga tcgtccttat cgcctacctc atcggcagga aacgctgttt ctgttaa	2697

<210> 15

<211> 2709

<212> DNA

<213> Artificial Sequence

<220>

<223> MHC-II nucleic acid for MHC-II presentation (sorting endosome target)

SequenceListing_102538_0033PCT_ST25

<400> 15

atgctgctgc tgcccttcca gttgctggct gtcctctttc ccggcggcaa ctccgaggca	60
ctgcaggcct accacctgga tcctcaatgc tggggcgtga acgtgcagcc ctactccggg	120
agccctgcca atgtcgcagt ttatacagct ttggtagagc ctcatggcag aatcatgggt	180
ctcgatcttc cagacggcgg gcatctcacg ggccctggtc cgggtgatac cgatgaagct	240
gaggatccag agaaaatgct tgccaacttt gagtccggaa agcataagta tcgacagaca	300
gccatgttta ccgccacat gccaccagcc gtcgagagac tggctagatc ctacctgagg	360
agacctgctg tgggtgtacgg ccagggcccg ggcaggcggg atctgttgca gaacacagct	420
ctcgaagtct tcatggcaaa tcgcacttct gttatgttca actttcctga acaagccacg	480
gtgaagaaag tggatatatt ccttcccagg gttggggctg gcacaagcta tgggctcccc	540
caagcagggc caggaccagg gaagattgag ccgatatga tgtcaatgga acatagcttc	600
gaaacggcat cccatgacgg agaggctggc ccctccccag aagtgttgca gggccctgga	660
cctggcaagg ttctgatggc atccacttcc tacttgccct ccaggtcac tgagatgttt	720
aaccagggaa gggcatttgc agcagtcaga ttgccttttt gtggacacaa aaacatctgt	780
agcctgacaa caatccagaa gattccacga ctgctcgtag gacctggacc tggcatgccc	840
gcagccgagt tggcactcag cgccttcctc gtcctcgtct ttttgtgggt gcattctttg	900
cgccgccttc tcgaatgctt ctatgtatct gtattctcta acgccgcat ccatgtttgta	960
caatactgtt tcggcctcgt gtactacggg cctggccccg gactcctcga gctcctgcac	1020
tgcccacttg gtcactgtca tctgtgttcc gagccgatgt tcacgtttgt gtaccccaca	1080
attttccac tcagagagac tcctatggct gggcttcacc agcggcgaac gtccatcggc	1140
ttcgtggcct attgtggccc aggccaggc gccattttc gccttgtgtc aaaggaaaag	1200
atgccgtggg acagcatcaa actgaccttc gaggcaaccg gacctaggca catgagcttc	1260
tatgtgcgca ccacaaaggg ttctaccctc agccagtggg cactgggtaa tggaattcca	1320
gtgggcccctg gaccgggagg taggacacag caaatgtca ttcccgttg gcaacaggtt	1380
acacctatgg ctccagccgc cgccacattg acattcgagg gcatggccgg atctcagagg	1440
ctgggcgact ggggaaagat gattccccac agcaaccatt acaactccgt tgggccaggc	1500

SequenceListing_102538_0033PCT_ST25

cctggtgaac ttcagctcgt ccagttggag ggcgggggcg gcagcgggac atatagagtc	1560
gggaacgccc aaccatcact cgccgattgt ctggacgccg gggatcttgc ccagcgcctc	1620
agagagcatg gcgccgaagt gcccacagaa cctaaagagg gaccaggacc cggcgagctt	1680
gaaaagttcc gcaagtctga ggagggtgag caacggggcg ccgccccag tgccgccagc	1740
tcaccagcag acgtccagag cctgaagaag gccatgtcct ctctgcagaa tgacagggac	1800
cggctgctca aggaactgaa gaatctgggc cccggccctg ggggcaaaca cgaccgggat	1860
ctgctgattg ggaccgctaa gcacggtctg aatcgaactg attactacat catgaatgga	1920
cctcagctct catttctcga cgcatacaga aactacgccc agcataaacg aactgacaca	1980
caggctcctg gcagtggacc cggccctgga attctcgagg tggacaaaag cggccctatt	2040
actctcttgg tgcagggaca catggaggga gaggtctggg ggctgtctac tcatccatac	2100
ctgcccatac gcgccaccgt tagtgatgac aaaactctca gaatttggga cttgtccccg	2160
tccggcccag gtcctggtat gctcaccgct cggcttttgc tccaaggct gctctgtctt	2220
cagggcagga ccactagtta ttcaacagcc gcagtactgc ccaatccaat cccaaacccc	2280
gagatttggt ataataagtt gtttatcaat aacgagtggc acgacgccgt cggcccgggc	2340
cctggggaag ttagtggtct ggaacagctg gaatctatca ttaatttcga gaaactgaca	2400
gaatggactt ccagcaacgt cggggggacca ggtcctggaa tgacagagca gcagtggaat	2460
tttgccggaa ttgaggccgc tgcacttgcc atccaaggaa atgtgacatc cattcactcc	2520
ctcctcgatg attacaagga cgacgacgac aagggaagtg actacaaaga ccacgacggg	2580
gactacaagg accacgacat tatgctgac cccatcgccg tgggcggggc cctggccggc	2640
ctcgtgctga tcgtccttat cgcctacctc atcggcaaga agcactgctc atatcaggac	2700
atcctgtga	2709

<210> 16

<211> 903

<212> PRT

<213> Artificial Sequence

<220>

<223> MHC-II polypeptide for MHC-II presentation (lysosomal target)

<400> 16

SequenceListing_102538_0033PCT_ST25

Met Leu Leu Leu Pro Phe Gln Leu Leu Ala Val Leu Phe Pro Gly Gly
1 5 10 15

Asn Ser Glu Ala Leu Gln Ala Tyr His Leu Asp Pro Gln Cys Trp Gly
20 25 30

Val Asn Val Gln Pro Tyr Ser Gly Ser Pro Ala Asn Val Ala Val Tyr
35 40 45

Thr Ala Leu Val Glu Pro His Gly Arg Ile Met Gly Leu Asp Leu Pro
50 55 60

Asp Gly Gly His Leu Thr Gly Pro Gly Pro Gly Asp Thr Asp Glu Ala
65 70 75 80

Glu Asp Pro Glu Lys Met Leu Ala Asn Phe Glu Ser Gly Lys His Lys
85 90 95

Tyr Arg Gln Thr Ala Met Phe Thr Ala Thr Met Pro Pro Ala Val Glu
100 105 110

Arg Leu Ala Arg Ser Tyr Leu Arg Arg Pro Ala Val Val Tyr Gly Pro
115 120 125

Gly Pro Gly Arg Arg Tyr Leu Leu Gln Asn Thr Ala Leu Glu Val Phe
130 135 140

Met Ala Asn Arg Thr Ser Val Met Phe Asn Phe Pro Glu Gln Ala Thr
145 150 155 160

Val Lys Lys Val Val Tyr Ser Leu Pro Arg Val Gly Val Gly Thr Ser
165 170 175

Tyr Gly Leu Pro Gln Ala Gly Pro Gly Pro Gly Lys Ile Glu Pro Asp
180 185 190

Met Met Ser Met Glu His Ser Phe Glu Thr Ala Ser His Asp Gly Glu
195 200 205

SequenceListing_102538_0033PCT_ST25

Ala Gly Pro Ser Pro Glu Val Leu Gln Gly Pro Gly Pro Gly Lys Val
210 215 220

Leu Met Ala Ser Thr Ser Tyr Leu Pro Ser Gln Val Thr Glu Met Phe
225 230 235 240

Asn Gln Gly Arg Ala Phe Ala Ala Val Arg Leu Pro Phe Cys Gly His
245 250 255

Lys Asn Ile Cys Ser Leu Thr Thr Ile Gln Lys Ile Pro Arg Leu Leu
260 265 270

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

Phe Leu Val Leu Val Phe Leu Trp Val His Ser Leu Arg Arg Leu Leu
290 295 300

Glu Cys Phe Tyr Val Ser Val Phe Ser Asn Ala Ala Ile His Val Val
305 310 315 320

Gln Tyr Cys Phe Gly Leu Val Tyr Tyr Gly Pro Gly Pro Gly Leu Leu
325 330 335

Glu Leu Leu His Cys Pro Leu Gly His Cys His Leu Cys Ser Glu Pro
340 345 350

Met Phe Thr Phe Val Tyr Pro Thr Ile Phe Pro Leu Arg Glu Thr Pro
355 360 365

Met Ala Gly Leu His Gln Arg Arg Thr Ser Ile Gly Phe Val Ala Tyr
370 375 380

Cys Gly Pro Gly Pro Gly Ala His Phe Arg Leu Val Ser Lys Glu Lys
385 390 395 400

Met Pro Trp Asp Ser Ile Lys Leu Thr Phe Glu Ala Thr Gly Pro Arg
405 410 415

SequenceListing_102538_0033PCT_ST25

His Met Ser Phe Tyr Val Arg Thr His Lys Gly Ser Thr Leu Ser Gln
420 425 430

Trp Ser Leu Gly Asn Gly Ile Pro Val Gly Pro Gly Pro Gly Gly Arg
435 440 445

Thr Gln Gln Met Leu Ile Pro Ala Trp Gln Gln Val Thr Pro Met Ala
450 455 460

Pro Ala Ala Ala Thr Leu Thr Phe Glu Gly Met Ala Gly Ser Gln Arg
465 470 475 480

Leu Gly Asp Trp Gly Lys Met Ile Pro His Ser Asn His Tyr Asn Ser
485 490 495

Val Gly Pro Gly Pro Gly Glu Leu Gln Leu Val Gln Leu Glu Gly Gly
500 505 510

Gly Gly Ser Gly Thr Tyr Arg Val Gly Asn Ala Gln Pro Ser Leu Ala
515 520 525

Asp Cys Leu Asp Ala Gly Asp Leu Ala Gln Arg Leu Arg Glu His Gly
530 535 540

Ala Glu Val Pro Thr Glu Pro Lys Glu Gly Pro Gly Pro Gly Glu Leu
545 550 555 560

Glu Lys Phe Arg Lys Ser Glu Glu Gly Lys Gln Arg Ala Ala Ala Pro
565 570 575

Ser Ala Ala Ser Ser Pro Ala Asp Val Gln Ser Leu Lys Lys Ala Met
580 585 590

Ser Ser Leu Gln Asn Asp Arg Asp Arg Leu Leu Lys Glu Leu Lys Asn
595 600 605

Leu Gly Pro Gly Pro Gly Gly Lys His Asp Arg Asp Leu Leu Ile Gly
610 615 620

SequenceListing_102538_0033PCT_ST25

Thr Ala Lys His Gly Leu Asn Arg Thr Asp Tyr Tyr Ile Met Asn Gly
625 630 635 640

Pro Gln Leu Ser Phe Leu Asp Ala Tyr Arg Asn Tyr Ala Gln His Lys
645 650 655

Arg Thr Asp Thr Gln Ala Pro Gly Ser Gly Pro Gly Pro Gly Ile Leu
660 665 670

Glu Val Asp Lys Ser Gly Pro Ile Thr Leu Leu Val Gln Gly His Met
675 680 685

Glu Gly Glu Val Trp Gly Leu Ser Thr His Pro Tyr Leu Pro Ile Cys
690 695 700

Ala Thr Val Ser Asp Asp Lys Thr Leu Arg Ile Trp Asp Leu Ser Pro
705 710 715 720

Ser Gly Pro Gly Pro Gly Met Leu Thr Ala Arg Leu Leu Leu Pro Arg
725 730 735

Leu Leu Cys Leu Gln Gly Arg Thr Thr Ser Tyr Ser Thr Ala Ala Val
740 745 750

Leu Pro Asn Pro Ile Pro Asn Pro Glu Ile Cys Tyr Asn Lys Leu Phe
755 760 765

Ile Asn Asn Glu Trp His Asp Ala Val Gly Pro Gly Pro Gly Glu Val
770 775 780

Ser Gly Leu Glu Gln Leu Glu Ser Ile Ile Asn Phe Glu Lys Leu Thr
785 790 795 800

Glu Trp Thr Ser Ser Asn Val Gly Gly Pro Gly Pro Gly Met Thr Glu
805 810 815

Gln Gln Trp Asn Phe Ala Gly Ile Glu Ala Ala Ala Ser Ala Ile Gln
820 825 830

SequenceListing_102538_0033PCT_ST25

Gly Asn Val Thr Ser Ile His Ser Leu Leu Asp Asp Tyr Lys Asp Asp
835 840 845

Asp Asp Lys Gly Ser Asp Tyr Lys Asp His Asp Gly Asp Tyr Lys Asp
850 855 860

His Asp Ile Met Leu Ile Pro Ile Ala Val Gly Gly Ala Leu Ala Gly
865 870 875 880

Leu Val Leu Ile Val Leu Ile Ala Tyr Leu Ile Gly Arg Lys Arg Ser
885 890 895

His Ala Gly Tyr Gln Thr Ile
900

<210> 17

<211> 898

<212> PRT

<213> Artificial Sequence

<220>

<223> MHC-II polypeptide for MHC-II presentation (recycling endosome target)

<400> 17

Met Leu Leu Leu Pro Phe Gln Leu Leu Ala Val Leu Phe Pro Gly Gly
1 5 10 15

Asn Ser Glu Ala Leu Gln Ala Tyr His Leu Asp Pro Gln Cys Trp Gly
20 25 30

Val Asn Val Gln Pro Tyr Ser Gly Ser Pro Ala Asn Val Ala Val Tyr
35 40 45

Thr Ala Leu Val Glu Pro His Gly Arg Ile Met Gly Leu Asp Leu Pro
50 55 60

Asp Gly Gly His Leu Thr Gly Pro Gly Pro Gly Asp Thr Asp Glu Ala
65 70 75 80

SequenceListing_102538_0033PCT_ST25

Glu Asp Pro Glu Lys Met Leu Ala Asn Phe Glu Ser Gly Lys His Lys
85 90 95

Tyr Arg Gln Thr Ala Met Phe Thr Ala Thr Met Pro Pro Ala Val Glu
100 105 110

Arg Leu Ala Arg Ser Tyr Leu Arg Arg Pro Ala Val Val Tyr Gly Pro
115 120 125

Gly Pro Gly Arg Arg Tyr Leu Leu Gln Asn Thr Ala Leu Glu Val Phe
130 135 140

Met Ala Asn Arg Thr Ser Val Met Phe Asn Phe Pro Glu Gln Ala Thr
145 150 155 160

Val Lys Lys Val Val Tyr Ser Leu Pro Arg Val Gly Val Gly Thr Ser
165 170 175

Tyr Gly Leu Pro Gln Ala Gly Pro Gly Pro Gly Lys Ile Glu Pro Asp
180 185 190

Met Met Ser Met Glu His Ser Phe Glu Thr Ala Ser His Asp Gly Glu
195 200 205

Ala Gly Pro Ser Pro Glu Val Leu Gln Gly Pro Gly Pro Gly Lys Val
210 215 220

Leu Met Ala Ser Thr Ser Tyr Leu Pro Ser Gln Val Thr Glu Met Phe
225 230 235 240

Asn Gln Gly Arg Ala Phe Ala Ala Val Arg Leu Pro Phe Cys Gly His
245 250 255

Lys Asn Ile Cys Ser Leu Thr Thr Ile Gln Lys Ile Pro Arg Leu Leu
260 265 270

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

SequenceListing_102538_0033PCT_ST25

Phe Leu Val Leu Val Phe Leu Trp Val His Ser Leu Arg Arg Leu Leu
290 295 300

Glu Cys Phe Tyr Val Ser Val Phe Ser Asn Ala Ala Ile His Val Val
305 310 315 320

Gln Tyr Cys Phe Gly Leu Val Tyr Tyr Gly Pro Gly Pro Gly Leu Leu
325 330 335

Glu Leu Leu His Cys Pro Leu Gly His Cys His Leu Cys Ser Glu Pro
340 345 350

Met Phe Thr Phe Val Tyr Pro Thr Ile Phe Pro Leu Arg Glu Thr Pro
355 360 365

Met Ala Gly Leu His Gln Arg Arg Thr Ser Ile Gly Phe Val Ala Tyr
370 375 380

Cys Gly Pro Gly Pro Gly Ala His Phe Arg Leu Val Ser Lys Glu Lys
385 390 395 400

Met Pro Trp Asp Ser Ile Lys Leu Thr Phe Glu Ala Thr Gly Pro Arg
405 410 415

His Met Ser Phe Tyr Val Arg Thr His Lys Gly Ser Thr Leu Ser Gln
420 425 430

Trp Ser Leu Gly Asn Gly Ile Pro Val Gly Pro Gly Pro Gly Gly Arg
435 440 445

Thr Gln Gln Met Leu Ile Pro Ala Trp Gln Gln Val Thr Pro Met Ala
450 455 460

Pro Ala Ala Ala Thr Leu Thr Phe Glu Gly Met Ala Gly Ser Gln Arg
465 470 475 480

Leu Gly Asp Trp Gly Lys Met Ile Pro His Ser Asn His Tyr Asn Ser
485 490 495

SequenceListing_102538_0033PCT_ST25

Val Gly Pro Gly Pro Gly Glu Leu Gln Leu Val Gln Leu Glu Gly Gly
500 505 510

Gly Gly Ser Gly Thr Tyr Arg Val Gly Asn Ala Gln Pro Ser Leu Ala
515 520 525

Asp Cys Leu Asp Ala Gly Asp Leu Ala Gln Arg Leu Arg Glu His Gly
530 535 540

Ala Glu Val Pro Thr Glu Pro Lys Glu Gly Pro Gly Pro Gly Glu Leu
545 550 555 560

Glu Lys Phe Arg Lys Ser Glu Glu Gly Lys Gln Arg Ala Ala Ala Pro
565 570 575

Ser Ala Ala Ser Ser Pro Ala Asp Val Gln Ser Leu Lys Lys Ala Met
580 585 590

Ser Ser Leu Gln Asn Asp Arg Asp Arg Leu Leu Lys Glu Leu Lys Asn
595 600 605

Leu Gly Pro Gly Pro Gly Gly Lys His Asp Arg Asp Leu Leu Ile Gly
610 615 620

Thr Ala Lys His Gly Leu Asn Arg Thr Asp Tyr Tyr Ile Met Asn Gly
625 630 635 640

Pro Gln Leu Ser Phe Leu Asp Ala Tyr Arg Asn Tyr Ala Gln His Lys
645 650 655

Arg Thr Asp Thr Gln Ala Pro Gly Ser Gly Pro Gly Pro Gly Ile Leu
660 665 670

Glu Val Asp Lys Ser Gly Pro Ile Thr Leu Leu Val Gln Gly His Met
675 680 685

Glu Gly Glu Val Trp Gly Leu Ser Thr His Pro Tyr Leu Pro Ile Cys
690 695 700

SequenceListing_102538_0033PCT_ST25

Ala Thr Val Ser Asp Asp Lys Thr Leu Arg Ile Trp Asp Leu Ser Pro
705 710 715 720

Ser Gly Pro Gly Pro Gly Met Leu Thr Ala Arg Leu Leu Leu Pro Arg
725 730 735

Leu Leu Cys Leu Gln Gly Arg Thr Thr Ser Tyr Ser Thr Ala Ala Val
740 745 750

Leu Pro Asn Pro Ile Pro Asn Pro Glu Ile Cys Tyr Asn Lys Leu Phe
755 760 765

Ile Asn Asn Glu Trp His Asp Ala Val Gly Pro Gly Pro Gly Glu Val
770 775 780

Ser Gly Leu Glu Gln Leu Glu Ser Ile Ile Asn Phe Glu Lys Leu Thr
785 790 795 800

Glu Trp Thr Ser Ser Asn Val Gly Gly Pro Gly Pro Gly Met Thr Glu
805 810 815

Gln Gln Trp Asn Phe Ala Gly Ile Glu Ala Ala Ala Ser Ala Ile Gln
820 825 830

Gly Asn Val Thr Ser Ile His Ser Leu Leu Asp Asp Tyr Lys Asp Asp
835 840 845

Asp Asp Lys Gly Ser Asp Tyr Lys Asp His Asp Gly Asp Tyr Lys Asp
850 855 860

His Asp Ile Met Leu Ile Pro Ile Ala Val Gly Gly Ala Leu Ala Gly
865 870 875 880

Leu Val Leu Ile Val Leu Ile Ala Tyr Leu Ile Gly Arg Lys Arg Cys
885 890 895

Phe Cys

SequenceListing_102538_0033PCT_ST25

<210> 18

<211> 902

<212> PRT

<213> Artificial Sequence

<220>

<223> MHC-II polypeptide for MHC-II presentation (sorting endosome target)

<400> 18

Met Leu Leu Leu Pro Phe Gln Leu Leu Ala Val Leu Phe Pro Gly Gly
1 5 10 15

Asn Ser Glu Ala Leu Gln Ala Tyr His Leu Asp Pro Gln Cys Trp Gly
20 25 30

Val Asn Val Gln Pro Tyr Ser Gly Ser Pro Ala Asn Val Ala Val Tyr
35 40 45

Thr Ala Leu Val Glu Pro His Gly Arg Ile Met Gly Leu Asp Leu Pro
50 55 60

Asp Gly Gly His Leu Thr Gly Pro Gly Pro Gly Asp Thr Asp Glu Ala
65 70 75 80

Glu Asp Pro Glu Lys Met Leu Ala Asn Phe Glu Ser Gly Lys His Lys
85 90 95

Tyr Arg Gln Thr Ala Met Phe Thr Ala Thr Met Pro Pro Ala Val Glu
100 105 110

Arg Leu Ala Arg Ser Tyr Leu Arg Arg Pro Ala Val Val Tyr Gly Pro
115 120 125

Gly Pro Gly Arg Arg Tyr Leu Leu Gln Asn Thr Ala Leu Glu Val Phe
130 135 140

Met Ala Asn Arg Thr Ser Val Met Phe Asn Phe Pro Glu Gln Ala Thr
145 150 155 160

Val Lys Lys Val Val Tyr Ser Leu Pro Arg Val Gly Val Gly Thr Ser

SequenceListing_102538_0033PCT_ST25

165

170

175

Tyr Gly Leu Pro Gln Ala Gly Pro Gly Pro Gly Lys Ile Glu Pro Asp
180 185 190

Met Met Ser Met Glu His Ser Phe Glu Thr Ala Ser His Asp Gly Glu
195 200 205

Ala Gly Pro Ser Pro Glu Val Leu Gln Gly Pro Gly Pro Gly Lys Val
210 215 220

Leu Met Ala Ser Thr Ser Tyr Leu Pro Ser Gln Val Thr Glu Met Phe
225 230 235 240

Asn Gln Gly Arg Ala Phe Ala Ala Val Arg Leu Pro Phe Cys Gly His
245 250 255

Lys Asn Ile Cys Ser Leu Thr Thr Ile Gln Lys Ile Pro Arg Leu Leu
260 265 270

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

Phe Leu Val Leu Val Phe Leu Trp Val His Ser Leu Arg Arg Leu Leu
290 295 300

Glu Cys Phe Tyr Val Ser Val Phe Ser Asn Ala Ala Ile His Val Val
305 310 315 320

Gln Tyr Cys Phe Gly Leu Val Tyr Tyr Gly Pro Gly Pro Gly Leu Leu
325 330 335

Glu Leu Leu His Cys Pro Leu Gly His Cys His Leu Cys Ser Glu Pro
340 345 350

Met Phe Thr Phe Val Tyr Pro Thr Ile Phe Pro Leu Arg Glu Thr Pro
355 360 365

Met Ala Gly Leu His Gln Arg Arg Thr Ser Ile Gly Phe Val Ala Tyr

SequenceListing_102538_0033PCT_ST25

370

375

380

Cys Gly Pro Gly Pro Gly Ala His Phe Arg Leu Val Ser Lys Glu Lys
 385 390 395 400

Met Pro Trp Asp Ser Ile Lys Leu Thr Phe Glu Ala Thr Gly Pro Arg
 405 410 415

His Met Ser Phe Tyr Val Arg Thr His Lys Gly Ser Thr Leu Ser Gln
 420 425 430

Trp Ser Leu Gly Asn Gly Ile Pro Val Gly Pro Gly Pro Gly Gly Arg
 435 440 445

Thr Gln Gln Met Leu Ile Pro Ala Trp Gln Gln Val Thr Pro Met Ala
 450 455 460

Pro Ala Ala Ala Thr Leu Thr Phe Glu Gly Met Ala Gly Ser Gln Arg
 465 470 475 480

Leu Gly Asp Trp Gly Lys Met Ile Pro His Ser Asn His Tyr Asn Ser
 485 490 495

Val Gly Pro Gly Pro Gly Glu Leu Gln Leu Val Gln Leu Glu Gly Gly
 500 505 510

Gly Gly Ser Gly Thr Tyr Arg Val Gly Asn Ala Gln Pro Ser Leu Ala
 515 520 525

Asp Cys Leu Asp Ala Gly Asp Leu Ala Gln Arg Leu Arg Glu His Gly
 530 535 540

Ala Glu Val Pro Thr Glu Pro Lys Glu Gly Pro Gly Pro Gly Glu Leu
 545 550 555 560

Glu Lys Phe Arg Lys Ser Glu Glu Gly Lys Gln Arg Ala Ala Ala Pro
 565 570 575

Ser Ala Ala Ser Ser Pro Ala Asp Val Gln Ser Leu Lys Lys Ala Met

SequenceListing_102538_0033PCT_ST25

580

585

590

Ser Ser Leu Gln Asn Asp Arg Asp Arg Leu Leu Lys Glu Leu Lys Asn
 595 600 605

Leu Gly Pro Gly Pro Gly Gly Lys His Asp Arg Asp Leu Leu Ile Gly
 610 615 620

Thr Ala Lys His Gly Leu Asn Arg Thr Asp Tyr Tyr Ile Met Asn Gly
 625 630 635 640

Pro Gln Leu Ser Phe Leu Asp Ala Tyr Arg Asn Tyr Ala Gln His Lys
 645 650 655

Arg Thr Asp Thr Gln Ala Pro Gly Ser Gly Pro Gly Pro Gly Ile Leu
 660 665 670

Glu Val Asp Lys Ser Gly Pro Ile Thr Leu Leu Val Gln Gly His Met
 675 680 685

Glu Gly Glu Val Trp Gly Leu Ser Thr His Pro Tyr Leu Pro Ile Cys
 690 695 700

Ala Thr Val Ser Asp Asp Lys Thr Leu Arg Ile Trp Asp Leu Ser Pro
 705 710 715 720

Ser Gly Pro Gly Pro Gly Met Leu Thr Ala Arg Leu Leu Leu Pro Arg
 725 730 735

Leu Leu Cys Leu Gln Gly Arg Thr Thr Ser Tyr Ser Thr Ala Ala Val
 740 745 750

Leu Pro Asn Pro Ile Pro Asn Pro Glu Ile Cys Tyr Asn Lys Leu Phe
 755 760 765

Ile Asn Asn Glu Trp His Asp Ala Val Gly Pro Gly Pro Gly Glu Val
 770 775 780

Ser Gly Leu Glu Gln Leu Glu Ser Ile Ile Asn Phe Glu Lys Leu Thr

785 790 795 800

Ser Tyr Gln Asp Ile Leu
900