

sequence listing-14OCT15\_ST25.txt  
SEQUENCE LISTING

<110> The Trustees of the University of Pennsylvania  
PATERSON, Yvonne

<120> RECOMBINANT LISTERIA VACCINE STRAINS AND METHODS OF USING THE  
SAME IN CANCER IMMUNOTHERAPY

<130> P-78581-PC

<140> PCT/US15/999999  
<141> 2015-10-14

<150> 62/065,973  
<151> 2014-10-20

<150> 62/063,828  
<151> 2014-10-14

<160> 30

<170> PatentIn version 3.5

<210> 1  
<211> 32  
<212> PRT  
<213> Listeria monocytogenes

<400> 1

Lys Glu Asn Ser Ile Ser Ser Met Ala Pro Pro Ala Ser Pro Pro Ala  
1 5 10 15

Ser Pro Lys Thr Pro Ile Glu Lys Lys His Ala Asp Glu Ile Asp Lys  
20 25 30

<210> 2  
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<213> Listeria monocytogenes

<400> 2

Met Lys Lys Ile Met Leu Val Phe Ile Thr Leu Ile Leu Val Ser Leu  
1 5 10 15

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

Glu Asn Ser Ile Ser Ser Val Ala Pro Pro Ala Ser Pro Pro Ala Ser  
35 40 45

Pro Lys Thr Pro Ile Glu Lys Lys His Ala Asp Glu Ile Asp Lys Tyr  
50 55 60

Ile Gln Gly Leu Asp Tyr Asn Lys Asn Asn Val Leu Val Tyr His Gly  
65 70 75 80

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Asp Ala Val Thr Asn Val Pro Pro Arg Lys Gly Tyr Lys Asp Gly Asn  
85 90 95

Glu Tyr Ile Val Val Glu Lys Lys Lys Lys Ser Ile Asn Gln Asn Asn  
100 105 110

Ala Asp Ile Gln Val Val Asn Ala Ile Ser Ser Leu Thr Tyr Pro Gly  
115 120 125

Ala Leu Val Lys Ala Asn Ser Glu Leu Val Glu Asn Gln Pro Asp Val  
130 135 140

Leu Pro Val Lys Arg Asp Ser Leu Thr Leu Ser Ile Asp Leu Pro Gly  
145 150 155 160

Met Thr Asn Gln Asp Asn Lys Ile Val Val Lys Asn Ala Thr Lys Ser  
165 170 175

Asn Val Asn Asn Ala Val Asn Thr Leu Val Glu Arg Trp Asn Glu Lys  
180 185 190

Tyr Ala Gln Ala Tyr Ser Asn Val Ser Ala Lys Ile Asp Tyr Asp Asp  
195 200 205

Glu Met Ala Tyr Ser Glu Ser Gln Leu Ile Ala Lys Phe Gly Thr Ala  
210 215 220

Phe Lys Ala Val Asn Asn Ser Leu Asn Val Asn Phe Gly Ala Ile Ser  
225 230 235 240

Glu Gly Lys Met Gln Glu Glu Val Ile Ser Phe Lys Gln Ile Tyr Tyr  
245 250 255

Asn Val Asn Val Asn Glu Pro Thr Arg Pro Ser Arg Phe Phe Gly Lys  
260 265 270

Ala Val Thr Lys Glu Gln Leu Gln Ala Leu Gly Val Asn Ala Glu Asn  
275 280 285

Pro Pro Ala Tyr Ile Ser Ser Val Ala Tyr Gly Arg Gln Val Tyr Leu  
290 295 300

Lys Leu Ser Thr Asn Ser His Ser Thr Lys Val Lys Ala Ala Phe Asp  
305 310 315 320

Ala Ala Val Ser Gly Lys Ser Val Ser Gly Asp Val Glu Leu Thr Asn

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325

330

335

Ile Ile Lys Asn Ser Ser Phe Lys Ala Val Ile Tyr Gly Gly Ser Ala  
340 345 350

Lys Asp Glu Val Gln Ile Ile Asp Gly Asn Leu Gly Asp Leu Arg Asp  
355 360 365

Ile Leu Lys Lys Gly Ala Thr Phe Asn Arg Glu Thr Pro Gly Val Pro  
370 375 380

Ile Ala Tyr Thr Thr Asn Phe Leu Lys Asp Asn Glu Leu Ala Val Ile  
385 390 395 400

Lys Asn Asn Ser Glu Tyr Ile Glu Thr Thr Ser Lys Ala Tyr Thr Asp  
405 410 415

Gly Lys Ile Asn Ile Asp His Ser Gly Gly Tyr Val Ala Gln Phe Asn  
420 425 430

Ile Ser Trp Asp Glu Val Asn Tyr Asp  
435 440

<210> 3

<211> 529

<212> PRT

<213> Listeria monocytogenes

<400> 3

Met Lys Lys Ile Met Leu Val Phe Ile Thr Leu Ile Leu Val Ser Leu  
1 5 10 15

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

Glu Asn Ser Ile Ser Ser Met Ala Pro Pro Ala Ser Pro Pro Ala Ser  
35 40 45

Pro Lys Thr Pro Ile Glu Lys Lys His Ala Asp Glu Ile Asp Lys Tyr  
50 55 60

Ile Gln Gly Leu Asp Tyr Asn Lys Asn Asn Val Leu Val Tyr His Gly  
65 70 75 80

Asp Ala Val Thr Asn Val Pro Pro Arg Lys Gly Tyr Lys Asp Gly Asn  
85 90 95

Glu Tyr Ile Val Val Glu Lys Lys Lys Lys Ser Ile Asn Gln Asn Asn  
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100

105

110

Ala Asp Ile Gln Val Val Asn Ala Ile Ser Ser Leu Thr Tyr Pro Gly  
115 120 125

Ala Leu Val Lys Ala Asn Ser Glu Leu Val Glu Asn Gln Pro Asp Val  
130 135 140

Leu Pro Val Lys Arg Asp Ser Leu Thr Leu Ser Ile Asp Leu Pro Gly  
145 150 155 160

Met Thr Asn Gln Asp Asn Lys Ile Val Val Lys Asn Ala Thr Lys Ser  
165 170 175

Asn Val Asn Asn Ala Val Asn Thr Leu Val Glu Arg Trp Asn Glu Lys  
180 185 190

Tyr Ala Gln Ala Tyr Pro Asn Val Ser Ala Lys Ile Asp Tyr Asp Asp  
195 200 205

Glu Met Ala Tyr Ser Glu Ser Gln Leu Ile Ala Lys Phe Gly Thr Ala  
210 215 220

Phe Lys Ala Val Asn Asn Ser Leu Asn Val Asn Phe Gly Ala Ile Ser  
225 230 235 240

Glu Gly Lys Met Gln Glu Glu Val Ile Ser Phe Lys Gln Ile Tyr Tyr  
245 250 255

Asn Val Asn Val Asn Glu Pro Thr Arg Pro Ser Arg Phe Phe Gly Lys  
260 265 270

Ala Val Thr Lys Glu Gln Leu Gln Ala Leu Gly Val Asn Ala Glu Asn  
275 280 285

Pro Pro Ala Tyr Ile Ser Ser Val Ala Tyr Gly Arg Gln Val Tyr Leu  
290 295 300

Lys Leu Ser Thr Asn Ser His Ser Thr Lys Val Lys Ala Ala Phe Asp  
305 310 315 320

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

Ile Ile Lys Asn Ser Ser Phe Lys Ala Val Ile Tyr Gly Gly Ser Ala  
340 345 350

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Lys Asp Glu Val Gln Ile Ile Asp Gly Asn Leu Gly Asp Leu Arg Asp  
355 360 365

Ile Leu Lys Lys Gly Ala Thr Phe Asn Arg Glu Thr Pro Gly Val Pro  
370 375 380

Ile Ala Tyr Thr Thr Asn Phe Leu Lys Asp Asn Glu Leu Ala Val Ile  
385 390 395 400

Lys Asn Asn Ser Glu Tyr Ile Glu Thr Thr Ser Lys Ala Tyr Thr Asp  
405 410 415

Gly Lys Ile Asn Ile Asp His Ser Gly Gly Tyr Val Ala Gln Phe Asn  
420 425 430

Ile Ser Trp Asp Glu Val Asn Tyr Asp Pro Glu Gly Asn Glu Ile Val  
435 440 445

Gln His Lys Asn Trp Ser Glu Asn Asn Lys Ser Lys Leu Ala His Phe  
450 455 460

Thr Ser Ser Ile Tyr Leu Pro Gly Asn Ala Arg Asn Ile Asn Val Tyr  
465 470 475 480

Ala Lys Glu Cys Thr Gly Leu Ala Trp Glu Trp Trp Arg Thr Val Ile  
485 490 495

Asp Asp Arg Asn Leu Pro Leu Val Lys Asn Arg Asn Ile Ser Ile Trp  
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Gly Thr Thr Leu Tyr Pro Lys Tyr Ser Asn Lys Val Asp Asn Pro Ile  
515 520 525

Glu

<210> 4

<211> 416

<212> PRT

<213> Listeria monocytogenes

<400> 4

Met Lys Lys Ile Met Leu Val Phe Ile Thr Leu Ile Leu Val Ser Leu  
1 5 10 15

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

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Glu Asn Ser Ile Ser Ser Val Ala Pro Pro Ala Ser Pro Pro Ala Ser  
35 40 45

Pro Lys Thr Pro Ile Glu Lys Lys His Ala Asp Glu Ile Asp Lys Tyr  
50 55 60

Ile Gln Gly Leu Asp Tyr Asn Lys Asn Asn Val Leu Val Tyr His Gly  
65 70 75 80

Asp Ala Val Thr Asn Val Pro Pro Arg Lys Gly Tyr Lys Asp Gly Asn  
85 90 95

Glu Tyr Ile Val Val Glu Lys Lys Lys Lys Ser Ile Asn Gln Asn Asn  
100 105 110

Ala Asp Ile Gln Val Val Asn Ala Ile Ser Ser Leu Thr Tyr Pro Gly  
115 120 125

Ala Leu Val Lys Ala Asn Ser Glu Leu Val Glu Asn Gln Pro Asp Val  
130 135 140

Leu Pro Val Lys Arg Asp Ser Leu Thr Leu Ser Ile Asp Leu Pro Gly  
145 150 155 160

Met Thr Asn Gln Asp Asn Lys Ile Val Val Lys Asn Ala Thr Lys Ser  
165 170 175

Asn Val Asn Asn Ala Val Asn Thr Leu Val Glu Arg Trp Asn Glu Lys  
180 185 190

Tyr Ala Gln Ala Tyr Ser Asn Val Ser Ala Lys Ile Asp Tyr Asp Asp  
195 200 205

Glu Met Ala Tyr Ser Glu Ser Gln Leu Ile Ala Lys Phe Gly Thr Ala  
210 215 220

Phe Lys Ala Val Asn Asn Ser Leu Asn Val Asn Phe Gly Ala Ile Ser  
225 230 235 240

Glu Gly Lys Met Gln Glu Glu Val Ile Ser Phe Lys Gln Ile Tyr Tyr  
245 250 255

Asn Val Asn Val Asn Glu Pro Thr Arg Pro Ser Arg Phe Phe Gly Lys  
260 265 270

Ala Val Thr Lys Glu Gln Leu Gln Ala Leu Gly Val Asn Ala Glu Asn  
275 280 285

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Pro Pro Ala Tyr Ile Ser Ser Val Ala Tyr Gly Arg Gln Val Tyr Leu  
290 295 300

Lys Leu Ser Thr Asn Ser His Ser Thr Lys Val Lys Ala Ala Phe Asp  
305 310 315 320

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

Ile Ile Lys Asn Ser Ser Phe Lys Ala Val Ile Tyr Gly Gly Ser Ala  
340 345 350

Lys Asp Glu Val Gln Ile Ile Asp Gly Asn Leu Gly Asp Leu Arg Asp  
355 360 365

Ile Leu Lys Lys Gly Ala Thr Phe Asn Arg Glu Thr Pro Gly Val Pro  
370 375 380

Ile Ala Tyr Thr Thr Asn Phe Leu Lys Asp Asn Glu Leu Ala Val Ile  
385 390 395 400

Lys Asn Asn Ser Glu Tyr Ile Glu Thr Thr Ser Lys Ala Tyr Thr Asp  
405 410 415

<210> 5

<211> 390

<212> PRT

<213> *Listeria monocytogenes*

<400> 5

Met Arg Ala Met Met Val Val Phe Ile Thr Ala Asn Cys Ile Thr Ile  
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Asn Pro Asp Ile Ile Phe Ala Ala Thr Asp Ser Glu Asp Ser Ser Leu  
20 25 30

Asn Thr Asp Glu Trp Glu Glu Glu Lys Thr Glu Glu Gln Pro Ser Glu  
35 40 45

Val Asn Thr Gly Pro Arg Tyr Glu Thr Ala Arg Glu Val Ser Ser Arg  
50 55 60

Asp Ile Lys Glu Leu Glu Lys Ser Asn Lys Val Arg Asn Thr Asn Lys  
65 70 75 80

Ala Asp Leu Ile Ala Met Leu Lys Glu Lys Ala Glu Lys Gly Pro Asn  
85 90 95

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Ile Asn Asn Asn Asn Ser Glu Gln Thr Glu Asn Ala Ala Ile Asn Glu  
100 105 110

Glu Ala Ser Gly Ala Asp Arg Pro Ala Ile Gln Val Glu Arg Arg His  
115 120 125

Pro Gly Leu Pro Ser Asp Ser Ala Ala Glu Ile Lys Lys Arg Arg Lys  
130 135 140

Ala Ile Ala Ser Ser Asp Ser Glu Leu Glu Ser Leu Thr Tyr Pro Asp  
145 150 155 160

Lys Pro Thr Lys Val Asn Lys Lys Lys Val Ala Lys Glu Ser Val Ala  
165 170 175

Asp Ala Ser Glu Ser Asp Leu Asp Ser Ser Met Gln Ser Ala Asp Glu  
180 185 190

Ser Ser Pro Gln Pro Leu Lys Ala Asn Gln Gln Pro Phe Phe Pro Lys  
195 200 205

Val Phe Lys Lys Ile Lys Asp Ala Gly Lys Trp Val Arg Asp Lys Ile  
210 215 220

Asp Glu Asn Pro Glu Val Lys Lys Ala Ile Val Asp Lys Ser Ala Gly  
225 230 235 240

Leu Ile Asp Gln Leu Leu Thr Lys Lys Lys Ser Glu Glu Val Asn Ala  
245 250 255

Ser Asp Phe Pro Pro Pro Pro Thr Asp Glu Glu Leu Arg Leu Ala Leu  
260 265 270

Pro Glu Thr Pro Met Leu Leu Gly Phe Asn Ala Pro Ala Thr Ser Glu  
275 280 285

Pro Ser Ser Phe Glu Phe Pro Pro Pro Pro Thr Asp Glu Glu Leu Arg  
290 295 300

Leu Ala Leu Pro Glu Thr Pro Met Leu Leu Gly Phe Asn Ala Pro Ala  
305 310 315 320

Thr Ser Glu Pro Ser Ser Phe Glu Phe Pro Pro Pro Pro Thr Glu Asp  
325 330 335

Glu Leu Glu Ile Ile Arg Glu Thr Ala Ser Ser Leu Asp Ser Ser Phe  
340 345 350

sequence listing-14OCT15\_ST25.txt

Thr Arg Gly Asp Leu Ala Ser Leu Arg Asn Ala Ile Asn Arg His Ser  
355 360 365

Gln Asn Phe Ser Asp Phe Pro Pro Ile Pro Thr Glu Glu Glu Leu Asn  
370 375 380

Gly Arg Gly Gly Arg Pro  
385 390

<210> 6  
<211> 1170  
<212> DNA  
<213> *Listeria monocytogenes*

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aaaacagaag agcaaccaag cgaggtaaata acgggaccaa gatacgaaac tgcacgtgaa      180
gtaagttcac gtgatattaa agaactagaa aaatcgaata aagtgagaaa tacgaacaaa      240
gcagacctaa tagcaatggt gaaagaaaaa gcagaaaaag gtccaaatat caataataac      300
aacagtgaac aaactgagaa tgcggctata aatgaagagg cttcaggagc cgaccgacca      360
gctatacaag tggagcgtcg tcatccagga ttgccatcgg atagcgcagc ggaaattaaa      420
aaaagaagga aagccatagc atcatcggat agtgagcttg aaagccttac ttatccggat      480
aaaccaacaa aagtaaataa gaaaaaagtg gcgaaagagt cagttgcgga tgcttctgaa      540
agtgacttag attctagcat gcagtcagca gatgagcttt caccacaacc tttaaaagca      600
aaccaacaac catttttccc taaagtattt aaaaaataa aagatgcggg gaaatgggta      660
cgtgataaaa tcgacgaaaa tcctgaagta aagaaagcga ttgttgataa aagtgcaggg      720
ttaattgacc aattattaac caaaaagaaa agtgaagagg taaatgcttc ggacttccccg      780
ccaccaccta cggatgaaga gttaagactt gctttgccag agacaccaat gcttcttggt      840
tttaatgctc ctgctacatc agaaccgagc tcattcgaat ttccaccacc acctacggat      900
gaagagttaa gacttgcttt gccagagacg ccaatgcttc ttggttttta tgctcctgct      960
acatcggaac cgagctcggt cgaatttcca ccgcctccaa cagaagatga actagaaatc     1020
atccgggaaa cagcatcctc gctagattct agttttacaa gaggggattt agctagtttg     1080
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gaagagttga acgggagagg cggtagacca                                     1170

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<210> 7  
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sequence listing-14OCT15\_ST25.txt

<212> PRT

<213> *Listeria monocytogenes*

<400> 7

Lys Thr Glu Glu Gln Pro Ser Glu Val Asn Thr Gly Pro Arg  
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<210> 8

<211> 28

<212> PRT

<213> *Listeria monocytogenes*

<400> 8

Lys Ala Ser Val Thr Asp Thr Ser Glu Gly Asp Leu Asp Ser Ser Met  
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Gln Ser Ala Asp Glu Ser Thr Pro Gln Pro Leu Lys  
20 25

<210> 9

<211> 20

<212> PRT

<213> *Listeria monocytogenes*

<400> 9

Lys Asn Glu Glu Val Asn Ala Ser Asp Phe Pro Pro Pro Pro Thr Asp  
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Glu Glu Leu Arg  
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<210> 10

<211> 33

<212> PRT

<213> *Listeria monocytogenes*

<400> 10

Arg Gly Gly Ile Pro Thr Ser Glu Glu Phe Ser Ser Leu Asn Ser Gly  
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Asp Phe Thr Asp Asp Glu Asn Ser Glu Thr Thr Glu Glu Glu Ile Asp  
20 25 30

Arg

<210> 11

<211> 17

<212> PRT

<213> *Streptococcus* sp. G148

sequence listing-14OCT15\_ST25.txt

<400> 11

Lys Gln Asn Thr Ala Ser Thr Glu Thr Thr Thr Thr Asn Glu Gln Pro  
1 5 10 15

Lys

<210> 12

<211> 17

<212> PRT

<213> Streptococcus equisimilis

<400> 12

Lys Gln Asn Thr Ala Asn Thr Glu Thr Thr Thr Thr Asn Glu Gln Pro  
1 5 10 15

Lys

<210> 13

<211> 98

<212> PRT

<213> Human papillomavirus type 16

<400> 13

Met His Gly Asp Thr Pro Thr Leu His Glu Tyr Met Leu Asp Leu Gln  
1 5 10 15

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

Glu Glu Glu Asp Glu Ile Asp Gly Pro Ala Gly Gln Ala Glu Pro Asp  
35 40 45

Arg Ala His Tyr Asn Ile Val Thr Phe Cys Cys Lys Cys Asp Ser Thr  
50 55 60

Leu Arg Leu Cys Val Gln Ser Thr His Val Asp Ile Arg Thr Leu Glu  
65 70 75 80

Asp Leu Leu Met Gly Thr Leu Gly Ile Val Cys Pro Ile Cys Ser Gln  
85 90 95

Lys Pro

<210> 14

<211> 105

<212> PRT

sequence listing-14OCT15\_ST25.txt

<213> Human papillomavirus type 16

<400> 14

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Met His Gly Pro Lys Ala Thr Leu Gln Asp Ile Val Leu His Leu Glu
1          5          10          15

Pro Gln Asn Glu Ile Pro Val Asp Leu Leu Cys His Glu Gln Leu Ser
          20          25          30

Asp Ser Glu Glu Glu Asn Asp Glu Ile Asp Gly Val Asn His Gln His
          35          40          45

Leu Pro Ala Arg Arg Ala Glu Pro Gln Arg His Thr Met Leu Cys Met
          50          55          60

Cys Cys Lys Cys Glu Ala Arg Ile Glu Leu Val Val Glu Ser Ser Ala
65          70          75          80

Asp Asp Leu Arg Ala Phe Gln Gln Leu Phe Leu Asn Thr Leu Ser Phe
          85          90          95

Val Cys Pro Trp Cys Ala Ser Gln Gln
          100          105

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<210> 15

<211> 158

<212> PRT

<213> Human papillomavirus type 16

<400> 15

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Met His Gln Lys Arg Thr Ala Met Phe Gln Asp Pro Gln Glu Arg Pro
1          5          10          15

Arg Lys Leu Pro Gln Leu Cys Thr Glu Leu Gln Thr Thr Ile His Asp
          20          25          30

Ile Ile Leu Glu Cys Val Tyr Cys Lys Gln Gln Leu Leu Arg Arg Glu
          35          40          45

Val Tyr Asp Phe Ala Phe Arg Asp Leu Cys Ile Val Tyr Arg Asp Gly
          50          55          60

Asn Pro Tyr Ala Val Cys Asp Lys Cys Leu Lys Phe Tyr Ser Lys Ile
65          70          75          80

Ser Glu Tyr Arg His Tyr Cys Tyr Ser Leu Tyr Gly Thr Thr Leu Glu
          85          90          95

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sequence listing-14OCT15\_ST25.txt

Gln Gln Tyr Asn Lys Pro Leu Cys Asp Leu Leu Ile Arg Cys Ile Asn  
100 105 110

Cys Gln Lys Pro Leu Cys Pro Glu Glu Lys Gln Arg His Leu Asp Lys  
115 120 125

Lys Gln Arg Phe His Asn Ile Arg Gly Arg Trp Thr Gly Arg Cys Met  
130 135 140

Ser Cys Cys Arg Ser Ser Arg Thr Arg Arg Glu Thr Gln Leu  
145 150 155

<210> 16  
<211> 158  
<212> PRT  
<213> Human papillomavirus type 16

<400> 16

Met Ala Arg Phe Glu Asp Pro Thr Arg Arg Pro Tyr Lys Leu Pro Asp  
1 5 10 15

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

Val Tyr Cys Lys Thr Val Leu Glu Leu Thr Glu Val Phe Glu Phe Ala  
35 40 45

Phe Lys Asp Leu Phe Val Val Tyr Arg Asp Ser Ile Pro His Ala Ala  
50 55 60

Cys His Lys Cys Ile Asp Phe Tyr Ser Arg Ile Arg Glu Leu Arg His  
65 70 75 80

Tyr Ser Asp Ser Val Tyr Gly Asp Thr Leu Glu Lys Leu Thr Asn Thr  
85 90 95

Gly Leu Tyr Asn Leu Leu Ile Arg Cys Leu Arg Cys Gln Lys Pro Leu  
100 105 110

Asn Pro Ala Glu Lys Leu Arg His Leu Asn Glu Lys Arg Arg Phe His  
115 120 125

Asn Ile Ala Gly His Tyr Arg Gly Gln Cys His Ser Cys Cys Asn Arg  
130 135 140

Ala Arg Gln Glu Arg Leu Gln Arg Arg Arg Glu Thr Gln Val  
145 150 155

sequence listing-14OCT15\_ST25.txt

|       |                                    |    |
|-------|------------------------------------|----|
| <210> | 17                                 |    |
| <211> | 22                                 |    |
| <212> | DNA                                |    |
| <213> | Artificial Sequence                |    |
| <220> |                                    |    |
| <223> | Primer                             |    |
| <400> | 17                                 |    |
|       | ggctcgagca tggagataca cc           | 22 |
| <210> | 18                                 |    |
| <211> | 28                                 |    |
| <212> | DNA                                |    |
| <213> | Artificial Sequence                |    |
| <220> |                                    |    |
| <223> | Primer                             |    |
| <400> | 18                                 |    |
|       | ggggactagt ttatggtttc tgagaaca     | 28 |
| <210> | 19                                 |    |
| <211> | 31                                 |    |
| <212> | DNA                                |    |
| <213> | Artificial Sequence                |    |
| <220> |                                    |    |
| <223> | Primer                             |    |
| <400> | 19                                 |    |
|       | gggggctagc cctcctttga ttagtatatt c | 31 |
| <210> | 20                                 |    |
| <211> | 28                                 |    |
| <212> | DNA                                |    |
| <213> | Artificial Sequence                |    |
| <220> |                                    |    |
| <223> | Primer                             |    |
| <400> | 20                                 |    |
|       | ctccctcgag atcataattt acttcac      | 28 |
| <210> | 21                                 |    |
| <211> | 27                                 |    |
| <212> | DNA                                |    |
| <213> | Artificial Sequence                |    |
| <220> |                                    |    |
| <223> | Primer                             |    |
| <400> | 21                                 |    |
|       | cccgtcgacc agctcttctt ggtgaag      | 27 |
| <210> | 22                                 |    |
| <211> | 25                                 |    |
| <212> | DNA                                |    |

<213> Artificial Sequence

<220>

<223> Primer

<400> 22

gcggatccca tggagataca cctac

25

<210> 23

<211> 22

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 23

gctctagatt atggtttctg ag

22

<210> 24

<211> 9

<212> PRT

<213> Human papillomavirus type 16

<400> 24

Arg Ala His Tyr Asn Ile Val Thr Phe  
1 5

<210> 25

<211> 9

<212> PRT

<213> Human immunodeficiency virus

<400> 25

Ala Met Gln Met Leu Lys Glu Thr Ile  
1 5

<210> 26

<211> 9

<212> PRT

<213> Listeria monocytogenes

<400> 26

Gly Tyr Lys Asp Gly Asn Glu Tyr Ile  
1 5

<210> 27

<211> 55

<212> PRT

<213> Artificial Sequence

<220>

<223> Primer

<400> 27

sequence listing-14OCT15\_ST25.txt

Gly Ala Cys Thr Ala Cys Ala Ala Gly Gly Ala Cys Gly Ala Thr Gly  
1 5 10 15

Ala Cys Cys Gly Ala Cys Ala Ala Gly Thr Gly Ala Thr Ala Ala Cys  
20 25 30

Cys Cys Gly Gly Gly Ala Thr Cys Thr Ala Ala Ala Thr Ala Ala Ala  
35 40 45

Thr Cys Cys Gly Thr Thr Thr  
50 55

<210> 28  
<211> 18  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> ADV451 forward primer

<400> 28  
cctagctaaa tttaatgt 18

<210> 29  
<211> 18  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> ADV452 forward primer

<400> 29  
cctagctaaa tttaatga 18

<210> 30  
<211> 21  
<212> DNA  
<213> Artificial Sequence

<220>  
<223> ADV453 reverse primer

<400> 30  
taattttccc caagtagcag g 21