SEQUENCE LISTING

<110> ALBERT EINSTEIN COLLEGE OF MEDICINE OF YESHIVA UNIVERSITY

<120> CELLULAR PLATFORM FOR RAPID AND COMPREHENSIVE T-CELL IMMUNOMONITORING

<130> 96700/2199

<140> PCT/US2015/12160
<141> 2015-01-21

<150> US 61/929,651
<151> 2014-01-21

<160> 10

<170> PatentIn version 3.5

<210> 1
<211> 2269
<212> DNA
<213> Homo sapiens

<220>
<221> misc_feature
<222> (61)..(61)
<223> "n" is an 8, 9, 10, 11 or 12 amino acid-encoding nucleotide sequence (n)x, with x being 24, 27, 30, 33, or 36 nucleotides, respectively

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aaagattcag gtttactcac gtcatccagc agagaatgga aagtcaaatt tcctgaattg 180

ctatgtgtct gggtttcatc catccgacat tgaagttgac ttactgaaga atggagagag 240

aattgaaaaa gtggagcatt cagacttgtc tttcagcaag gactggtctt tctatctctt 300

gtattatact gaattcaccc ccactgaaaa agatgagtat gcctgccgtg tgaaccacgt 360

gactttgtca cagcccaaga tagttaagtg ggatcgagac atgggaggcg gaggatctgg 420

tggtggaggt tctggtggtg ggggatctgg ctctcactcc atgaggtatt tcttcacatc 480

cgtgtcccgg cccggccgcg gggagccccg cttcatcgca gtgggctacg tggacgacac 540

gcagttcgtg cggttcgaca gcgacgccgc gagccagagg atggagccgc gggcgccgtg 600

gatagagcag gagggtccgg agtattggga cggggagaca cggaaagtga aggcccactc 660

acagactcac cgagtggacc tggggaccct gcgcggcgcc tacaaccaga gcgaggccgg 720

ttctcacacc gtccagagga tgtatggctg cgacgtgggg tcggactggc gcttcctccg 780

cgggtaccac cagtacgcct acgacggcaa ggattacatc gccctgaaag aggacctgcg 840

ctcttggacc gcggcggaca tggcagctca gaccaccaag cacaagtggg aggcggccca 900

tgtggcggag cagttgagag cctacctgga gggcacgtgc gtggagtggc tccgcagata 960

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tggacaggag cagagataca cctgccatgt gcagcatgag ggtttgccca agcccctcac 1260

cctgagatgg gagccgggtg gaggcggatc tggcggcgga ggatctggag gaggtggatc 1320

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ttctggagga ggcggttcga gcagccagcc gaccattccg attgtgggca ttattgcggg 2160

cctggtgctg tttggcgcgg tgattaccgg cgcggtggtg gcggcggtga tgtggcgtcg 2220

taaaagcagc gatcgtaaag attataaaga tgatgatgat aaataatag 2269

<210> 2
<211> 755
<212> PRT
<213> Homo sapiens

<220>
<221> MISC_FEATURE
<222> (21)..(21)
<223> "Xaa" is a 8, 9, 10, 11, or 12 amino acid peptide sequence.

<400> 2

Met Ser Arg Ser Val Ala Leu Ala Val Leu Ala Leu Leu Ser Leu Ser
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Gly Leu Glu Ala Xaa Asn Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser
            20                  25                  30

Gly Gly Gly Gly Ser Ile Gln Arg Thr Pro Lys Ile Gln Val Tyr Ser
        35                  40                  45

Arg His Pro Ala Glu Asn Gly Lys Ser Asn Phe Leu Asn Cys Tyr Val
    50                  55                  60

Ser Gly Phe His Pro Ser Asp Ile Glu Val Asp Leu Leu Lys Asn Gly
65                  70                  75                  80

Glu Arg Ile Glu Lys Val Glu His Ser Asp Leu Ser Phe Ser Lys Asp
                85                  90                  95

Trp Ser Phe Tyr Leu Leu Tyr Tyr Thr Glu Phe Thr Pro Thr Glu Lys
            100                 105                 110

Asp Glu Tyr Ala Cys Arg Val Asn His Val Thr Leu Ser Gln Pro Lys
        115                 120                 125

Ile Val Lys Trp Asp Arg Asp Met Gly Gly Gly Gly Ser Gly Gly Gly
    130                 135                 140

Gly Ser Gly Gly Gly Gly Ser Gly Ser His Ser Met Arg Tyr Phe Phe
145                 150                 155                 160

Thr Ser Val Ser Arg Pro Gly Arg Gly Glu Pro Arg Phe Ile Ala Val
                165                 170                 175

Gly Tyr Val Asp Asp Thr Gln Phe Val Arg Phe Asp Ser Asp Ala Ala
            180                 185                 190

Ser Gln Arg Met Glu Pro Arg Ala Pro Trp Ile Glu Gln Glu Gly Pro
        195                 200                 205

Glu Tyr Trp Asp Gly Glu Thr Arg Lys Val Lys Ala His Ser Gln Thr
    210                 215                 220

His Arg Val Asp Leu Gly Thr Leu Arg Gly Ala Tyr Asn Gln Ser Glu
225                 230                 235                 240

Ala Gly Ser His Thr Val Gln Arg Met Tyr Gly Cys Asp Val Gly Ser
                245                 250                 255

Asp Trp Arg Phe Leu Arg Gly Tyr His Gln Tyr Ala Tyr Asp Gly Lys
            260                 265                 270
```

```
Asp Tyr Ile Ala Leu Lys Glu Asp Leu Arg Ser Trp Thr Ala Ala Asp
        275                 280                 285

Met Ala Ala Gln Thr Thr Lys His Lys Trp Glu Ala Ala His Val Ala
    290                 295                 300

Glu Gln Leu Arg Ala Tyr Leu Glu Gly Thr Cys Val Glu Trp Leu Arg
305                 310                 315                 320

Arg Tyr Leu Glu Asn Gly Lys Glu Thr Leu Gln Arg Thr Asp Ala Pro
                325                 330                 335

Lys Thr His Met Thr His His Ala Val Ser Asp His Glu Ala Thr Leu
            340                 345                 350

Arg Cys Trp Ala Leu Ser Phe Tyr Pro Ala Glu Ile Thr Leu Thr Trp
        355                 360                 365

Gln Arg Asp Gly Glu Asp Gln Thr Gln Asp Thr Glu Leu Val Glu Thr
    370                 375                 380

Arg Pro Ala Gly Asp Gly Thr Phe Gln Lys Trp Ala Ala Val Val Val
385                 390                 395                 400

Pro Ser Gly Gln Glu Gln Arg Tyr Thr Cys His Val Gln His Glu Gly
                405                 410                 415

Leu Pro Lys Pro Leu Thr Leu Arg Trp Glu Pro Gly Gly Gly Gly Ser
            420                 425                 430

Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Gly
        435                 440                 445

Leu Asn Asp Ile Phe Glu Ala Gln Lys Ile Glu Trp His Glu Met Val
    450                 455                 460

Ser Lys Gly Glu Glu Asp Asn Met Ala Ile Ile Lys Glu Phe Met Arg
465                 470                 475                 480

Phe Lys Val His Met Glu Gly Ser Val Asn Gly His Glu Phe Glu Ile
                485                 490                 495

Glu Gly Glu Gly Glu Gly Arg Pro Tyr Glu Gly Thr Gln Thr Ala Lys
            500                 505                 510

Leu Lys Val Thr Lys Gly Gly Pro Leu Pro Phe Ala Trp Asp Ile Leu
```

```
515                 520                 525

Ser Pro Gln Phe Met Tyr Gly Ser Lys Ala Tyr Val Lys His Pro Ala
    530                 535                 540

Asp Ile Pro Asp Tyr Leu Lys Leu Ser Phe Pro Glu Gly Phe Lys Trp
545                 550                 555                 560

Glu Arg Val Met Asn Phe Glu Asp Gly Gly Val Val Thr Val Thr Gln
                565                 570                 575

Asp Ser Ser Leu Gln Asp Gly Glu Phe Ile Tyr Lys Val Lys Leu Arg
            580                 585                 590

Gly Thr Asn Phe Pro Ser Asp Gly Pro Val Met Gln Lys Lys Thr Met
        595                 600                 605

Gly Trp Glu Ala Ser Ser Glu Arg Met Tyr Pro Glu Asp Gly Ala Leu
    610                 615                 620

Lys Gly Glu Ile Lys Gln Arg Leu Lys Leu Lys Asp Gly Gly His Tyr
625                 630                 635                 640

Asp Ala Glu Val Lys Thr Thr Tyr Lys Ala Lys Lys Pro Val Gln Leu
                645                 650                 655

Pro Gly Ala Tyr Asn Val Asn Ile Lys Leu Asp Ile Thr Ser His Asn
            660                 665                 670

Glu Asp Tyr Thr Ile Val Glu Gln Tyr Glu Arg Ala Glu Gly Arg His
        675                 680                 685

Ser Thr Gly Gly Met Asp Glu Leu Tyr Lys Gly Gly Gly Gly Ser Gly
    690                 695                 700

Gly Gly Gly Ser Ser Ser Gln Pro Thr Ile Pro Ile Val Gly Ile Ile
705                 710                 715                 720

Ala Gly Leu Val Leu Phe Gly Ala Val Ile Thr Gly Ala Val Val Ala
                725                 730                 735

Ala Val Met Trp Arg Arg Lys Ser Ser Asp Arg Lys Asp Tyr Lys Asp
            740                 745                 750

Asp Asp Lys
        755
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<210> 3
<211> 20
<212> PRT
<213> Homo sapiens

<400> 3

Met Ser Arg Ser Val Ala Leu Ala Val Leu Ala Leu Leu Ser Leu Ser
1 5 10 15

Gly Leu Glu Ala
20

<210> 4
<211> 99
<212> PRT
<213> Homo sapiens

<400> 4

Ile Gln Arg Thr Pro Lys Ile Gln Val Tyr Ser Arg His Pro Ala Glu
1 5 10 15

Asn Gly Lys Ser Asn Phe Leu Asn Cys Tyr Val Ser Gly Phe His Pro
20 25 30

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

Val Glu His Ser Asp Leu Ser Phe Ser Lys Asp Trp Ser Phe Tyr Leu
50 55 60

Leu Tyr Tyr Thr Glu Phe Thr Pro Thr Glu Lys Asp Glu Tyr Ala Cys
65 70 75 80

Arg Val Asn His Val Thr Leu Ser Gln Pro Lys Ile Val Lys Trp Asp
85 90 95

Arg Asp Met

<210> 5
<211> 276
<212> PRT
<213> Homo sapiens

<400> 5

Gly Ser His Ser Met Arg Tyr Phe Phe Thr Ser Val Ser Arg Pro Gly
1 5 10 15

Arg Gly Glu Pro Arg Phe Ile Ala Val Gly Tyr Val Asp Asp Thr Gln
20 25 30

```
Phe Val Arg Phe Asp Ser Asp Ala Ala Ser Gln Arg Met Glu Pro Arg
        35                  40                  45

Ala Pro Trp Ile Glu Gln Glu Gly Pro Glu Tyr Trp Asp Gly Glu Thr
    50                  55                  60

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

Leu Arg Gly Ala Tyr Asn Gln Ser Glu Ala Gly Ser His Thr Val Gln
                85                  90                  95

Arg Met Tyr Gly Cys Asp Val Gly Ser Asp Trp Arg Phe Leu Arg Gly
            100                 105                 110

Tyr His Gln Tyr Ala Tyr Asp Gly Lys Asp Tyr Ile Ala Leu Lys Glu
        115                 120                 125

Asp Leu Arg Ser Trp Thr Ala Ala Asp Met Ala Ala Gln Thr Thr Lys
    130                 135                 140

His Lys Trp Glu Ala Ala His Val Ala Glu Gln Leu Arg Ala Tyr Leu
145                 150                 155                 160

Glu Gly Thr Cys Val Glu Trp Leu Arg Arg Tyr Leu Glu Asn Gly Lys
                165                 170                 175

Glu Thr Leu Gln Arg Thr Asp Ala Pro Lys Thr His Met Thr His His
            180                 185                 190

Ala Val Ser Asp His Glu Ala Thr Leu Arg Cys Trp Ala Leu Ser Phe
        195                 200                 205

Tyr Pro Ala Glu Ile Thr Leu Thr Trp Gln Arg Asp Gly Glu Asp Gln
    210                 215                 220

Thr Gln Asp Thr Glu Leu Val Glu Thr Arg Pro Ala Gly Asp Gly Thr
225                 230                 235                 240

Phe Gln Lys Trp Ala Ala Val Val Val Pro Ser Gly Gln Glu Gln Arg
                245                 250                 255

Tyr Thr Cys His Val Gln His Glu Gly Leu Pro Lys Pro Leu Thr Leu
            260                 265                 270

Arg Trp Glu Pro
```

275

<210> 6
<211> 227
<212> PRT
<213> Homo sapiens

<400> 6

Asp Lys Thr His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly
1 5 10 15

Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu Met
20 25 30

Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser His
35 40 45

Glu Asp Pro Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val Glu Val
50 55 60

His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr
65 70 75 80

Arg Val Val Ser Val Leu Thr Val Leu His Gln Asp Trp Leu Asn Gly
85 90 95

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

Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln Val
115 120 125

Tyr Thr Leu Pro Pro Ser Arg Glu Glu Met Thr Lys Asn Gln Val Ser
130 135 140

Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile Ala Val Glu
145 150 155 160

Trp Glu Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro
165 170 175

Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val
180 185 190

Asp Lys Ser Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met
195 200 205

His Glu Ala Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser

210 215 220

Pro Gly Lys
225

<210> 7
<211> 8
<212> PRT
<213> Cytomegalovirus

<400> 7

Asn Arg Val Arg Gln Gly Tyr Ser
1 5

<210> 8
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Artifically synthesized linker sequence

<400> 8

Gly Gly Gly Gly Ser
1 5

<210> 9
<211> 9
<212> PRT
<213> Cytomegalovirus

<400> 9

Asn Leu Val Pro Met Val Ala Thr Val
1 5

<210> 10
<211> 9
<212> PRT
<213> Influenza Virus

<400> 10

Gly Ile Leu Gly Phe Val Phe Thr Leu
1 5