Vector pGIPZ

```
901   caagcagggagctagaacgattcgcagttaatcctggcctgttagaaacatcagaaggct 960
      GTTCGTCCCTCGATCTTGCTAAGCGTCAATTAGGACCGGACAATCTTTGTAGTCTTCCGA

961   gtagacaaatactgggacagctacaaccatcccttcagacaggatcagaagaacttagat 1020
      CATCTGTTTATGACCCTGTCGATGTTGGTAGGGAAGTCTGTCCTAGTCTTCTTGAATCTA

1021  cattatataatacagtagcaaccctctattgtgtgcatcaaaggatagagataaaagaca 1080
      GTAATATATTATGTCATCGTTGGGAGATAACACACGTAGTTTCCTATCTCTATTTTCTGT

1081  ccaaggaagctttagacaagatagaggaagagcaaaacaaaagtaagaccaccgcacagc 1140
      GGTTCCTTCGAAATCTGTTCTATCTCCTTCTCGTTTTGTTTTCATTCTGGTGGCGTGTCG

1141  aagcggccggccgctgatcttcagacctggaggaggagatatgagggacaattggagaag 1200
      TTCGCCGGCCGGCGACTAGAAGTCTGGACCTCCTCCTCTATACTCCCTGTTAACCTCTTC

1201  tgaattatataaatataaagtagtaaaaattgaaccattaggagtagcacccaccaaggc 1260
      ACTTAATATATTTATATTTCATCATTTTTAACTTGGTAATCCTCATCGTGGGTGGTTCCG

                                                          RRE(HIV) reg(13
14,1518)>>>
                                                          |
1261  aaagagaagagtggtgcagagagaaaaaagagcagtgggaataggagctttgttccttgg 1320
      TTTCTCTTCTCACCACGTCTCTCTTTTTTCTCGTCACCCTTATCCTCGAAACAAGGAACC

1321  gttcttgggagcagcaggaagcactatgggcgcagcgtcaatgacgctgacggtacaggc 1380
      CAAGAACCCTCGTCGTCCTTCGTGATACCCGCGTCGCAGTTACTGCGACTGCCATGTCCG

1381  cagacaattattgtctggtatagtgcagcagcagaacaatttgctgagggctattgaggc 1440
      GTCTGTTAATAACAGACCATATCACGTCGTCGTCTTGTTAAACGACTCCCGATAACTCCG

1441  gcaacagcatctgttgcaactcacagtctggggcatcaagcagctccaggcaagaatcct 1500
      CGTTGTCGTAGACAACGTTGAGTGTCAGACCCCGTAGTTCGTCGAGGTCCGTTCTTAGGA

1501  ggctgtggaaagatacctaaaggatcaacagctcctggggatttggggttgctctggaaa 1560
      CCGACACCTTTCTATGGATTTCCTAGTTGTCGAGGACCCCTAAACCCCAACGAGACCTTT

1561  actcatttgcaccactgctgtgccttggaatgctagttggagtaataaatctctggaaca 1620
      TGAGTAAACGTGGTGACGACACGGAACCTTACGATCAACCTCATTATTTAGAGACCTTGT

1621  gatttggaatcacacgacctggatggagtgggacagagaaattaacaattacacaagctt 1680
      CTAAACCTTAGTGTGCTGGACCTACCTCACCCTGTCTCTTTAATTGTTAATGTGTTCGAA

1681  aatacactccttaattgaagaatcgcaaaaccagcaagaaaagaatgaacaagaattatt 1740
      TTATGTGAGGAATTAACTTCTTAGCGTTTTGGTCGTTCTTTTCTTACTTGTTCTTAATAA

1741  ggaattagataaatgggcaagtttgtggaattggtttaacataacaaattggctgtggta 1800
      CCTTAATCTATTTACCCGTTCAAACACCTTAACCAAATTGTATTGTTTAACCGACACCAT

1801  tataaaattattcataatgatagtaggaggcttggtaggtttaagaatagtttttgctgt 1860
      ATATTTTAATAAGTATTACTATCATCCTCCGAACCATCCAAATTCTTATCAAAAACGACA

1861  actttctatagtgaatagagttaggcagggatattcaccattatcgtttcagacccacct 1920
      TGAAAGATATCACTTATCTCAATCCGTCCCTATAAGTGGTAATAGCAAAGTCTGGGTGGA

1921  cccaaccccgaggggacccgacaggcccgaaggaatagaagaagaaggtggagagagaga 1980
      GGGTTGGGGCTCCCCTGGGCTGTCCGGGCTTCCTTATCTTCTTCTTCCACCTCTCTCTCT

1981  cagagacagatccattcgattagtgaacggatcggcactgcgtgcgccaattctgcagac 2040
      GTCTCTGTCTAGGTAAGCTAATCACTTGCCTAGCCGTGACGCACGCGGTTAAGACGTCTG
```

```
                            CTS reg(2064,2214)>>>
                            |
2041  aaatggcagtattcatccacaattttaaaagaaaaggggggattgggggtacagtgcag 2100
      TTTACCGTCATAAGTAGGTGTTAAAATTTTCTTTTCCCCCCTAACCCCCCATGTCACGTC

2101  gggaaagaatagtagacataatagcaacagacatacaaactaaagaattacaaaaacaaa 2160
      CCCTTTCTTATCATCTGTATTATCGTTGTCTGTATGTTTGATTTCTTAATGTTTTTGTTT

2161  ttacaaaaattcaaaattttcgggtttattacagggacagcagagatccagtttggttag 2220
      AATGTTTTTAAGTTTTAAAAGCCCAAATAATGTCCCTGTCGTCTCTAGGTCAAACCAATC

                             ZeoR marker(2245,2619)<<<
                             |
2221  taccgggcccgctctagtccggaatcagtcctgctcctcggccacgaagtgcacgcagtt 2280
      ATGGCCCGGGCGAGATCAGGCCTTAGTCAGGACGAGGAGCCGGTGCTTCACGTGCGTCAA

2281  gccggccgggtcgcgcagggcgaactcccgcccccacggctgctcgccgatctcggtcat 2340
      CGGCCGGCCCAGCGCGTCCCGCTTGAGGGCGGGGGTGCCGACGAGCGGCTAGAGCCAGTA

2341  ggccggcccggaggcgtcccggaagttcgtggacacgacctccgaccactcggcgtacag 2400
      CCGGCCGGGCCTCCGCAGGGCCTTCAAGCACCTGTGCTGGAGGCTGGTGAGCCGCATGTC

2401  ctcgtccaggccgcgcacccacacccaggccagggtgttgtccggcaccacctggtcctg 2460
      GAGCAGGTCCGGCGCGTGGGTGTGGGTCCGGTCCCACAACAGGCCGTGGTGGACCAGGAC

2461  gaccgcgctgatgaacagggtcacgtcgtcccggaccacaccggcgaagtcgtcctccac 2520
      CTGGCGCGACTACTTGTCCCAGTGCAGCAGGGCCTGGTGTGGCCGCTTCAGCAGGAGGTG

2521  gaagtcccgggagaacccgagccggtcggtccagaactcgaccgctccggcgacgtcgcg 2580
      CTTCAGGGCCCTCTTGGGCTCGGCCAGCCAGGTCTTGAGCTGGCGAGGCCGCTGCAGCGC

                                              SfiI
                                              |
                                            EM7 prom(2620,2683)<<<
                                            | |
2581  cgcggtgagcaccggaacggcactggtcaacttggccatggtggccctcctatagtgagt 2640
      GCGCCACTCGTGGCCTTGCCGTGACCAGTTGAACCGGTACCACCGGGAGGATATCACTCA

2641  cgtattatactatgccgatatactatgccgatgattaattgtcaacacgtgctgcaggtc 2700
      GCATAATATGATACGGCTATATGATACGGCTACTAATTAACAGTTGTGCACGACGTCCAG

                                  CMV(Enhancer) reg(2731,3262)>>>
                                  |
             XbaI                 CMV prom(2731,3366)>>>
             |                    |
2701  cgaggttctagacgtattaccgccatgcattagttattaatagtaatcaattacggggtc 2760
      GCTCCAAGATCTGCATAATGGCGGTACGTAATCAATAATTATCATTAGTTAATGCCCCAG

2761  attagttcatagcccatatatggagttccgcgttacataacttacggtaaatggcccgcc 2820
      TAATCAAGTATCGGGTATATACCTCAAGGCGCAATGTATTGAATGCCATTTACCGGGCGG

2821  tggctgaccgcccaacgacccccgcccattgacgtcaataatgacgtatgttcccatagt 2880
      ACCGACTGGCGGGTTGCTGGGGGCGGGTAACTGCAGTTATTACTGCATACAAGGGTATCA

2881  aacgccaatagggactttccattgacgtcaatgggtggagtatttacggtaaactgccca 2940
      TTGCGGTTATCCCTGAAAGGTAACTGCAGTTACCCACCTCATAAATGCCATTTGACGGGT

2941  cttggcagtacatcaagtgtatcatatgccaagtacgccccctattgacgtcaatgacgg 3000
      GAACCGTCATGTAGTTCACATAGTATACGGTTCATGCGGGGGATAACTGCAGTTACTGCC

3001  taaatggcccgcctggcattatgcccagtacatgaccttatgggactttcctacttggca 3060
```

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      ATTTACCGGGCGGACCGTAATACGGGTCATGTACTGGAATACCCTGAAAGGATGAACCGT

3061  gtacatctacgtattagtcatcgctattaccatggtgatgcggttttggcagtacatcaa 3120
      CATGTAGATGCATAATCAGTAGCGATAATGGTACCACTACGCCAAAACCGTCATGTAGTT

3121  tgggcgtggatagcggtttgactcacggggatttccaagtctccaccccattgacgtcaa 3180
      ACCCGCACCTATCGCCAAACTGAGTGCCCCTAAAGGTTCAGAGGTGGGGTAACTGCAGTT

3181  tgggagtttgttttggcaccaaaatcaacgggactttccaaaatgtcgtaacaactccgc 3240
      ACCCTCAAACAAAACCGTGGTTTTAGTTGCCCTGAAAGGTTTTACAGCATTGTTGAGGCG

                           CMV-minimal(-50to+8) reg(3263,3320)>>>
                           |
3241  cccattgacgcaaatgggcggtaggcgtgtacggtgggaggtctatataagcagagctcg 3300
      GGGTAACTGCGTTTACCCGCCATCCGCACATGCCACCCTCCAGATATATTCGTCTCGAGC

3301  tttagtgaaccgtcagatcgcctggagacgccatccacgctgttttgacctccatagaag 3360
      AAATCACTTGGCAGTCTAGCGGACCTCTGCGGTAGGTGCGACAAAACTGGAGGTATCTTC

                                   turboGFP tag(3390,4088)>>>
                                   |
3361  acaccgactctactagaggatctgccaccatggagagcgacgagagcggcctgcccgcca 3420
      TGTGGCTGAGATGATCTCCTAGACGGTGGTACCTCTCGCTGCTCTCGCCGGACGGGCGGT

3421  tggagatcgagtgccgcatcaccggcaccctgaacggcgtggagttcgagctggtgggcg 3480
      ACCTCTAGCTCACGGCGTAGTGGCCGTGGGACTTGCCGCACCTCAAGCTCGACCACCCGC

3481  gcggagagggcacccccgagcagggccgcatgaccaacaagatgaagagcaccaaaggcg 3540
      CGCCTCTCCCGTGGGGGCTCGTCCCGGCGTACTGGTTGTTCTACTTCTCGTGGTTTCCGC

3541  ccctgaccttcagcccctacctgctgagccacgtgatgggctacggcttctaccacttcg 3600
      GGGACTGGAAGTCGGGGATGGACGACTCGGTGCACTACCCGATGCCGAAGATGGTGAAGC

3601  gcacctaccccagcggctacgagaacccctttcctgcacgccatcaacaacggcggctaca 3660
      CGTGGATGGGGTCGCCGATGCTCTTGGGGAAGGACGTGCGGTAGTTGTTGCCGCCGATGT

3661  ccaacacccgcatcgagaagtacgaggacggcggcgtgctgcacgtgagcttcagctacc 3720
      GGTTGTGGGCGTAGCTCTTCATGCTCCTGCCGCCGCACGACGTGCACTCGAAGTCGATGG

3721  gctacgaggccggccgcgtgatcggcgacttcaaggtgatgggcaccggcttccccgagg 3780
      CGATGCTCCGGCCGGCGCACTAGCCGCTGAAGTTCCACTACCCGTGGCCGAAGGGGCTCC

3781  acagcgtgatcttcaccgacaagatcatccgcagcaacgccaccgtggagcacctgcacc 3840
      TGTCGCACTAGAAGTGGCTGTTCTAGTAGGCGTCGTTGCGGTGGCACCTCGTGGACGTGG

3841  ccatgggcgataacgatctggatggcagcttcacccgcaccttcagcctgcgcgacggcg 3900
      GGTACCCGCTATTGCTAGACCTACCGTCGAAGTGGGCGTGGAAGTCGGACGCGCTGCCGC

3901  gctactacagctccgtggtggacagccacatgcacttcaagagcgccatccaccccagca 3960
      CGATGATGTCGAGGCACCACCTGTCGGTGTACGTGAAGTTCTCGCGGTAGGTGGGGTCGT

3961  tcctgcagaacgggggccccatgttcgccttccgccgcgtggaggaggatcacagcaaca 4020
      AGGACGTCTTGCCCCCGGGGTACAAGCGGAAGGCGGCGCACCTCCTCCTAGTGTCGTTGT

4021  ccgagctgggcatcgtggagtaccagcacgccttcaagaccccggatgcagatgccggtg 4080
      GGCTCGACCCGTAGCACCTCATGGTCGTGCGGAAGTTCTGGGGCCTACGTCTACGGCCAC

                         NotI         IRES reg(4114,4689)>>>
                         |            |
4081  aagaataatgtacaagtagcggccgcaaattccgcccctctccctcccccccccctaacg 4140
      TTCTTATTACATGTTCATCGCCGGCGTTTAAGGCGGGGAGAGGGAGGGGGGGGGATTGC
```

```
4141  ttactggccgaagccgcttggaataaggccggtgtgcgtttgtctatatgttattttcca 4200
      AATGACCGGCTTCGGCGAACCTTATTCCGGCCACACGCAAACAGATATACAATAAAAGGT

4201  ccatattgccgtcttttggcaatgtgagggcccggaaacctggccctgtcttcttgacga 4260
      GGTATAACGGCAGAAAACCGTTACACTCCCGGGCCTTTGGACCGGGACAGAAGAACTGCT

4261  gcattcctaggggtctttcccctctcgccaaaggaatgcaaggtctgttgaatgtcgtga 4320
      CGTAAGGATCCCCAGAAAGGGGAGAGCGGTTTCCTTACGTTCCAGACAACTTACAGCACT

4321  aggaagcagttcctctggaagcttcttgaagacaaacaacgtctgtagcgacccttttgca 4380
      TCCTTCGTCAAGGAGACCTTCGAAGAACTTCTGTTTGTTGCAGACATCGCTGGGAAACGT

4381  ggcagcggaacccccacctggcgacaggtgcctctgcggccaaaagccacgtgtataag 4440
      CCGTCGCCTTGGGGGGTGGACCGCTGTCCACGGAGACGCCGGTTTTCGGTGCACATATTC

4441  atacacctgcaaaggcggcacaaccccagtgccacgttgtgagttggatagttgtggaaa 4500
      TATGTGGACGTTTCCGCCGTGTTGGGGTCACGGTGCAACACTCAACCTATCAACACCTTT

4501  gagtcaaatggctctcctcaagcgtattcaacaaggggctgaaggatgcccagaaggtac 4560
      CTCAGTTTACCGAGAGGAGTTCGCATAAGTTGTTCCCCGACTTCCTACGGGTCTTCCATG

4561  cccattgtatgggatctgatctggggcctcggtgcacatgctttacatgtgtttagtcga 4620
      GGGTAACATACCCTAGACTAGACCCCGGAGCCACGTGTACGAAATGTACACAAATCAGCT

4621  ggttaaaaaaacgtctaggccccccgaaccacggggacgtggttttcctttgaaaaacac 4680
      CCAATTTTTTTGCAGATCCGGGGGGCTTGGTGCCCCTGCACCAAAAGGAAACTTTTTGTG

                PuroR marker(4690,5292)>>>
                |
4681  gataataccatggccaccgagtacaagcccacggtgcgcctcgccacccgcgacgacgtc 4740
      CTATTATGGTACCGGTGGCTCATGTTCGGGTGCCACGCGGAGCGGTGGGCGCTGCTGCAG

4741  ccccgggccgtacgcaccctcgccgccgcgttcgccgactaccccgccacgcgccacacc 4800
      GGGGCCCGGCATGCGTGGGAGCGGCGGCGCAAGCGGCTGATGGGGCGGTGCGCGGTGTGG

4801  gtcgacccggaccgccacatcgagcgggtcaccgagctgcaagaactcttcctcacgcgc 4860
      CAGCTGGGCCTGGCGGTGTAGCTCGCCCAGTGGCTCGACGTTCTTGAGAAGGAGTGCGCG

4861  gtcgggctcgacatcggcaaggtgtgggtcgcggacgacggcgccgcggtggcggtctgg 4920
      CAGCCCGAGCTGTAGCCGTTCCACACCCAGCGCCTGCTGCCGCGGCGCCACCGCCAGACC

4921  accacgccggagagcgtcgaagcgggggcggtgttcgccgagatcggctcgcgcatggcc 4980
      TGGTGCGGCCTCTCGCAGCTTCGCCCCCGCCACAAGCGGCTCTAGCCGAGCGCGTACCGG

4981  gagttgagcggttcccggctggccgcgcagcaacagatggaaggcctcctggcgccgcac 5040
      CTCAACTCGCCAAGGGCCGACCGGCGCGTCGTTGTCTACCTTCCGGAGGACCGCGGCGTG

5041  cggcccaaggagcccgcgtggttcctggccaccgtcggcgtctcgcccgaccaccagggc 5100
      GCCGGGTTCCTCGGGCGCACCAAGGACCGGTGGCAGCCGCAGAGCGGGCTGGTGGTCCCG

5101  aagggtctgggcagcgccgtcgtgctccccggagtggaggcggccgagcgcgctggggtg 5160
      TTCCCAGACCCGTCGCGGCAGCACGAGGGGCCTCACCTCCGCCGGCTCGCGCGACCCCAC

5161  cccgccttcctggagacctccgcgccccgcaacctccccttctacgagcggctcggcttc 5220
      GGGCGGAAGGACCTCTGGAGGCGCGGGGCGTTGGAGGGGAAGATGCTCGCCGAGCCGAAG

5221  accgtcaccgccgacgtcgaggtgcccgaaggaccgcgcacctggtgcatgacccgcaag 5280
      TGGCAGTGGCGGCTGCAGCTCCACGGGCTTCCTGGCGCGTGGACCACGTACTGGGCGTTC

                      5'mir30(vector_portion) reg(5296,5390)>>>
```

```
                    |
5281  cccggtgcctgagtttgtttgaatgaggcttcagtactttacagaatcgttgcctgcaca 5340
      GGGCCACGGACTCAAACAAACTTACTCCGAAGTCATGAAATGTCTTAGCAACGGACGTGT

                                                          XhoI
                                                          |
                                              HpaI        5'mir30(inserted_w
ith_hairpin) reg(5391,5423)>>>
                                              |           ||
5341  tcttggaaacacttgctgggattacttcttcaggttaacccaacagaaggctcgagaaagg 5400
      AGAACCTTTGTGAACGACCCTAATGAAGAAGTCCAATTGGGTTGTCTTCCGAGCTCTTCC

                              shRNA-stem other(5424,5445)>>>
                              |
5401  tatattgctgttgacagtgagcgcagcagcagcagcagcagcagcatgtgaagccacaga 5460
      ATATAACGACAACTGTCACTCGCGTCGTCGTCGTCGTCGTCGTACACTTCGGTGTCT

                                 3'mir30(inserted_with_hairpin) reg(5487,55
06)>>>
                                 |
          shRNA-
stem other(5465,5486)<<<             3'mir30(vector_portion) reg(5507,5614)
>>>
          |                      |                   |
5461  tgtagctgctgctgctgctgctgtgcctactgcctcggaattcaaggggctacttta 5520
      ACATCGACGACGACGACGACGACACGGATGACGGAGCCTTAAGTTCCCCGATGAAAT

5521  ggagcaattatcttgtttactaaaactgaataccttgctatctctttgatacatttttac 5580
      CCTCGTTAATAGAACAAATGATTTTGACTTATGGAACGATAGAGAAACTATGTAAAAATG

                                                    5'Common-Barcode-
Flank other(5626,5646)>>>
                                                    |
5581  aaagctgaattaaaatggtataaattaaatcacttttttcaattggaagactaatgcggc 5640
      TTTCGACTTAATTTTACCATATTTAATTTAGTGAAAAAAGTTAACCTTCTGATTACGCCG

5641  cggccattactccgtctcgtgtcttgttgcatatgtctgctggtttgtttgatgttgttt 5700
      GCCGGTAATGAGGCAGAGCACAGAACAACGTATACAGACGACCAAACAAACTACAACAAA

                T7 prom(5710,5729)<<<                  WPRE(HIV) reg(5749,6
337)>>>
                |                        |             |
             3'Common-Barcode-Flank other(5707,5729)>>>
             |  |                        |             |
5701  gcgggcgggccctatagtgagtcgtattacctaggacgcgtctggaacaatcaacctctg 5760
      CGCCCGCCCGGGATATCACTCAGCATAATGGATCCTGCGCAGACCTTGTTAGTTGGAGAC

5761  gattacaaaatttgtgaaagattgactggtattcttaactatgttgctccttttacgcta 5820
      CTAATGTTTTAAACACTTTCTAACTGACCATAAGAATTGATACAACGAGGAAAATGCGAT

5821  tgtggatacgctgctttaatgcctttgtatcatgctattgcttcccgtatggctttcatt 5880
      ACACCTATGCGACGAAATTACGGAAACATAGTACGATAACGAAGGGCATACCGAAAGTAA

5881  ttctcctccttgtataaatcctggttgctgtctctttatgaggagttgtggcccgttgtc 5940
      AAGAGGAGGAACATATTTAGGACCAACGACAGAGAAATACTCCTCAACACCGGGCAACAG

5941  aggcaacgtggcgtggtgtgcactgtgtttgctgacgcaacccccactggttggggcatt 6000
      TCCGTTGCACCGCACCACACGTGACACAAACGACTGCGTTGGGGGTGACCAACCCCGTAA

6001  gccaccacctgtcagctcctttccgggactttcgctttccccctccctattgccacggcg 6060
      CGGTGGTGGACAGTCGAGGAAAGGCCCTGAAAGCGAAAGGGGGAGGGATAACGGTGCCGC
```

```
6061  gaactcatcgccgcctgccttgcccgctgctggacaggggctcggctgttgggcactgac 6120
      CTTGAGTAGCGGCGGACGGAACGGGCGACGACCTGTCCCCGAGCCGACAACCCGTGACTG

6121  aattccgtggtgttgtcggggaagctgacgtcctttccatggctgctcgcctgtgttgcc 6180
      TTAAGGCACCACAACAGCCCCTTCGACTGCAGGAAAGGTACCGACGAGCGGACACAACGG

6181  acctggattctgcgcgggacgtccttctgctacgtcccttcggccctcaatccagcggac 6240
      TGGACCTAAGACGCGCCCTGCAGGAAGACGATGCAGGGAAGCCGGGAGTTAGGTCGCCTG

6241  cttccttcccgcggcctgctgccggctctgcggcctcttccgcgtcttcgccttcgccct 6300
      GAAGGAAGGGCGCCGGACGACGGCCGAGACGCCGGAGAAGGCGCAGAAGCGGAAGCGGGA

6301  cagacgagtcggatctccctttgggccgcctccccgcctggaattaattctgcagtcgag 6360
      GTCTGCTCAGCCTAGAGGGAAACCCGGCGGAGGGGCGGACCTTAATTAAGACGTCAGCTC

6361  acctagaaaaacatggagcaatcacaagtagcaatacagcagctaccaatgctgattgtg 6420
      TGGATCTTTTTGTACCTCGTTAGTGTTCATCGTTATGTCGTCGATGGTTACGACTAACAC

6421  cctggctagaagcacaagaggaggaggaggtgggttttccagtcacacctcaggtacctt 6480
      GGACCGATCTTCGTGTTCTCCTCCTCCTCCACCCAAAAGGTCAGTGTGGAGTCCATGGAA

6481  taagaccaatgacttacaaggcagctgtagatcttagccacttttttaaaagaaaagaggg 6540
      ATTCTGGTTACTGAATGTTCCGTCGACATCTAGAATCGGTGAAAAATTTTCTTTTCTCCC

         3'SIN-LTR(Lenti) other(6544,6779)>>>
         |
         delta_U3 reg(6544,6596)>>>                              R(HIV-
LTR) reg(6599,6693)>>>
         |                                                       |
6541  gactggaagggctaattcactcccaacgaagacaagatctgcttttgcttgtactgggt 6600
      CTGACCTTCCCGATTAAGTGAGGGTTGCTTCTGTTCTAGACGAAAAACGAACATGACCCA

6601  ctctctggttagaccagatctgagcctgggagctctctggctaactagggaacccactgc 6660
      GAGAGACCAATCTGGTCTAGACTCGGACCCTCGAGAGACCGATTGATCCCTTGGGTGACG

                                       U5(HIV-LTR) reg(6694,6778)>>>
                                       |
6661  ttaagcctcaataaagcttgccttgagtgcttcaagtagtgtgtgcccgtctgttgtgtg 6720
      AATTCGGAGTTATTTCGAACGGAACTCACGAAGTTCATCACACACGGGCAGACAACACAC

6721  actctggtaactagagatccctcagacccttttagtcagtgtggaaaatctctagcagta 6780
      TGAGACCATTGATCTCTAGGGAGTCTGGGAAAATCAGTCACACCTTTTAGAGATCGTCAT

6781  gtagttcatgtcatcttattattcagtatttataacttgcaaagaaatgaatatcagaga 6840
      CATCAAGTACAGTAGAATAATAAGTCATAAATATTGAACGTTTCTTTACTTATAGTCTCT

                                  BGH-polyA reg(6868,7091)>>>
                                  |
6841  gtgagaggccttgacattgtttaaacccgctgatcagcctcgactgtgccttctagttgc 6900
      CACTCTCCGGAACTGTAACAAATTTGGGCGACTAGTCGGAGCTGACACGGAAGATCAACG

6901  cagccatctgttgtttgcccctcccccgtgccttccttgaccctggaaggtgccactccc 6960
      GTCGGTAGACAACAAACGGGGAGGGGGCACGGAAGGAACTGGGACCTTCCACGGTGAGGG

6961  actgtcctttcctaataaaatgaggaaattgcatcgcattgtctgagtaggtgtcattct 7020
      TGACAGGAAAGGATTATTTTACTCCTTTAACGTAGCGTAACAGACTCATCCACAGTAAGA

7021  attctgggggtggggtggggcaggacagcaagggggaggattgggaagacaatagcagg 7080
      TAAGACCCCCCACCCCACCCCGTCCTGTCGTTCCCCCTCCTAACCCTTCTGTTATCGTCC
```

```
7081  catgctggggatgcggtgggctctatggcttctgaggcggaaagaaccagctggggctct 7140
      GTACGACCCCTACGCCACCCGAGATACCGAAGACTCCGCCTTTCTTGGTCGACCCCGAGA

                                    f1 origin(7171,7477)>>>
                                    |
7141  aggggggtatccccacgcgccctgtagcggcgcattaagcgcggcgggtgtggtggttacg 7200
      TCCCCCATAGGGGTGCGCGGGACATCGCCGCGTAATTCGCGCCGCCCACACCACCAATGC

7201  cgcagcgtgaccgctacacttgccagcgccctagcgcccgctcctttcgctttcttccct 7260
      GCGTCGCACTGGCGATGTGAACGGTCGCGGGATCGCGGGCGAGGAAAGCGAAAGAAGGGA

7261  tcctttctcgccacgttcgccggctttccccgtcaagctctaaatcgggggctcccttta 7320
      AGGAAAGAGCGGTGCAAGCGGCCGAAAGGGGCAGTTCGAGATTTAGCCCCCGAGGGAAAT

7321  gggttccgatttagtgctttacggcacctcgaccccaaaaaacttgattagggtgatggt 7380
      CCCAAGGCTAAATCACGAAATGCCGTGGAGCTGGGGTTTTTTGAACTAATCCCACTACCA

7381  tcacgtagtgggccatcgccctgatagacggtttttcgccctttgacgttggagtccacg 7440
      AGTGCATCACCCGGTAGCGGGACTATCTGCCAAAAAGCGGGAAACTGCAACCTCAGGTGC

7441  ttctttaatagtggactcttgttccaaactggaacaacactcaaccctatctcggtctat 7500
      AAGAAATTATCACCTGAGAACAAGGTTTGACCTTGTTGTGAGTTGGGATAGAGCCAGATA

7501  tcttttgatttataagggattttgccgatttcggcctattggttaaaaaatgagctgatt 7560
      AGAAAACTAAATATTCCCTAAAACGGCTAAAGCCGGATAACCAATTTTTTACTCGACTAA

                                                      SV40-
Enhancer(DTS) other(7609,7680)>>>
                                                      |
                                                      SV40 prom(7609,7930)
>>>
                                                      |
7561  taacaaaaatttaacgcgaattaattctgtggaatgtgtgtcagttagggtgtggaaagt 7620
      ATTGTTTTTAAATTGCGCTTAATTAAGACACCTTACACACAGTCAATCCCACACCTTTCA

7621  ccccaggctccccagcaggcagaagtatgcaaagcatgcatctcaattagtcagcaacca 7680
      GGGGTCCGAGGGGTCGTCCGTCTTCATACGTTTCGTACGTAGAGTTAATCAGTCGTTGGT

      SV40-Enhancer(DTS) other(7681,7752)>>>
      |
7681  ggtgtggaaagtccccaggctccccagcaggcagaagtatgcaaagcatgcatctcaatt 7740
      CCACACCTTTCAGGGGTCCGAGGGGTCGTCCGTCTTCATACGTTTCGTACGTAGAGTTAA

                                        SV40 origin(7776,7853)>>>
                                        |
7741  agtcagcaaccatagtcccgcccctaactccgcccatcccgcccctaactccgcccagtt 7800
      TCAGTCGTTGGTATCAGGGCGGGGATTGAGGCGGGTAGGGCGGGGATTGAGGCGGGTCAA

7801  ccgcccattctccgccccatggctgactaatttttttatttatgcagaggccgaggccg 7860
      GGCGGGTAAGAGGCGGGGTACCGACTGATTAAAAAAAATAAATACGTCTCCGGCTCCGGC

7861  cctctgcctctgagctattccagaagtagtgaggaggctttttggaggcctaggctttt 7920
      GGAGACGGAGACTCGATAAGGTCTTCATCACTCCTCCGAAAAAACCTCCGGATCCGAAAA

                                                                  HygroR mar
ker(7979,8996)>>>
                                                                  |
7921  gcaaaaagctcccgggagcttgtatatccattttcggatctgatcagcacgtgatgaaaa 7980
      CGTTTTTCGAGGGCCCTCGAACATATAGGTAAAAGCCTAGACTAGTCGTGCACTACTTTT

7981  agcctgaactcaccgcgacgtctgtcgagaagtttctgatcgaaaagttcgacagcgtct 8040
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      TCGGACTTGAGTGGCGCTGCAGACAGCTCTTCAAAGACTAGCTTTTCAAGCTGTCGCAGA

8041  ccgacctgatgcagctctcggagggcgaagaatctcgtgctttcagcttcgatgtaggag 8100
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8101  ggcgtggatatgtcctgcgggtaaatagctgcgccgatggtttctacaaagatcgttatg 8160
      CCGCACCTATACAGGACGCCCATTTATCGACGCGGCTACCAAAGATGTTTCTAGCAATAC

8161  tttatcggcactttgcatcggccgcgctcccgattccggaagtgcttgacattggggaat 8220
      AAATAGCCGTGAAACGTAGCCGGCGCGAGGGCTAAGGCCTTCACGAACTGTAACCCCTTA

8221  tcagcgagagcctgacctattgcatctcccgccgtgcacagggtgtcacgttgcaagacc 8280
      AGTCGCTCTCGGACTGGATAACGTAGAGGGCGGCACGTGTCCCACAGTGCAACGTTCTGG

8281  tgcctgaaaccgaactgcccgctgttctgcagccggtcgcggaggccatggatgcgatcg 8340
      ACGGACTTTGGCTTGACGGGCGACAAGACGTCGGCCAGCGCCTCCGGTACCTACGCTAGC

8341  ctgcggccgatcttagccagacgagcgggttcggcccattcggaccgcaaggaatcggtc 8400
      GACGCCGGCTAGAATCGGTCTGCTCGCCCAAGCCGGGTAAGCCTGGCGTTCCTTAGCCAG

8401  aatacactacatggcgtgatttcatatgcgcgattgctgatccccatgtgtatcactggc 8460
      TTATGTGATGTACCGCACTAAAGTATACGCGCTAACGACTAGGGGTACACATAGTGACCG

8461  aaactgtgatggacgacaccgtcagtgcgtccgtcgcgcaggctctcgatgagctgatgc 8520
      TTTGACACTACCTGCTGTGGCAGTCACGCAGGCAGCGCGTCCGAGAGCTACTCGACTACG

8521  tttgggccgaggactgccccgaagtccggcacctcgtgcacgcggatttcggctccaaca 8580
      AAACCCGGCTCCTGACGGGGCTTCAGGCCGTGGAGCACGTGCGCCTAAAGCCGAGGTTGT

8581  atgtcctgacggacaatggccgcataacagcggtcattgactggagcgaggcgatgttcg 8640
      TACAGGACTGCCTGTTACCGGCGTATTGTCGCCAGTAACTGACCTCGCTCCGCTACAAGC

8641  gggattcccaatacgaggtcgccaacatcttcttctggaggccgtggttggcttgtatgg 8700
      CCCTAAGGGTTATGCTCCAGCGGTTGTAGAAGAAGACCTCCGGCACCAACCGAACATACC

8701  agcagcagacgcgctacttcgagcggaggcatccggagcttgcaggatcgccgcggctcc 8760
      TCGTCGTCTGCGCGATGAAGCTCGCCTCCGTAGGCCTCGAACGTCCTAGCGGCGCCGAGG

8761  gggcgtatatgctccgcattggtcttgaccaactctatcagagcttggttgacggcaatt 8820
      CCCGCATATACGAGGCGTAACCAGAACTGGTTGAGATAGTCTCGAACCAACTGCCGTTAA

8821  tcgatgatgcagcttgggcgcagggtcgatgcgacgcaatcgtccgatccggagccggga 8880
      AGCTACTACGTCGAACCCGCGTCCCAGCTACGCTGCGTTAGCAGGCTAGGCCTCGGCCCT

8881  ctgtcgggcgtacacaaatcgcccgcagaagcgcggccgtctggaccgatggctgtgtag 8940
      GACAGCCCGCATGTGTTTAGCGGGCGTCTTCGCGCCGGCAGACCTGGCTACCGACACATC

8941  aagtactcgccgatagtggaaaccgacgccccagcactcgtccgagggcaaaggaatagc 9000
      TTCATGAGCGGCTATCACCTTTGGCTGCGGGGTCGTGAGCAGGCTCCCGTTTCCTTATCG

9001  acgtgctacgagatttcgattccaccgccgccttctatgaaaggttgggcttcggaatcg 9060
      TGCACGATGCTCTAAAGCTAAGGTGGCGGCGGAAGATACTTTCCAACCCGAAGCCTTAGC

9061  ttttccgggacgccggctggatgatcctccagcgcggggatctcatgctggagttcttcg 9120
      AAAAGGCCCTGCGGCCGACCTACTAGGAGGTCGCGCCCCTAGAGTACGACCTCAAGAAGC

                                                SV40-polyA-
signal reg(9160,9194)>>>
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9121  cccaccccaacttgtttattgcagcttataatggttacaaataaagcaatagcatcacaa 9180
      GGGTGGGGTTGAACAAATAACGTCGAATATTACCAATGTTTATTTCGTTATCGTAGTGTT
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9181  atttcacaaataaagcatttttttcactgcattctagttgtggtttgtccaaactcatca 9240
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9241  atgtatcttatcatgtctgtataccgtcgacctctagctagagcttggcgtaatcatggt 9300
      TACATAGAATAGTACAGACATATGGCAGCTGGAGATCGATCTCGAACCGCATTAGTACCA

         lac prom(9304,9419)<<<
         |
9301  catagctgtttcctgtgtgaaattgttatccgctcacaattccacacaacatacgagccg 9360
      GTATCGACAAAGGACACACTTTAACAATAGGCGAGTGTTAAGGTGTGTTGTATGCTCGGC

9361  gaagcataaagtgtaaagcctggggtgcctaatgagtgagctaactcacattaattgcgt 9420
      CTTCGTATTTCACATTTCGGACCCCACGGATTACTCACTCGATTGAGTGTAATTAACGCA

9421  tgcgctcactgcccgctttccagtcgggaaacctgtcgtgccagctgcattaatgaatcg 9480
      ACGCGAGTGACGGGCGAAAGGTCAGCCCTTTGGACAGCACGGTCGACGTAATTACTTAGC

9481  gccaacgcgcggggagaggcggtttgcgtattgggcgctcttccgcttcctcgctcactg 9540
      CGGTTGCGCGCCCCTCTCCGCCAAACGCATAACCCGCGAGAAGGCGAAGGAGCGAGTGAC

9541  actcgctgcgctcggtcgttcggctgcggcgagcggtatcagctcactcaaaggcggtaa 9600
      TGAGCGACGCGAGCCAGCAAGCCGACGCCGCTCGCCATAGTCGAGTGAGTTTCCGCCATT

9601  tacggttatccacagaatcaggggataacgcaggaaagaacatgtgagcaaaaggccagc 9660
      ATGCCAATAGGTGTCTTAGTCCCCTATTGCGTCCTTTCTTGTACACTCGTTTTCCGGTCG

                              pUC origin(9686,10305)<<<
                              |
9661  aaaaggccaggaaccgtaaaaaggccgcgttgctggcgtttttccataggctccgccccc 9720
      TTTTCCGGTCCTTGGCATTTTTCCGGCGCAACGACCGCAAAAAGGTATCCGAGGCGGGGG

9721  ctgacgagcatcacaaaaatcgacgctcaagtcagaggtggcgaaacccgacaggactat 9780
      GACTGCTCGTAGTGTTTTTAGCTGCGAGTTCAGTCTCCACCGCTTTGGGCTGTCCTGATA

9781  aaagataccaggcgtttccccctggaagctccctcgtgcgctctcctgttccgaccctgc 9840
      TTTCTATGGTCCGCAAAGGGGGACCTTCGAGGGAGCACGCGAGAGGACAAGGCTGGGACG

9841  cgcttaccggatacctgtccgcctttctcccttcgggaagcgtggcgctttctcatagct 9900
      GCGAATGGCCTATGGACAGGCGGAAAGAGGGAAGCCCTTCGCACCGCGAAAGAGTATCGA

9901  cacgctgtaggtatctcagttcggtgtaggtcgttcgctccaagctgggctgtgtgcacg 9960
      GTGCGACATCCATAGAGTCAAGCCACATCCAGCAAGCGAGGTTCGACCCGACACACGTGC

9961  aacccccgttcagcccgaccgctgcgccttatccggtaactatcgtcttgagtccaacc 10020
      TTGGGGGGCAAGTCGGGCTGGCGACGCGGAATAGGCCATTGATAGCAGAACTCAGGTTGG

10021 cggtaagacacgacttatcgccactggcagcagccactggtaacaggattagcagagcga 10080
      GCCATTCTGTGCTGAATAGCGGTGACCGTCGTCGGTGACCATTGTCCTAATCGTCTCGCT

10081 ggtatgtaggcggtgctacagagttcttgaagtggtggcctaactacggctacactagaa 10140
      CCATACATCCGCCACGATGTCTCAAGAACTTCACCACCGGATTGATGCCGATGTGATCTT

10141 gaacagtatttggtatctgcgctctgctgaagccagttaccttcggaaaaagagttggta 10200
      CTTGTCATAAACCATAGACGCGAGACGACTTCGGTCAATGGAAGCCTTTTTCTCAACCAT

10201 gctcttgatccggcaaacaaaccaccgctggtagcggtggttttttgtttgcaagcagc 10260
      CGAGAACTAGGCCGTTTGTTTGGTGGCGACCATCGCCACCAAAAAAACAAACGTTCGTCG

10261 agattacgcgcagaaaaaaaggatctcaagaagatcctttgatcttttctacggggtctg 10320
      TCTAATGCGCGTCTTTTTTTCCTAGAGTTCTTCTAGGAAACTAGAAAAGATGCCCCAGAC
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10321 acgctcagtggaacgaaaactcacgttaagggattttggtcatgagattatcaaaaagga 10380
      TGCGAGTCACCTTGCTTTTGAGTGCAATTCCCTAAAACCAGTACTCTAATAGTTTTTCCT

10381 tcttcacctagatccttttaaattaaaaatgaagttttaaatcaatctaaagtatatatg 10440
      AGAAGTGGATCTAGGAAAATTTAATTTTTACTTCAAAATTTAGTTAGATTTCATATATAC

                          AmpR marker(10460,11320)<<<
                          |
10441 agtaaacttggtctgacagttaccaatgcttaatcagtgaggcacctatctcagcgatct 10500
      TCATTTGAACCAGACTGTCAATGGTTACGAATTAGTCACTCCGTGGATAGAGTCGCTAGA

10501 gtctatttcgttcatccatagttgcctgactccccgtcgtgtagataactacgatacggg 10560
      CAGATAAAGCAAGTAGGTATCAACGGACTGAGGGGCAGCACATCTATTGATGCTATGCCC

10561 agggcttaccatctggccccagtgctgcaatgataccgcgagacccacgctcaccggctc 10620
      TCCCGAATGGTAGACCGGGGTCACGACGTTACTATGGCGCTCTGGGTGCGAGTGGCCGAG

10621 cagatttatcagcaataaaccagccagccggaagggccgagcgcagaagtggtcctgcaa 10680
      GTCTAAATAGTCGTTATTTGGTCGGTCGGCCTTCCCGGCTCGCGTCTTCACCAGGACGTT

10681 ctttatccgcctccatccagtctattaattgttgccgggaagctagagtaagtagttcgc 10740
      GAAATAGGCGGAGGTAGGTCAGATAATTAACAACGGCCCTTCGATCTCATTCATCAAGCG

10741 cagttaatagtttgcgcaacgttgttgccattgctacaggcatcgtggtgtcacgctcgt 10800
      GTCAATTATCAAACGCGTTGCAACAACGGTAACGATGTCCGTAGCACCACAGTGCGAGCA

10801 cgtttggtatggcttcattcagctccggttcccaacgatcaaggcgagttacatgatccc 10860
      GCAAACCATACCGAAGTAAGTCGAGGCCAAGGGTTGCTAGTTCCGCTCAATGTACTAGGG

10861 ccatgttgtgcaaaaaagcggttagctccttcggtcctccgatcgttgtcagaagtaagt 10920
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10921 tggccgcagtgttatcactcatggttatggcagcactgcataattctcttactgtcatgc 10980
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10981 catccgtaagatgcttttctgtgactggtgagtactcaaccaagtcattctgagaatagt 11040
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11041 gtatgcggcgaccgagttgctcttgcccggcgtcaatacgggataataccgcgccacata 11100
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11101 gcagaactttaaaagtgctcatcattggaaaacgttcttcggggcgaaaactctcaagga 11160
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11161 tcttaccgctgttgagatccagttcgatgtaacccactcgtgcacccaactgatcttcag 11220
      AGAATGGCGACAACTCTAGGTCAAGCTACATTGGGTGAGCACGTGGGTTGACTAGAAGTC

11221 catcttttactttcaccagcgtttctgggtgagcaaaaacaggaaggcaaaatgccgcaa 11280
      GTAGAAAATGAAAGTGGTCGCAAAGACCCACTCGTTTTTGTCCTTCCGTTTTACGGCGTT

11281 aaaagggaataagggcgacacggaaatgttgaatactcatactcttccttttcaatatt 11340
      TTTTCCCTTATTCCCGCTGTGCCTTTACAACTTATGAGTATGAGAAGGAAAAAGTTATAA

                            Bact prom(11362,11400)<<<
                            |
11341 attgaagcatttatcagggttattgtctcatgagcggatacatatttgaatgtatttaga 11400
      TAACTTCGTAAATAGTCCCAATAACAGAGTACTCGCCTATGTATAAACTTACATAAATCT

11401 aaaataaacaaatagggttccgcgcacatttccccgaaaagtgccacctgacgtcgacg 11460
      TTTTATTTGTTTATCCCCAAGGCGCGTGTAAAGGGGCTTTTCACGGTGGACTGCAGCTGC
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signal reg(11504,11538)>>>
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11461 gatcgggagatcaacttgtttattgcagcttataatggttacaaataaagcaatagcatc 11520
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11521 acaaatttcacaaataaagcatttttttcactgcattctagttgtggtttgtccaaactc 11580
      TGTTTAAAGTGTTTATTTCGTAAAAAAAGTGACGTAAGATCAACACCAAACAGGTTTGAG

11581 atcaatgtatcttatcatgtctggatcaactggataactcaagctaaccaaaatcatccc 11640
      TAGTTACATAGAATAGTACAGACCTAGTTGACCTATTGAGTTCGATTGGTTTTAGTAGGG

11641 aaacttcccaccccataccctattaccactgccaattacctgtggtttcatttactctaa 11700
      TTTGAAGGGTGGGGTATGGGATAATGGTGACGGTTAATGGACACCAAAGTAAATGAGATT

11701 acctgtgattcctctgaattattttcattttaaagaaattgtatttgttaaatatgtact 11760
      TGGACACTAAGGAGACTTAATAAAAGTAAAATTTCTTTAACATAAACAATTTATACATGA

11761 acaaacttagtagt 11774
      TGTTTGAATCATCA
```