Sequence Listing

<110> Immunotech Biopharm Co.,Ltd.

<120> Improved lentiviral vector

<130> P2018TC581

<150> 201810986752.8
<151> 2018-08-28

<160> 18

<170> PatentIn version 3.5

<210> 1
<211> 5320
<212> DNA
<213> Artificial Sequence

<220>
<223> pPVLV1 vector containing CAR-19 coding sequence

<400> 1
gggtctctct ggttagacca gatctgagcc tgggagctct ctggctaact agggaaccca 60

ctgcttaagc ctcaataaag cttgccttga gtgcttcaag tagtgtgtgc ccgtctgttg 120

tgtgactctg gtaactagag atccctcaga ccctttttagt cagtgtggaa aatctctagc 180

agtggcgccc gaacagggac ttgaaagcga aagggaaacc agaggagctc tctcgacgca 240

ggactcggct tgctgaagcg cgcacggcaa gaggcgaggg gcggcgactg gtgagtacgc 300

caaaaatttt gactagcgga ggctagaagg agagagatgg gtgcgagagc gtcagtatta 360

agcgggggag aattagatcg cgatgggaaa aaattcggtt aaggccaggg ggaaagaaaa 420

aatataaatt aaaacatata gtatgggcaa gcagggagct agaacgattc gcagttaatc 480

ctggcctgtt agaaacatca gaaggctgta gacaaatact gggacagcta caaccatccc 540

ttcagacagg atcagaagaa cttagatcat tatataatac agtagcaacc ctctattgtg 600

tgcatcaaag gatagagata aaagacacca aggaagcttt agacaagata gaggaagagc 660

aaaacaaaag taagaccacc gcacagcaag cggccggccg ctgatcttca gacctggagg 720

aggagatatg agggacaatt ggagaagtga attatataaa tataaagtag taaaaattga 780

accattagga gtagcaccca ccaaggcaaa gagaagagtg gtgcagagag aaaaaagagc 840

agtgggaata ggagctttgt tccttgggtt cttgggagca gcaggaagca ctatgggcgc 900

agcgtcaatg acgctgacgg tacaggccag acaattattg tctggtatag tgcagcagca 960

gaacaatttg ctgagggcta ttgaggcgca acagcatctg ttgcaactca cagtctgggg 1020

catcaagcag ctccaggcaa gaatcctggc tgtggaaaga tacctaaagg atcaacagct 1080

cctggggatt tggggttgct ctggaaaact catttgcacc actgctgtgc cttggaatgc 1140

tagttggagt aataaatctc tggaacagat ttggaatcac acgacctgga tggagtggga 1200

cagagaaatt aacaattaca caagcttaat acactcctta attgaagaat cgcaaaacca 1260

gcaagaaaag aatgaacaag aattattgga attagataaa tgggcaagtt tgtggaattg 1320

gtttaacata acaaattggc tgtggtatat aaaattattc ataatgatag taggaggctt 1380

ggtaggttta agaatagttt ttgctgtact ttctatagtg aatagagtta ggcagggata 1440

ttcaccatta tcgtttcaga cccacctccc aaccccgagg ggacccgaca ggcccgaagg 1500

aatagaagaa gaaggtggag agagagacag agacagatcc attcgattag tgaacggatc 1560

ggcactgcgt gcgccaattc tgcagacaaa tggcagtatt catccacaat tttaaaagaa 1620

aaggggggat tgggggtac agtgcagggg aaagaatagt agacataata gcaacagaca 1680

tacaaactaa agaattacaa aaacaaatta caaaaattca aaattttcgg gtttattaca 1740

gggacagcag agatccagtt tggttagtac cgggcccgac gtcgcatgct cccggccgcc 1800

atggcggccg cgggaattcg attagatccg gtgcccgtca gtgggcagag cgcacatcgc 1860

ccacagtccc cgagaagttg gggggagggg tcggcaattg aaccggtgcc tagagaaggt 1920

ggcgcggggt aaactgggaa agtgatgtcg tgtactggct ccgccttttt cccgagggtg 1980

ggggagaacc gtatataagt gcagtagtcg ccgtgaacgt tctttttcgc aacgggtttg 2040

ccgccagaac acagctgaag cttcgagggg ctcgcatctc tccttcacgc gcccgccgcc 2100

ctacctgagg ccgccatcca cgccggttga gtcgcgttct gccgcctccc gcctgtggtg 2160

cctcctgaac tgcgtccgcc gtctaggtaa gtttaaagct caggtcgaga ccgggccttt 2220

gtccggcgct cccttggagc ctacctagac tcagccggct ctccacgctt tgcctgaccc 2280

tgcttgctca actctacgtc tttgtttcgt tttctgttct gcgccgttac agatccaagc 2340

tgtgaccggc gcctacgtaa gtgatatcta ctagatttat caaaaagagt gttgacttgt 2400

gagcgctcac aattgatact tagattcatc gagagggaca cgtcgactac taaccttctt 2460

ctctttccta cagctgagat cgccggtggg atcccctagg gttaacatgg ccttaccagt 2520

gaccgccttg ctcctgccgc tggccttgct gctccacgcc gccaggccgg acatccagat 2580

gacacagact acatcctccc tgtctgcctc tctgggagac agagtcacca tcagttgcag 2640

ggcaagtcag gacattagta aatatttaaa ttggtatcag cagaaaccag atggaactgt 2700

taaactcctg atctaccata catcaagatt acactcagga gtcccatcaa ggttcagtgg 2760

cagtgggtct ggaacagatt attctctcac cattagcaac ctggagcaag aagatattgc 2820

cacttacttt tgccaacagg gtaatacgct tccgtacacg ttcggagggg ggaccaagct 2880

ggagatcaca ggtggcggtg gctcgggcgg tggtgggtcg ggtggcggcg gatctgaggt 2940

gaaactgcag gagtcaggac ctggcctggt ggcgccctca cagagcctgt ccgtcacatg 3000

cactgtctca ggggtctcat tacccgacta tggtgtaagc tggattcgcc agcctccacg 3060

aaagggtctg gagtggctgg gagtaatatg gggtagtgaa accacatact ataattcagc 3120

tctcaaatcc agactgacca tcatcaagga caactccaag agccaagttt tcttaaaaat 3180

gaacagtctg caaactgatg acacagccat ttactactgt gccaaacatt attactacgg 3240

tggtagctat gctatggact actggggcca aggaacctca gtcaccgtct cctcaaccac 3300

gacgccagcg ccgcgaccac caacaccggc gcccaccatc gcgtcgcagc ccctgtccct 3360

gcgcccagag gcgtgccggc cagcggcggg gggcgcagtg cacacgaggg ggctggactt 3420

cgcctgtgat atctacatct gggcgccctt ggccgggact tgtggggtcc ttctcctgtc 3480

actggttatc acccctttact gcaaacgggg cagaaagaaa ctcctgtata tattcaaaca 3540

accatttatg agaccagtac aaactactca agaggaagat ggctgtagct gccgatttcc 3600

agaagaagaa gaaggaggat gtgaactgag agtgaagttc agcaggagcg cagacgcccc 3660

cgcgtacaag cagggccaga accagctcta taacgagctc aatctaggac gaagagagga 3720

gtacgatgtt ttggacaaga gacgtggccg ggaccctgag atgggggggaa agccgagaag 3780

gaagaaccct caggaaggcc tgtacaatga actgcagaaa gataagatgg cggaggccta 3840

cagtgagatt gggatgaaag gcgagcgccg gaggggcaag gggcacgatg gcctttacca 3900

gggtctcagt acagccacca aggacaccta cgacgccctt cacatgcagg ccctgccccc 3960

tcgctaaaca tgtttaaggg ttccggttcc actaggtaca attcgatatc aagcttatcg 4020

ataatcaacc tctggattac aaaatttgtg aaagattgac tggtattctt aactatgttg 4080

ctccttttac gctatgtgga tacgctgctt taatgccttt gtatcatgct attgcttccc 4140

gtatggcttt cattttctcc tccttgtata aatcctggtt gctgtctctt tatgaggagt 4200

tgtggcccgt tgtcaggcaa cgtggcgtgg tgtgcactgt gtttgctgac gcaaccccca 4260

ctggttgggg cattgccacc acctgtcagc tcctttccgg gactttcgct ttccccctcc 4320

ctattgccac ggcggaactc atcgccgcct gccttgcccg ctgctggaca ggggctcggc 4380

tgttgggcac tgacaattcc gtggtgttgt cggggaaatc atcgtccttt ccttggctgc 4440

tcgcctgtgt tgccacctgg attctgcgcg ggacgtcctt ctgctacgtc ccttcggccc 4500

tcaatccagc ggaccttcct tcccgcggcc tgctgccggc tctgcggcct cttccgcgtc 4560

ttcgccttcg ccctcagacg agtcggatct ccctttgggc cgcctccccg catcgatacc 4620

gtcgacctcg atcgagacct agaaaaacat ggagcaatca caagtagcaa tacagcagct 4680

accaatgctg attgtgcctg gctagaagca caagaggagg aggaggtggg ttttccagtc 4740

acacctcagg tacctttaag accaatgact tacaaggcag ctgtagatct tagccacttt 4800

ttaaaagaaa aggggggact ggaagggcta attcactccc aacgaagaca agatatcctt 4860

gatctgtgga tctaccacac acaaggctac ttccctgatt ggcagaacta cacaccaggg 4920

ccagggatca gatatccact gacctttgga tggtgctaca agctagtacc agttgagcaa 4980

gagaaggtag aagaagccaa tgaaggagag aacacccgct tgttacaccc tgtgagcctg 5040

catgggatgg atgacccgga gagagaagta ttagagtgga ggtttgacag ccgcctagca 5100

tttcatcaca tggcccgaga gctgcatccg gactgtactg ggtctctctg gttagaccag 5160

atctgagcct gggagctctc tggctaacta gggaacccac tgcttaagcc tcaataaagc 5220

ttgccttgag tgcttcaagt agtgtgtgcc cgtctgttgt gtgactctgg taactagaga 5280

tccctcagac ccttttagtc agtgtggaaa atctctagca 5320

<210> 2
<211> 4417
<212> DNA
<213> Artificial Sequence

<220>
<223> pPVLV2 vector containing CAR-19 coding sequence

<400> 2
gggtctctct ggttagacca gatctgagcc tgggagctct ctggctaact agggaaccca 60

ctgcttaagc ctcaataaag cttgccttga gtgcttcaag tagtgtgtgc ccgtctgttg 120

tgtgactctg gtaactagag atccctcaga ccctttttagt cagtgtggaa aatctctagc 180

agtggcgccc gaacagggac ttgaaagcga aagggaaacc agaggagctc tctcgacgca 240

ggactcggct tgctgaagcg cgcacggcaa gaggcgaggg gcggcgactg gtgagtacgc 300

caaaaatttt gactagcgga ggctagaagg agagagatgg gtgcgagagc gtcagtatta 360

agcgggggag aattagatcg cgatgggaaa aaattcggtt aaggccaggg ggaaagaaaa 420

aatataaatt aaaacatata gtatgggcaa gcagggagct agaacgattc gcagttaatc 480

ctggcctgtt agaaacatca gaaggctgta gacaaatact gggacagcta caaccatccc 540

ttcagacagg atcagaagaa cttagatcat tatataatac agtagcaacc ctctattgtg 600

tgcatcaaag gatagagata aaagacacca aggaagcttt agacaagata gaggaagagc 660

aaaacaaaag taagaccacc gcacagcaag cggccgctga tcttcagacc tggaggagga 720

gatatgaggg acaattggag aagtgaatta tataaatata aagtagtaaa aattgaacca 780

ttaggagtag cacccaccaa ggcaaagaga agagtggtgc agagagaaaa aagagcagtg 840

ggaataggag ctttgttcct tgggttcttg ggagcagcag gaagcactat gggcgcagcg 900

tcaatgacgc tgacggtaca ggccagacaa ttattgtctg gtatagtgca gcagcagaac 960

aatttgctga gggctattga ggcgcaacag catctgttgc aactcacagt ctggggcatc 1020

aagcagctcc aggcaagaat cctggctgtg gaaagatacc taaaggatca acagctcctg 1080

gggatttggg gttgctctgg aaaactcatt tgcaccactg ctgtgccttg gaatgctagt 1140

tggagtaata aatctctgga acagatttgg aatcacacga cctggatgga gtgggacaga 1200

gaaattaaca attacacaag cttaatacac tccttaattg aagaatcgca aaaccagcaa 1260

gaaaagaatg aacaagaatt attggaatta gataaatggg caagtttgtg gaattggttt 1320

aacataacaa attggctgtg gtatataaaa ttattcataa tgatagtagg aggcttggta 1380

ggtttaagaa tagtttttgc tgtactttct atagtgaata gagttaggca gggatattca 1440

ccattatcgt ttcagaccca cctcccaacc ccgaggggac ccgacaggcc cgaaggaata 1500

gaagaagaag gtggagagag agacagagac agatccattc gattagtgaa cggatcggca 1560

ctgcgtgcgc caattctgca gacaaatggc agtattcatc cacaatttta aaagaaaagg 1620

ggggattggg gggtacagtg caggggaaag aatagtagac ataatagcaa cagacataca 1680

aactaaagaa ttacaaaaac aaattacaaa aattcaaaat tttcgggttt attacaggga 1740

cagcagagat ccagtttggt taaattcgct agctaggtct tgaaaggagt gggaattggc 1800

tccggtgccc gtcagtgggc agagcgcaca tcgcccacag tccccgagaa gttgggggga 1860

ggggtcggca attgatccgg tgcctagaga aggtggcgcg gggtaaactg ggaaagtgat 1920

gtcgtgtact ggctccgcct ttttcccgag ggtgggggag aaccgtatat aagtgcagta 1980

gtcgccgtga acgttctttt tcgcaacggg tttgccgcca gaacacagga ccggttctag 2040

aatggcctta ccagtgaccg ccttgctcct gccgctggcc ttgctgctcc acgccgccag 2100

gccggacatc cagatgacac agactacatc ctccctgtct gcctctctgg gagacagagt 2160

caccatcagt tgcagggcaa gtcaggacat tagtaaatat ttaaattggt atcagcagaa 2220

accagatgga actgttaaac tcctgatcta ccatacatca agattacact caggagtccc 2280

atcaaggttc agtggcagtg ggtctggaac agattattct ctcaccatta gcaacctgga 2340

gcaagaagat attgccactt acttttgcca acagggtaat acgcttccgt acacgttcgg 2400

agggggggacc aagctggaga tcacaggtgg cggtggctcg ggcggtggtg ggtcgggtgg 2460

cggcggatct gaggtgaaac tgcaggagtc aggacctggc ctggtggcgc cctcacagag 2520

cctgtccgtc acatgcactg tctcaggggt ctcattaccc gactatggtg taagctggat 2580

tcgccagcct ccacgaaagg gtctggagtg gctgggagta atatggggta gtgaaaccac 2640

atactataat tcagctctca aatccagact gaccatcatc aaggacaact ccaagagcca 2700

agttttctta aaaatgaaca gtctgcaaac tgatgacaca gccatttact actgtgccaa 2760

acattattac tacggtggta gctatgctat ggactactgg ggccaaggaa cctcagtcac 2820

cgtctcctca accacgacgc cagcgccgcg accaccaaca ccggcgccca ccatcgcgtc 2880

gcagcccctg tccctgcgcc cagaggcgtg ccggccagcg gcgggggcg cagtgcacac 2940

gagggggctg gacttcgcct gtgatatcta catctgggcg cccttggccg ggacttgtgg 3000

ggtccttctc ctgtcactgg ttatcaccct ttactgcaaa cggggcagaa agaaactcct 3060

gtatatattc aaacaaccat ttatgagacc agtacaaact actcaagagg aagatggctg 3120

tagctgccga tttccagaag aagaagaagg aggatgtgaa ctgagagtga agttcagcag 3180

gagcgcagac gcccccgcgt accagcaggg ccagaaccag ctctataacg agctcaatct 3240

aggacgaaga gaggagtacg atgttttgga caagagacgt ggccgggacc ctgagatggg 3300

gggaaagccg agaaggaaga accctcagga aggcctgtac aatgaactgc agaaagataa 3360

gatggcggag gcctacagtg agattgggat gaaaggcgag cgccggaggg gcaaggggca 3420

cgatggcctt taccagggtc tcagtacagc caccaaggac acctacgacg cccttcacat 3480

gcaggccctg ccccctcgct gaggatccac gcgttaagtc gacaatcaac ctctggatta 3540

caaaatttgt gaaagattga ctggtattct taactatgtt gctcctttta cgctatgtgg 3600

atacgctgct ttaatgcctt tgtatcatgc tattgcttcc cgtatggctt tcattttctc 3660

ctccttgtat aaatcctggt tgctgtctct ttatgaggag ttgtggcccg ttgtcaggca 3720

acgtggcgtg gtgtgcactg tgtttgctga cgcaaccccc actggttggg gcattgccac 3780

cacctgtcag ctcctttccg ggactttcgc tttccccctc cctattgcca cggcggaact 3840

catcgccgcc tgccttgccc gctgctggac aggggctcgg ctgttgggca ctgacaattc 3900

cgtggtgttg tcggggaaat catcgtcctt tccttggctg ctcgcctgtg ttgccacctg 3960

gattctgcgc gggacgtcct tctgctacgt cccttcggcc ctcaatccag cggaccttcc 4020

ttcccgcggc ctgctgccgg ctctgcggcc tcttccgcgt cttcgccttc gccctcagac 4080

gagtcggatc tccctttggg ccgcctcccc gcgtcgactt taagaccaat gacttacaag 4140

gcagctgtag atcttagcca ctttttaaaa gaaaaggggg gactggaagg gctaattcac 4200

tcccaacgaa gacaagatct gcttttgct tgtactgggt ctctctggtt agaccagatc 4260

tgagcctggg agctctctgg ctaactaggg aacccactgc ttaagcctca ataaagcttg 4320

ccttgagtgc ttcaagtagt gtgtgcccgt ctgttgtgtg actctggtaa ctagagatcc 4380

ctcagaccct tttagtcagt gtggaaaatc tctagca 4417

<210> 3
<211> 675
<212> DNA
<213> Artificial Sequence

<220>
<223> 5'HIV R-U5-¦¤gag

<400> 3
gggtctctct ggttagacca gatctgagcc tgggagctct ctggctaact agggaaccca 60

ctgcttaagc ctcaataaag cttgccttga gtgcttcaag tagtgtgtgc ccgtctgttg 120

tgtgactctg gtaactagag atccctcaga ccctttttagt cagtgtggaa aatctctagc 180

agtggcgccc gaacagggac ttgaaagcga aagggaaacc agaggagctc tctcgacgca 240

ggactcggct tgctgaagcg cgcacggcaa gaggcgaggg gcggcgactg gtgagtacgc 300

caaaaatttt gactagcgga ggctagaagg agagagatgg gtgcgagagc gtcagtatta 360

agcgggggag aattagatcg cgatgggaaa aaattcggtt aaggccaggg ggaaagaaaa 420

aatataaatt aaaacatata gtatgggcaa gcagggagct agaacgattc gcagttaatc 480

ctggcctgtt agaaacatca gaaggctgta gacaaatact gggacagcta caaccatccc 540

ttcagacagg atcagaagaa cttagatcat tatataatac agtagcaacc ctctattgtg 600

tgcatcaaag gatagagata aaagacacca aggaagcttt agacaagata gaggaagagc 660

aaaacaaaag taaga 675

<210> 4
<211> 858
<212> DNA
<213> Artificial Sequence

<220>
<223> HIV-psi (¦×)

<400> 4
gatcttcaga cctggaggag gagatatgag ggacaattgg agaagtgaat tatataaata 60

taaagtagta aaaattgaac cattaggagt agcacccacc aaggcaaaga gaagagtggt 120

gcagagagaa aaaagagcag tgggaatagg agctttgttc cttgggttct tgggagcagc 180

aggaagcact atgggcgcag cgtcaatgac gctgacggta caggccagac aattattgtc 240

tggtatagtg cagcagcaga acaatttgct gagggctatt gaggcgcaac agcatctgtt 300

gcaactcaca gtctggggca tcaagcagct ccaggcaaga atcctggctg tggaaagata 360

cctaaaggat caacagctcc tggggatttg gggttgctct ggaaaactca tttgcaccac 420

tgctgtgcct tggaatgcta gttggagtaa taaatctctg gaacagattt ggaatcacac 480

gacctggatg gagtgggaca gagaaattaa caattacaca agcttaatac actccttaat 540

tgaagaatcg caaaaccagc aagaaaagaa tgaacaagaa ttattggaat tagataaatg 600

ggcaagtttg tggaattggt ttaacataac aaattggctg tggtatataa aattattcat 660

aatgatagta ggaggcttgg taggtttaag aatagttttt gctgtacttt ctatagtgaa 720

tagagttagg cagggatatt caccattatc gtttcagacc cacctcccaa ccccgagggg 780

acccgacagg cccgaaggaa tagaagaaga aggtggagag agagacagag acagatccat 840

tcgattagtg aacggatc 858

<210> 5
<211> 234
<212> DNA
<213> Artificial Sequence

<220>
<223> RRE

<400> 5
aggagctttg ttccttgggt tcttgggagc agcaggaagc actatgggcg cagcgtcaat 60

gacgctgacg gtacaggcca gacaattatt gtctggtata gtgcagcagc agaacaattt 120

gctgagggct attgaggcgc aacagcatct gttgcaactc acagtctggg gcatcaagca 180

gctccaggca agaatcctgg ctgtggaaag atacctaaag gatcaacagc tcct 234

<210> 6
<211> 118
<212> DNA
<213> Artificial Sequence

<220>
<223> cPPT/CTS

<400> 6
ttttaaaaga aaaggggga ttgggggta cagtgcaggg gaaagaatag tagacataat 60

agcaacagac atacaaacta aagaattaca aaaacaaatt acaaaaattc aaaatttt 118

<210> 7
<211> 531
<212> DNA
<213> Artificial Sequence

<220>
<223> EF1¦Á promoter long

<400> 7
tccggtgccc gtcagtgggc agagcgcaca tcgcccacag tccccgagaa gttgggggga 60

ggggtcggca attgaaccgg tgcctagaga aggtggcgcg gggtaaactg ggaaagtgat 120

gtcgtgtact ggctccgcct ttttcccgag ggtgggggag aaccgtatat aagtgcagta 180

gtcgccgtga acgttctttt tcgcaacggg tttgccgcca gaacacagct gaagcttcga 240

ggggctcgca tctctccttc acgcgcccgc cgccctacct gaggccgcca tccacgccgg 300

ttgagtcgcg ttctgccgcc tcccgcctgt ggtgcctcct gaactgcgtc cgccgtctag 360

gtaagtttaa agctcaggtc gagaccgggc ctttgtccgg cgctcccttg gagcctacct 420

agactcagcc ggctctccac gctttgcctg accctgcttg ctcaactcta cgtctttgtt 480

tcgttttctg ttctgcgccg ttacagatcc aagctgtgac cggcgcctac g 531

<210> 8
<211> 1458
<212> DNA
<213> Artificial Sequence

<220>
<223> CAR-19 coding sequence

<400> 8
atggccttac cagtgaccgc cttgctcctg ccgctggcct tgctgctcca cgccgccagg 60

ccggacatcc agatgacaca gactacatcc tccctgtctg cctctctggg agacagagtc 120

accatcagtt gcagggcaag tcaggacatt agtaaatatt taaattggta tcagcagaaa 180

ccagatggaa ctgttaaact cctgatctac catacatcaa gattacactc aggagtccca 240

tcaaggttca gtggcagtgg gtctggaaca gattattctc tcaccattag caacctggag 300

caagaagata ttgccactta cttttgccaa cagggtaata cgcttccgta cacgttcgga 360

gggggggacca agctggagat cacaggtggc ggtggctcgg gcggtggtgg gtcgggtggc 420

ggcggatctg aggtgaaact gcaggagtca ggacctggcc tggtggcgcc ctcacagagc 480

ctgtccgtca catgcactgt ctcaggggtc tcattacccg actatggtgt aagctggatt 540

cgccagcctc cacgaaaggg tctggagtgg ctgggagtaa tatggggtag tgaaaccaca 600

tactataatt cagctctcaa atccagactg accatcatca aggacaactc caagagccaa 660

gttttcttaa aaatgaacag tctgcaaact gatgacacag ccatttacta ctgtgccaaa 720

cattattact acggtggtag ctatgctatg gactactggg gccaaggaac ctcagtcacc 780

gtctcctcaa ccacgacgcc agcgccgcga ccaccaacac cggcgcccac catcgcgtcg 840

cagcccctgt ccctgcgccc agaggcgtgc cggccagcgg cgggggggcgc agtgcacacg 900

agggggctgg acttcgcctg tgatatctac atctgggcgc ccttggccgg gacttgtggg 960

gtccttctcc tgtcactggt tatcaccctt tactgcaaac ggggcagaaa gaaactcctg 1020

tatatattca aacaaccatt tatgagacca gtacaaacta ctcaagagga agatggctgt 1080

agctgccgat ttccagaaga agaagaagga ggatgtgaac tgagagtgaa gttcagcagg 1140

agcgcagacg cccccgcgta caagcagggc cagaaccagc tctataacga gctcaatcta 1200

ggacgaagag aggagtacga tgttttggac aagagacgtg gccgggaccc tgagatgggg 1260

ggaaagccga gaaggaagaa ccctcaggaa ggcctgtaca atgaactgca gaaagataag 1320

atggcggagg cctacagtga gattgggatg aaaggcgagc gccggagggg caaggggcac 1380

gatggccttt accagggtct cagtacagcc accaaggaca cctacgacgc ccttcacatg 1440

caggccctgc cccctcgc 1458

<210> 9
<211> 590
<212> DNA
<213> Artificial Sequence

<220>
<223> WPRE

<400> 9
taatcaacct ctggattaca aaatttgtga aagattgact ggtattctta actatgttgc 60

tccttttacg ctatgtggat acgctgcttt aatgcctttg tatcatgcta ttgcttcccg 120

tatggctttc attttctcct ccttgtataa atcctggttg ctgtctcttt atgaggagtt 180

gtggcccgtt gtcaggcaac gtggcgtggt gtgcactgtg tttgctgacg caacccccac 240

tggttggggc attgccacca cctgtcagct cctttccggg actttcgctt tccccctccc 300

tattgccacg gcggaactca tcgccgcctg ccttgcccgc tgctggacag gggctcggct 360

gttgggcact gacaattccg tggtgttgtc ggggaaatca tcgtcctttc cttggctgct 420

cgcctgtgtt gccacctgga ttctgcgcgg gacgtccttc tgctacgtcc cttcggccct 480

caatccagcg gaccttcctt cccgcggcct gctgccggct ctgcggcctc ttccgcgtct 540

tcgccttcgc cctcagacga gtcggatctc cctttgggcc gcctccccgc 590

<210> 10
<211> 690
<212> DNA
<213> Artificial Sequence

<220>
<223> 3' SIN LTR

<400> 10
atcgagacct agaaaaacat ggagcaatca caagtagcaa tacagcagct accaatgctg 60

attgtgcctg gctagaagca caagaggagg aggaggtggg ttttccagtc acacctcagg 120

taccttaag accaatgact tacaaggcag ctgtagatct tagccacttt ttaaaagaaa 180

agggggact ggaagggcta attcactccc aacgaagaca agatatcctt gatctgtgga 240

tctaccacac acaaggctac ttccctgatt ggcagaacta cacaccaggg ccagggatca 300

gatatccact gacctttgga tggtgctaca agctagtacc agttgagcaa gagaaggtag 360

aagaagccaa tgaaggagag aacacccgct tgttacaccc tgtgagcctg catgggatgg 420

atgacccgga gagagaagta ttagagtgga ggtttgacag ccgcctagca tttcatcaca 480

tggcccgaga gctgcatccg gactgtactg ggtctctctg gttagaccag atctgagcct 540

gggagctctc tggctaacta gggaacccac tgcttaagcc tcaataaagc ttgccttgag 600

tgcttcaagt agtgtgtgcc cgtctgttgt gtgactctgg taactagaga tccctcagac 660

ccttttagtc agtgtggaaa atctctagca 690

<210> 11
<211> 181
<212> DNA
<213> Artificial Sequence

<220>
<223> truncated 5'LTR

<400> 11
gggtctctct ggttagacca gatctgagcc tgggagctct ctggctaact agggaaccca 60

ctgcttaagc ctcaataaag cttgccttga gtgcttcaag tagtgtgtgc ccgtctgttg 120

tgtgactctg gtaactagag atccctcaga cccttttagt cagtgtggaa aatctctagc 180

a 181

<210> 12
<211> 126
<212> DNA
<213> Artificial Sequence

<220>
<223> HIV-psi (¦×)

<400> 12
ctctctcgac gcaggactcg gcttgctgaa gcgcgcacgg caagaggcga ggggcggcga 60

ctggtgagta cgccaaaaat tttgactagc ggaggctaga aggagagaga tgggtgcgag 120

agcgtc 126

<210> 13
<211> 212
<212> DNA
<213> Artificial Sequence

<220>
<223> EF1¦Á promoter short

<400> 13
gggcagagcg cacatcgccc acagtccccg agaagttggg gggaggggtc ggcaattgat 60

ccggtgccta gagaaggtgg cgcggggtaa actgggaaag tgatgtcgtg tactggctcc 120

gccttttcc cgagggtggg ggagaaccgt atataagtgc agtagtcgcc gtgaacgttc 180

tttttcgcaa cgggtttgcc gccagaacac ag 212

<210> 14
<211> 589
<212> DNA
<213> Artificial Sequence

<220>
<223> WPRE

<400> 14
aatcaacctc tggattacaa aatttgtgaa agattgactg gtattcttaa ctatgttgct 60

ccttttacgc tatgtggata cgctgcttta atgcctttgt atcatgctat tgcttcccgt 120

atggctttca ttttctcctc cttgtataaa tcctggttgc tgtctcttta tgaggagttg 180

tggcccgttg tcaggcaacg tggcgtggtg tgcactgtgt ttgctgacgc aacccccact 240

ggttggggca ttgccaccac ctgtcagctc ctttccggga ctttcgcttt ccccctccct 300

attgccacgg cggaactcat cgccgcctgc cttgcccgct gctggacagg ggctcggctg 360

ttgggcactg acaattccgt ggtgttgtcg gggaaatcat cgtcctttcc ttggctgctc 420

gcctgtgttg ccacctggat tctgcgcggg acgtccttct gctacgtccc ttcggccctc 480

aatccagcgg accttccttc ccgcggcctg ctgccggctc tgcggcctct tccgcgtctt 540

cgccttcgcc ctcagacgag tcggatctcc ctttgggccg cctccccgc 589

<210> 15
<211> 234
<212> DNA
<213> Artificial Sequence

<220>
<223> 3' LTR ¦¤-U3

<400> 15
tggaagggct aattcactcc caacgaagac aagatctgct ttttgcttgt actgggtctc 60

tctggttaga ccagatctga gcctgggagc tctctggcta actagggaac ccactgctta 120

agcctcaata aagcttgcct tgagtgcttc aagtagtgtg tgcccgtctg ttgtgtgact 180

ctggtaacta gagatccctc agacccttttt agtcagtgtg gaaaatctct agca 234

<210> 16
<211> 486
<212> PRT
<213> Artificial Sequence

<220>
<223> CAR-19 amino acid sequence

<400> 16

Met Ala Leu Pro Val Thr Ala Leu Leu Leu Pro Leu Ala Leu Leu Leu
1   5   10   15

His Ala Ala Arg Pro Asp Ile Gln Met Thr Gln Thr Thr Ser Ser Leu
            20   25   30

Ser Ala Ser Leu Gly Asp Arg Val Thr Ile Ser Cys Arg Ala Ser Gln
        35   40   45

Asp Ile Ser Lys Tyr Leu Asn Trp Tyr Gln Gln Lys Pro Asp Gly Thr
    50   55   60

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

Ser Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Tyr Ser Leu Thr Ile

```
                85                  90                  95

Ser Asn Leu Glu Gln Glu Asp Ile Ala Thr Tyr Phe Cys Gln Gln Gly
            100                 105                 110

Asn Thr Leu Pro Tyr Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Thr
        115                 120                 125

Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Glu
    130                 135                 140

Val Lys Leu Gln Glu Ser Gly Pro Gly Leu Val Ala Pro Ser Gln Ser
145                 150                 155                 160

Leu Ser Val Thr Cys Thr Val Ser Gly Val Ser Leu Pro Asp Tyr Gly
                165                 170                 175

Val Ser Trp Ile Arg Gln Pro Pro Arg Lys Gly Leu Glu Trp Leu Gly
            180                 185                 190

Val Ile Trp Gly Ser Glu Thr Thr Tyr Tyr Asn Ser Ala Leu Lys Ser
        195                 200                 205

Arg Leu Thr Ile Ile Lys Asp Asn Ser Lys Ser Gln Val Phe Leu Lys
    210                 215                 220

Met Asn Ser Leu Gln Thr Asp Asp Thr Ala Ile Tyr Tyr Cys Ala Lys
225                 230                 235                 240

His Tyr Tyr Tyr Gly Gly Ser Tyr Ala Met Asp Tyr Trp Gly Gln Gly
                245                 250                 255

Thr Ser Val Thr Val Ser Ser Thr Thr Thr Pro Ala Pro Arg Pro Pro
            260                 265                 270

Thr Pro Ala Pro Thr Ile Ala Ser Gln Pro Leu Ser Leu Arg Pro Glu
        275                 280                 285
```

```
Ala Cys Arg Pro Ala Ala Gly Gly Ala Val His Thr Arg Gly Leu Asp
    290                 295                 300

Phe Ala Cys Asp Ile Tyr Ile Trp Ala Pro Leu Ala Gly Thr Cys Gly
305                 310                 315                 320

Val Leu Leu Leu Ser Leu Val Ile Thr Leu Tyr Cys Lys Arg Gly Arg
                325                 330                 335

Lys Lys Leu Leu Tyr Ile Phe Lys Gln Pro Phe Met Arg Pro Val Gln
            340                 345                 350

Thr Thr Gln Glu Glu Asp Gly Cys Ser Cys Arg Phe Pro Glu Glu Glu
        355                 360                 365

Glu Gly Gly Cys Glu Leu Arg Val Lys Phe Ser Arg Ser Ala Asp Ala
    370                 375                 380

Pro Ala Tyr Gln Gln Gly Gln Asn Gln Leu Tyr Asn Glu Leu Asn Leu
385                 390                 395                 400

Gly Arg Arg Glu Glu Tyr Asp Val Leu Asp Lys Arg Arg Gly Arg Asp
                405                 410                 415

Pro Glu Met Gly Gly Lys Pro Arg Arg Lys Asn Pro Gln Glu Gly Leu
            420                 425                 430

Tyr Asn Glu Leu Gln Lys Asp Lys Met Ala Glu Ala Tyr Ser Glu Ile
        435                 440                 445

Gly Met Lys Gly Glu Arg Arg Arg Gly Lys Gly His Asp Gly Leu Tyr
    450                 455                 460

Gln Gly Leu Ser Thr Ala Thr Lys Asp Thr Tyr Asp Ala Leu His Met
465                 470                 475                 480

Gln Ala Leu Pro Pro Arg
```

485

<210> 17
<211> 219
<212> PRT
<213> Homo sapiens

<400> 17

Met Gly Arg Gly Leu Leu Arg Gly Leu Trp Pro Leu His Ile Val Leu
1 5 10 15

Trp Thr Arg Ile Ala Ser Thr Ile Pro Pro His Val Gln Lys Ser Val
20 25 30

Asn Asn Asp Met Ile Val Thr Asp Asn Asn Gly Ala Val Lys Phe Pro
35 40 45

Gln Leu Cys Lys Phe Cys Asp Val Arg Phe Ser Thr Cys Asp Asn Gln
50 55 60

Lys Ser Cys Met Ser Asn Cys Ser Ile Thr Ser Ile Cys Glu Lys Pro
65 70 75 80

Gln Glu Val Cys Val Ala Val Trp Arg Lys Asn Asp Glu Asn Ile Thr
85 90 95

Leu Glu Thr Val Cys His Asp Pro Lys Leu Pro Tyr His Asp Phe Ile
100 105 110

Leu Glu Asp Ala Ala Ser Pro Lys Cys Ile Met Lys Glu Lys Lys Lys
115 120 125

Pro Gly Glu Thr Phe Phe Met Cys Ser Cys Ser Ser Asp Glu Cys Asn
130 135 140

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

```
Leu Leu Val Ile Phe Gln Val Thr Gly Ile Ser Leu Leu Pro Pro Leu
                165                 170                 175


Gly Val Ala Ile Ser Val Ile Ile Ile Phe Tyr Cys Tyr Arg Val Asn
            180                 185                 190


Arg Gln Gln Lys Leu Ser Ser Thr Trp Glu Thr Gly Lys Thr Arg Lys
        195                 200                 205


Leu Met Glu Phe Ser Glu His Cys Ala Ile Ile
    210                 215


<210>  18
<211>  657
<212>  DNA
<213>  Homo sapiens

<400>  18
atgggtcggg ggctgctcag gggcctgtgg ccgctgcaca tcgtcctgtg gacgcgtatc       60

gccagcacga tcccaccgca cgttcagaag tcggttaata acgacatgat agtcactgac      120

aacaacggtg cagtcaagtt tccacaactg tgtaaatttt gtgatgtgag attttccacc      180

tgtgacaacc agaaatcctg catgagcaac tgcagcatca cctccatctg tgagaagcca      240

caggaagtct gtgtggctgt atggagaaag aatgacgaga acataacact agagacagtt      300

tgccatgacc ccaagctccc ctaccatgac tttattctgg aagatgctgc ttctccaaag      360

tgcattatga aggaaaaaaa aaagcctggt gagactttct tcatgtgttc ctgtagctct      420

gatgagtgca atgacaacat catcttctca gaagaatata acaccagcaa tcctgacttg      480

ttgctagtca tatttcaagt gacaggcatc agcctcctgc caccactggg agttgccata      540

tctgtcatca tcatcttcta ctgctaccgc gttaaccggc agcagaagct gagttcaacc      600

tgggaaaccg gcaagacgcg gaagctcatg gagttcagcg agcactgtgc catcatc         657
```