

Sequence Listing

<110> Immunotech Biopharm Co.,Ltd.

<120> Improved therapeutic T cells

<130> P2018TC580

<150> 201810988074.9

<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 ggtagacca gatctgagcc tgggagctct ctggctaact agggaaaccca	60
ctgcttaagc ctcaataaag cttgccttga gtgcttcaag tagtgtgtgc ccgtctgttg	120
tgtgactctg gtaactagag atccctcaga cccttttagt cagtgtggaa aatctctagc	180
agtggcgccc gaacaggac ttgaaagcga aagggaacc agaggagctc tctcgacgca	240
ggactcggct tgctgaagcg cgcacggcaa gaggcgaggg gcggcgactg gtgagtacgc	300
caaaaatttt gactagcgga ggctagaagg agagagatgg gtgcgagagc gtcagtatta	360
agcgggggag aattagatcg cgatgggaaa aaattcgggt aaggccaggg ggaaagaaaa	420
aatataaatt aaaacatata gtatgggcaa gcaggagct 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 gaagggtggag agagagacag agacagatcc attcgattag tgaacggatc	1560
ggcactgcgt gcgccaattc tgcagacaaa tggcagtatt catccacaat tttaaaagaa	1620
aaggggggat tgggggttac agtgcagggg aaagaatagt agacataata gcaacagaca	1680
tacaaactaa agaattacaa aaacaaatta caaaaattca aaattttcgg gtttattaca	1740
gggacagcag agatccagtt tggttagtac cgggcccgc gtcgcatgct cccggccgcc	1800
atggcggccg cgggaattcg attagatccg gtgcccgtca gtgggcagag cgcacatcgc	1860
ccacagtccc cgagaagttg gggggagggg tcggcaattg aaccggtgcc tagagaaggt	1920
ggcgcggggg 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 caggctgaga 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 ctctgcccgc 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 ggtggcgggtg gctcgggcgg tgggtgggtcg ggtggcggcg gatctgaggt	2940
gaaactgcag gagtcaggac ctggcctggt ggcgccctca cagagcctgt ccgtcacatg	3000
cactgtctca ggggtctcat taccgacta tgggtgaagc tggattcgcc agcctccacg	3060
aaagggtctg gagtggctgg gagtaatatg gggtagtga 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 gccaccatc gcgtcgagc ccctgtccct	3360
gcgcccagag gcgtgccggc cagcggcggg gggcgcagtg cacacgaggg ggctggactt	3420
cgcctgtgat atctacatct gggcgccctt ggccgggact tgtgggggtcc ttctcctgtc	3480
actggttatc accctttact gcaaacgggg cagaaagaaa ctctgtata tattcaaaca	3540
accatttatg agaccagtac aaactactca agaggaagat ggctgtagct gccgatttcc	3600
agaagaagaa gaaggaggat gtgaactgag agtgaagtgc 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 gggatgaaaag gcgagcgccg gaggggcaag gggcacgatg gcctttacca	3900
gggtctcagt acagccacca aggacaccta cgacgccctt cacatgcagg ccctgcccc	3960
tcgctaaaca tgtttaaggg ttccggttcc actaggtaca attcgatatc aagcttatcg	4020
ataatcaacc tctggattac aaaatttgtg aaagattgac tggatttctt aactatgttg	4080
ctccttttac gctatgtgga tacgctgctt taatgccttt gtatcatgct attgcttccc	4140
gtatggcttt cattttctcc tccttgtata aatcctgggt 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 gtgggtgtgt cggggaaatc atcgtccttt ccttggctgc	4440
tcgcctgtgt tgccacctgg attctgcgcg ggacgtcctt ctgctacgtc ctttcggccc	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 tgggtgtaca agctagtacc agttgagcaa	4980
gagaaggtag aagaagccaa tgaaggagag aacacccgct tgttacaccc tgtgagcctg	5040
catgggatgg atgaccgga gagagaagta ttagagtgga ggtttgacag ccgcctagca	5100
tttcatcaca tggcccgaga gctgcatccg gactgtactg ggtctctctg gttagaccag	5160
atctgagcct gggagctctc tggctaacta gggaaccac 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 ggtagacca gatctgagcc tgggagctct ctggctaact agggaaccca 60
ctgcttaagc ctcaataaag cttgccttga gtgcttcaag tagtgtgtgc ccgtctgttg 120
tgtgactctg gtaactagag atccctcaga cccttttagt cagtgtggaa aatctctagc 180
agtggcgccc gaacagggac ttgaaagcga aagggaacc agaggagctc tctcgacgca 240
ggactcggct tgctgaagcg cgcacggcaa gaggcgaggg gcggcgactg gtgagtacgc 300
caaaaatttt gactagcggg ggctagaagg agagagatgg gtgcgagagc gtcagtatta 360
agcgggggag aattagatcg cgatgggaaa aaattcggtt aaggccaggg ggaaagaaaa 420
aatataaatt aaaacatata gtatgggcaa gcaggagagct 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 caccaccaa ggcaaagaga agagtgggtgc agagagaaaa aagagcagtg 840
ggaataggag ctttgttcct tgggttcttg ggagcagcag gaagcactat gggcgagcgc 900
tcaatgacgc tgacgttaca ggccagacaa ttattgtctg gtatagtgc 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 gattagtga cggatcggca	1560
ctgcgtgcgc caattctgca gacaaatggc agtattcatc cacaatttta aaagaaaagg	1620
ggggattggg gggtagagt caggggaaaag aatagtagac ataatagcaa cagacataca	1680
aactaaagaa ttacaaaaac aaattacaaa aattcaaaat tttcgggttt attacaggga	1740
cagcagagat ccagtttggg taaattcgct agctagggtc tgaaaggagt gggaattggc	1800
tccggtgccc gtcagtgggc agagcgcaca tcgcccacag tccccgagaa gttgggggga	1860
ggggtcggca attgatccgg tgcctagaga aggtggcgcg gggtaaactg ggaaagtgat	1920
gtcgtgtact ggctccgcct ttttcccag 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 ttaaattggg atcagcagaa	2220
accagatgga actgttaaac tcctgatcta ccatacatca agattacact caggagtccc	2280
atcaagggtc agtggcagt ggtctggaac agattattct ctcaccatta gcaacctgga	2340
gcaagaagat attgccactt acttttgcca acagggtaat acgcttccgt acacgttcgg	2400
aggggggacc aagctggaga tcacagggtg cggtggctcg ggcggtggtg ggtcgggtgg	2460
cggcggatct gaggtgaaac tgcaggagtc aggacctggc ctggtggcgc cctcacagag	2520
cctgtccgtc acatgcactg tctcaggggt ctcattaccc gactatggtg taagctggat	2580
tcgccagcct ccacgaaagg gtctggagt 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 gcggggggcg 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 gccccgcgt 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 cccctcgct gaggatccac gcgttaagtc gacaatcaac ctctggatta	3540
caaaatttgt gaaagattga ctggtattct taactatgtt gtccttttta cgctatgtgg	3600
atacgctgct ttaatgcctt tgtatcatgc tattgcttcc cgtatggctt tcattttctc	3660
ctccttgat aaatcctggg tgctgtctct ttatgaggag ttgtggcccg ttgtcaggca	3720
acgtggcgtg gtgtgcactg tgtttgctga cgcaaccccc actggttggg gcattgccac	3780
cacctgtcag ctcttttccg ggactttcgc tttccccctc cctattgcca cggcggaact	3840
catcgccgcc tgccttgccc gctgctggac aggggctcgg ctgttgggca ctgacaattc	3900
cgtggtgttg tcggggaaat catcgtcctt tccttggctg ctgcctgtg ttgccacctg	3960
gattctgcgc gggacgtcct tctgctacgt cccttcggcc ctcaatccag cggaccttcc	4020
ttcccgcggc ctgctgccgg ctctgcggcc tcttccgcgt cttcgcttc gccctcagac	4080
gagtcggatc tccctttggg ccgcctcccc gcgtcgactt taagaccaat gacttacaag	4140

gcagctgtag atcttagcca ctttttaaaa gaaaaggggg gactggaagg gctaattcac	4200
tcccaacgaa gacaagatct gctttttgct tgtactgggt ctctctgggt agaccagatc	4260
tgagcctggg agctctctgg ctaactaggg aaccactgc 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 ggtagacca gatctgagcc tgggagctct ctggctaact agggaaccca	60
ctgcttaagc ctcaataaag cttgccttga gtgcttcaag tagtgtgtgc ccgtctgttg	120
tgtgactctg gtaactagag atccctcaga cccttttagt cagtgtggaa aatctctagc	180
agtggcgccc gaacagggaac ttgaaagcga aagggaacc agaggagctc tctcgacgca	240
ggactcggct tgctgaagcg cgcacggcaa gaggcgaggg gcggcgactg gtgagtacgc	300
caaaaatttt gactagcgga ggctagaagg agagagatgg gtgcgagagc gtcagtatta	360
agcggggggag aattagatcg cgatgggaaa aaattcgggt aaggccaggg ggaaagaaaa	420
aatataaatt aaaacatata gtatgggcaa gcaggagct agaacgattc gcagttaatc	480
ctggcctgtt agaaacatca gaaggctgta gacaaatact gggacagcta caaccatccc	540
ttcagacagg atcagaagaa cttagatcat tatataatac agtagcaacc ctctattgtg	600
tgcacaaag 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 agcaccacc aaggcaaaga gaagagtgg	120
gcagagagaa aaaagagcag tgggaatagg agctttgttc cttgggttct tgggagcagc	180
aggaagcact atggg'gcag 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 tggaattgg ttaacataac aaattggctg tggtatataa aattattcat	660
aatgatagta ggaggcttgg taggtttaag aatagttttt gctgtacttt ctatagtga	720
tagagttagg cagggatatt caccattatc gtttcagacc cacctccaa 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 aaagggggga ttggggggta cagtgcaggg gaaagaatag tagacataat 60
 agcaacagac atacaaacta aagaattaca aaaacaaatt acaaaaattc aaaatttt 118

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

<220>
 <223> EF1 α promoter long

<400> 7
 tccggtgccc gtcagtgggc agagcgcaca tcgcccacag tccccgagaa gttggggggga 60
 ggggtcggca attgaaccgg tgcctagaga aggtggcgcg gggtaaactg ggaaagtgat 120
 gtcgtgtact ggctccgcct ttttcccagag ggtgggggag aaccgtatat aagtgcagta 180
 gtcgccgtga acgttctttt tcgcaacggg tttgccgcca gaacacagct gaagcttcga 240
 ggggctcgca tctctccttc acgcgcccgc cgccctacct gaggccgcca tccacgccgg 300
 ttgagtcgcg ttctgccgcc tcccgctgt ggtgcctcct gaactgcgtc cgccgtctag 360
 gtaagtttaa agctcaggtc gagaccgggc ctttgtccgg cgctcccttg gaggcctacct 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 agtaaattatt taaattggta tcagcagaaa	180
ccagatggaa ctgttaaact cctgatctac catacatcaa gattacactc aggagtccca	240
tcaaggttca gtggcagtggt gtctggaaca gattattctc tcaccattag caacctggag	300
caagaagata ttgccactta cttttgcca cagggtaata cgcttccgta cacgttcgga	360
ggggggacca agctggagat cacaggtggc ggtggctcgg gcggtggtgg gtcgggtggc	420
ggcggatctg aggtgaaact gcaggagtca ggacctggcc tgggtggcgcc ctcacagagc	480
ctgtccgtca catgcactgt ctcaggggtc tcattaccgc 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 gccaaaggaa ctcagtcacc	780
gtctcctcaa ccacgacgcc agcgccgcga ccaccaacac cggcgccac catcgctcg	840
cagccccctgt ccctgcgccc agaggcgtgc cggccagcgg cggggggcgc agtgcacacg	900
agggggctgg acttcgcctg tgatatctac atctgggcgc ctttggccgg gacttgtggg	960
gtccttctcc tgtcactggt tatcaccctt tactgcaaac ggggcagaaa gaaactcctg	1020
tatatattca aacaaccatt tatgagacca gtacaaacta ctcaagagga agatggctgt	1080
agctgccgat ttccagaaga agaagaagga ggatgtgaac tgagagtga gttcagcagg	1140
agcgagacg ccccgcgta caagcagggc cagaaccagc tctataacga gctcaatcta	1200
ggacgaagag aggagtacga tgttttggac aagagacgtg gccgggaccc tgagatgggg	1260
ggaaaagccga gaaggaagaa ccctcaggaa ggctgtaca atgaactgca gaaagataag	1320
atggcggagg cctacagtga gattgggatg aaaggcgagc gccggagggg caaggggcac	1380

gatggccttt accagggctct 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
gtggcccggt gtcaggcaac gtggcgtggt gtgcactgtg tttgctgacg caacccccac	240
tggttggggc attgccacca cctgtcagct cctttccggg actttcgctt tccccctccc	300
tattgccacg gcggaactca tcgccgcctg ccttgcccgc tgctggacag gggctcggct	360
gttgggcact gacaattccg tgggtgtgtc 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 aggagggtggg ttttccagtc acacctcagg	120
tacctttaag accaatgact tacaaggcag ctgtagatct tagccacttt ttaaaagaaa	180

aggggggact ggaagggcta attcactccc aacgaagaca agatatcctt gatctgtgga	240
tctaccacac acaaggctac ttccctgatt ggcagaacta cacaccaggg ccagggatca	300
gatatccact gacctttgga tgggtgctaca 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 gggaaccac 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 ggtagacca 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 tgggtgctgag	120

agcgtc 126

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

<220>
<223> EF1 α promoter short

<400> 13
gggcagagcg cacatcgccc acagtcccg agaagttggg gggaggggtc ggcaattgat 60
ccggtgccta gagaagggtg cgcggggtaa actgggaaag tgatgtcgtg tactggctcc 120
gcctttttcc 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
atggcctttca ttttctcctc cttgtataaa tcctggttgc tgtctcttta tgaggagttg 180
tggcccgttg tcaggcaacg tggcgtgggtg tgcactgtgt ttgctgacgc aacccccact 240
ggttggggca ttgccaccac ctgtcagctc ctttccggga ctttcgcttt cccctccct 300
attgccacgg cggaactcat cgccgcctgc cttgcccgt 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 ctacagacgag tcggatctcc ctttgggccg cctccccgc 589

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

<220>
<223> 3' LTR |α-U3

<400> 15
tggaagggtc aattcactcc caacgaagac aagatctgct ttttgcttgt actgggtctc 60
tctggttaga ccagatctga gcctgggagc tctctggcta actagggaac ccactgctta 120
agcctcaata aagcttgccct tgagtgcctc aagtagtggtg tgcccgtctg ttgtgtgact 180
ctggtaacta gagatccctc agaccctttt 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
aacaacgggtg cagtcaagtt tccacaactg tgtaaatttt gtgatgtgag attttccacc 180
tgtgacaacc agaaatcctg catgagcaac tgcagcatca cctccatctg tgagaagcca 240
caggaagtct gtgtggctgt atggagaaaag aatgacgaga acataacact agagacagtt 300
tgccatgacc ccaagctccc ctaccatgac ttatttctgg aagatgctgc ttctccaaag 360
tgcattatga aggaaaaaaaa aaagcctggg gagactttct tcatgtgttc ctgtagctct 420
gatgagtgca atgacaacat catctttctca gaagaatata acaccagcaa tcctgacttg 480
ttgctagtca tatttcaagt gacaggcatc agcctcctgc caccactggg agttgccata 540
tctgtcatca tcatctttcta ctgctaccgc gttaaccggc agcagaagct gagttcaacc 600
tgggaaaccg gcaagacgcg gaagctcatg gagttcagcg agcactgtgc catcatc 657