

CU01P130WO1_ST25
SEQUENCE LISTING

<110> CUREVAC GMBH

<120> Nucleic acid comprising or coding for a histone stem-loop and a poly(A) sequence or a polyadenylation signal for increasing the expression of an encoded therapeutic protein

<130> CU01P130WO

<140> PCT/EP2012/000671

<141> 2012-02-15

<160> 58

<170> PatentIn version 3.5

<210> 1

<211> 16

<212> RNA

<213> artificial

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<223> histone stem-loop sequence according to formula (Ic): metazoan and protozoan histone stem-loop consensus sequence without stem bordering elements

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<210> 2

<211> 26

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<213> artificial

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<400> 2
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<210> 3
 <211> 16
 <212> RNA
 <213> artificial

<220>
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<210> 4
 <211> 26
 <212> RNA

<213> artificial

<220>

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nnnnnncnnn nnnunnnnng nnnnnn

26

<210> 5

<211> 16

<212> RNA

<213> artificial

<220>

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dgnnnnnnun nnnnch

16

<210> 6

<211> 26

<212> RNA

<213> artificial

<220>

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<223> histone stem-loop sequence according to formula (IIe): protozoan
histone stem-loop consensus sequence with stem bordering elements

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<400> 6
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<210> 7
<211> 16
<212> RNA
<213> artificial

<220>
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histone stem-loop consensus sequence without stem bordering
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<400> 7
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16

<210> 8
 <211> 26
 <212> RNA
 <213> artificial

<220>
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 histone stem-loop consensus sequence with stem bordering elements

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<400> 8
 nnnnnngnby ynnunvndnc nnnnnn 26

<210> 9
 <211> 16
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 <213> artificial

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 histone stem-loop consensus sequence without stem bordering
 elements

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<220>
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<220>
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<400> 9
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<210> 10
 <211> 26
 <212> RNA
 <213> artificial

<220>
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 histone stem-loop consensus sequence with stem bordering elements

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 <223> n is selected from a nucleotide selected from A, U, T, G and C,
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<220>
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or a nucleotide analogue thereof

<220>
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<400> 10
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<210> 11
 <211> 16
 <212> RNA
 <213> artificial

<220>
 <223> histone stem-loop sequence according to formula (Ih): humane
 histone stem-loop consensus sequence (Homo sapiens) without stem
 bordering elements

<400> 11
 dghycudyuh asrrcc 16

<210> 12
 <211> 26
 <212> RNA
 <213> artificial

<220>
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 histone stem-loop consensus sequence (Homo sapiens) with stem
 bordering elements

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<400> 12
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<210> 13
 <211> 16
 <212> DNA
 <213> artificial

<220>
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 according to formula (Ic) -----

<400> 13
 vgyyyhhth rvvrcb 16

<210> 14
 <211> 16

<212> DNA
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 according to formula (Ic)

 <400> 14
 sgyyttytm arrrcs 16

 <210> 15
 <211> 16
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 <220>
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 according to formula (Ic)

 <400> 15
 sgyycttttm agrrcs 16

 <210> 16
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 according to formula (Ie)

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 <220>
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 <400> 16
 dgnnnbnnth vnnch 16

 <210> 17
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 according to formula (Ie)

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<222> (3)..(5)
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<220>
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<400> 17
 rgnnnyhbth rdncyc 16

<210> 18
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<220>
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 according to formula (Ie)

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<400> 18
 rgndbyhyth rdhncy 16

<210> 19
 <211> 16
 <212> DNA
 <213> artificial

<220>
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 according to formula (If)

<400> 19
 vgyyytyhth rvrrcb 16

<210> 20
 <211> 16
 <212> DNA
 <213> artificial

<220>
 <223> histone stem-loop sequences (without stem-bordering elements)
 according to formula (If)

<400> 20
 sgyycttytm agrrcs 16

<210> 21
 <211> 16

<212> DNA
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 <220>
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 according to formula (If)

 <400> 21
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 <210> 22
 <211> 16
 <212> DNA
 <213> artificial

 <220>
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 according to formula (Ig)

 <400> 22
 ggyycttyth agrrrc 16

 <210> 23
 <211> 16
 <212> DNA
 <213> artificial

 <220>
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 according to formula (Ig)

 <400> 23
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 <210> 24
 <211> 16
 <212> DNA
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 <220>
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 according to formula (Ig)

 <400> 24
 ggctcttttm agrgcc 16

 <210> 25
 <211> 16
 <212> DNA
 <213> artificial

 <220>
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 according to formula (Ih)

 <400> 25
 dghyctdyth asrrcc 16

 <210> 26
 <211> 16
 <212> DNA
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<220>
 <223> histone stem-loop sequences (without stem-bordering elements)
 according to formula (Ih)

<400> 26
 ggcyctttth agrgcc 16

<210> 27
 <211> 16
 <212> DNA
 <213> artificial

<220>
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 according to formula (Ih)

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<210> 28
 <211> 26
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 <213> artificial

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 hhhhvgyyy yhhthrvrc bvhhnn 26

<210> 29
 <211> 26
 <212> DNA
 <213> artificial

<220>
 <223> histone stem-loop sequence (with stem bordering elements)
 according to formula (IIC)

<400> 29
 mhmhmsgyyy ttytmarrrc smchhh 26

<210> 30
 <211> 26
 <212> DNA
 <213> artificial

<220>
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 according to formula (IIC)

<400> 30
 mmmmsgyyt tttmagrrc sachmh 26

<210> 31

<211> 26
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<400> 31
 nnnnndgnnn bnnthvnnnc hnhnnn

26

<210> 32
 <211> 26
 <212> DNA
 <213> artificial

<220>
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<400> 32

nnhhnrgnnn yhbthrdnnc ydhnnn

26

<210> 33

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according to formula (IIe)

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<400> 33

nhhhvrgndb yhythrdhnc yrhhhh

26

<210> 34

<211> 26

<212> DNA

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according to formula (IIIf)

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 hhmhmvggyy tyhthrvrrc bvmhnn 26

<210> 35
 <211> 26
 <212> DNA
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<220>
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 according to formula (IIIf)

<400> 35
 mmmmmmsggyy ttytmagrrc smchhh 26

<210> 36
 <211> 26
 <212> DNA
 <213> artificial

<220>
 <223> histone stem-loop sequence (with stem bordering elements)
 according to formula (IIIf)

<400> 36
 mmmmmmsggyy ttttmagrrc sachmh 26

<210> 37
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<220>
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<220>
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 <222> (24)..(25)
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<400> 37
 hhmamggyy ttythagrrc cvhnnm 26

<210> 38
 <211> 26
 <212> DNA
 <213> artificial

<220>
 <223> histone stem-loop sequence (with stem bordering elements)
 according to formula (IIg)

<400> 38
 hhaamggcyc ttytmagrgc cvchhm 26

<210> 39
 <211> 26
 <212> DNA
 <213> artificial

<220>
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 according to formula (IIg)

<400> 39
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26

<210> 40
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 <212> DNA
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<220>
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 <222> (25)..(25)
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<400> 40
 nhaahdghyc tdythasrrc cvhbnh

26

<210> 41
 <211> 26
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 <213> artificial

<220>
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 according to formula (IIh)

<220>
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<400> 41
 hhaamggcyc tttthagrgc cvmynm

26

<210> 42
 <211> 26
 <212> DNA
 <213> artificial

<220>
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 according to formula (IIh)

<400> 42
hmaaaggcyc tttmagrgc crmyhm

26

<210> 43
<211> 1747
<212> RNA
<213> artificial

<220>
<223> mRNA sequence of ppLuc(GC)-ag

<400> 43
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cccgcuggag gacgggaccg ccggcgagca gcuccacaag gccaugaagc gguacgcccu 120
ggugccggggc acgaucgccu ucaccgacgc ccacaucgag gucgacauca ccuacgcgga 180
guacuucgag augagcgugc gccuggccga ggccaugaag cgguacggcc ugaacaccaa 240
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gaacagcaug gggauacagc agccgaccgu gguguucgug agcaagaagg gccugcagaa 420
gauccugaac gugcagaaga agcugcccau cauccagaag aucaucauca uggacagcaa 480
gaccgacuac caggguucc agucgaugua cacguucgug accagccacc ucccggccgg 540
cuucaacgag uacgacuucg ucccggagag cuucgaccgg gacaagacca ucgcccugau 600
caugaacagc agcggcagca ccggccugcc gaagggggug gccugccgc accggaccgc 660
cugcgugcgc uucucgcacg cccgggaccc caucuucggc aaccagauca ucccggacac 720
cgccauccug agcguugugc cguuccacca cggcuucggc auguucacga ccuggggcu 780
ccucaucugc ggcuuuccggg ugguccugau guaccgguuc gaggaggagc uguuccugcg 840
gagccugcag gacuacaaga uccagagcgc gcugcucgug ccgaccucgu ucagcuucuu 900
cgccaagagc acccugaucg acaaguacga ccugucgaac cugcacgaga ucgccagcgg 960
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cauccgccag ggcuaaggcc ugaccgagac cacgagcgcg auccugauca ccccgagggg 1080
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ccuggacacc ggcaagaccc ugggcgugaa ccagcggggc gagcugugcg ugcgggggccc 1200
gaugaucaug agcggcuacg ugaacaaccc ggaggccacc aacgcccua ucgacaagga 1260
cggcuggcug cacagcggcg acaucgccua cugggacgag gacgagcacu ucuucaucgu 1320
cgaccggcug aagucgcuga ucaaguacaa gggcuaccag guggcgccgg ccgagcugga 1380
gagcauccug cuccagcacc ccaacaucuu cgacgccggc guggccgggc ugccggacga 1440
cgacgccggc gagcugccgg ccgcgguggu ggugcuggag cacggcaaga ccaugacgga 1500
gaaggagauc gucgaacuac uggccagcca ggugaccacc gccaagaagc ugcggggcgg 1560
cgugguguuc guggacgagg ucccgaaggg ccugaccggg aagcucgacg cccggaagau 1620
ccgcgagauc cugaucaagg ccaagaaggg cggcaagauc gccguguaag acuaguuaua 1680

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agacugacua gcccgauggg ccucccaacg ggcccuccuc ccuccuugc accgagauua 1740
 auagauc 1747

<210> 44
 <211> 1806
 <212> RNA
 <213> artificial

<220>
 <223> mRNA sequence of ppLuc(GC)-ag-A64

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 ggugccgggc acgaucgcu ucaccgacgc ccacaucgag gucgacauca ccuacgcgga 180
 guacuucgag augagcgugc gccuggccga ggccaugaag cgguacggcc ugaacaccaa 240
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 ccucuuauc ggcguggccg ugcggccggc gaacgacau uacaacgagc gggagcugcu 360
 gaacagcaug gggauagcc agccgaccgu gguguucgug agcaagaagg gccugcagaa 420
 gauccugaac gugcagaaga agcugccau cauccagaag aucaucauca uggacagcaa 480
 gaccgacuac caggguucc agucgaugua cacguucgug accagccacc ucccgccggg 540
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 caugaacagc agcggcagca ccggccugcc gaagggggug gccugccgc accggaccgc 660
 cugcgugcgc uucucgcacg cccgggaccc caucuucggc aaccagauca ucccggacac 720
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 ccucaucugc ggcuuccggg ugguccugau guaccgguuc gaggaggagc uguuccugcg 840
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 cgccaagagc acccugaucg acaaguacga ccugucgaac cugcacgaga ucgccagcgg 960
 gggcgccccg cugagcaagg agguuggcga ggccguggcc aagcgguucc accuccggg 1020
 cauccgccag ggcuacggcc ugaccgagac cacgagcgcg auccugauca ccccgaggg 1080
 ggacgacaag ccgggcgcg ugggcaaggu ggucccgguu uucgaggcca agguugguga 1140
 ccuggacacc ggcaagacc ugggcgugaa ccagcggggc gagcugugcg ugcgggggccc 1200
 gaugaucaug agcggcuacg ugaacaaccc ggaggccacc aacgcccua ucgacaagga 1260
 cggcuggcug cacagcggcg acaucgccua cugggacgag gacgagcacu ucuucaucgu 1320
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 gaaggagauc gucgacuacg uggccagcca ggugaccacc gccaaagaagc ugcggggcgg 1560
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ccgcgagauc	cugaucaagg	ccaagaaggg	cggcaagauc	gccguguaag	acuaguuaa	1680
agacugacua	gcccgauggg	ccucccaacg	ggcccuccuc	cccuccuugc	accgagauua	1740
auaaaaaaaa	aaaaaaaaaa	aaaaaaaaaa	aaaaaaaaaa	aaaaaaaaaa	aaaaaaaaaa	1800
aaaaaa						1806

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 <211> 1772
 <212> RNA
 <213> artificial

<220>
 <223> mRNA sequence of ppLuc(GC)-ag-histonesL

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ccggcgagca	gcuccacaag
gccaugaagc	gguacgcccu
120	
ggugccgggc	acgaucgccu
ucaccgacgc	ccacaucgag
gucgacauca	ccuacgcgga
180	
guacuucgag	augagcgugc
gccuggccga	ggccaugaag
cgguacggcc	ugaacaccaa
240	
ccaccggauc	guggugugcu
cggagaacag	ccugcaguuc
uucaugccgg	ugcugggcgc
300	
ccucuucauc	ggcguggccg
ucgccccggc	gaacgcacau
uacaacgagc	gggagcugcu
360	
gaacagcaug	gggaucagcc
agccgaccgu	gguguucgug
agcaagaagg	gccugcagaa
420	
gauccugaac	gugcagaaga
agcugcccau	cauccagaag
aucaucauca	uggacagcaa
480	
gaccgacuac	cagggcuucc
agucgaugua	cacguucgug
accagccacc	ucccgccggg
540	
cuucaacgag	uacgacuucg
ucccgagag	cuucgaccgg
gacaagacca	ucgcccugau
600	
caugaacagc	agcggcagca
ccggccugcc	gaagggggug
gcccugccgc	accggaccgc
660	
cugcgugcgc	uucucgcacg
cccgggaccc	caucuucggc
aaccagauca	ucccggaac
720	
cgccauccug	agcguggugc
cguuccacca	cggcuucggc
auguucacga	cccugggcua
780	
ccucaucugc	ggcuuccggg
ugguccugau	guaccggguu
gaggaggagc	uguuccugcg
840	
gagccugcag	gacuacaaga
uccagagcgc	gcugcucgug
ccgaccuugu	ucagcuucuu
900	
cgccaagagc	accugaucg
acaaguacga	ccugucgaac
cugcacgaga	ucgccagcgg
960	
gggcgccccg	cugagcaagg
aggugggcga	ggccguggcc
aagcgggucc	accucccggg
1020	
cauccgccag	ggcuacggcc
ugaccgagac	cacgagcgcg
auccugauca	cccccgaggg
1080	
ggacgacaag	ccgggcgccc
ugggcaaggu	ggucccgguu
uucgaggcca	agguggugga
1140	
ccuggacacc	ggcaagaccc
ugggcgugaa	ccagcggggc
gagcugugcg	ugcggggggc
1200	
gaugaucaug	agcggcuacg
ugaacaaccc	ggaggccacc
aacgcccua	ucgacaagga
1260	
cggcuggcug	cacagcggcg
acaucgccua	cugggacgag
gacgagcacu	ucuucaucgu
1320	
cgaccggcug	aagucgcuga
ucaaguacaa	gggcuaccag
guggcgccgg	ccgagcugga
1380	
gagcauccug	cuccagcacc
ccaacaucuu	cgacgccggc
guggccgggc	ugccggacga
1440	
cgacgccggc	gagcugccgg
ccgcgguggu	ggugcuggag
cacggcaaga	ccaugacgga
1500	

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gaaggagauc	gucgacuacg	uggccagcca	ggugaccacc	gccaagaagc	ugcggggcgg	1560
cgugguguuuc	guggacgagg	ucccgaaagg	ccugaccggg	aagcucgacg	cccggaagau	1620
ccgcgagauc	cugaucaagg	ccaagaagg	cggcaagauc	gccguguaag	acuaguuaua	1680
agacugacua	gcccgauggg	ccucccaacg	ggccuccuc	cccuccuugc	accgagauua	1740
auagaucua	aaggcucuuu	ucagagccac	ca			1772

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<211>	1835
<212>	RNA
<213>	artificial

<220>
<223> mRNA sequence of ppLuc(GC)-ag-A64-histoneSL

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ggugccgggc	acgaucgcc	ucaccgac	ccacaucg	gucgacau	ccuacgcgg		180
guacuucgag	augagcgug	gccuggccc	ggccauga	cgguacggc	ugaacaccaa		240
ccaccggau	guggugug	cggagaac	ccugcagu	uucaugccc	ugcugggcg		300
ccucuucau	ggcguggcc	ucgccccg	gaacgaca	uacaacgag	gggagcug		360
gaacagcau	gggaucag	agccgacc	gguguucg	agcaagaag	gccugcaga		420
gauccuga	gugcaga	agcugccc	cauccaga	aucaucau	uggacagca		480
gaccgacu	cagggcu	agucgaug	cacguucg	accagccac	ucccgccgg		540
cuucaacg	uacgacu	ucccgga	cuucgacc	gacaagacc	ucgcccuga		600
caugaac	agcggcag	ccggccug	gaaggggg	gcccgccg	accggaccg		660
cugcgugc	uucucgc	cccgggac	caucuucg	aaccagau	ucccggac		720
cgccaucc	agcgugg	cguuccac	cgguucg	auguucac	cccugggc		780
ccucaucg	ggcuucc	ugguuccg	guaccgg	gaggaggag	uguuccug		840
gagccugc	gacuaca	uccagagc	gcugcucg	ccgaccucu	ucagcuucu		900
cgccaag	accugauc	acaaguac	ccugucga	cugcacgag	ucgccagcg		960
gggcgcccc	cugagca	aggugggc	ggccgugg	aagcgguu	accuccggg		1020
cauccgcc	ggcuacg	ugaccgag	cacgagcg	auccugau	cccccgagg		1080
ggacgaca	ccgggcgc	ugggcaag	ggucccg	uucgaggcc	agguggugg		1140
ccuggacac	ggcaagac	ugggcgug	ccagcggg	gagcugug	ugcgggggc		1200
gaugauca	agcggcu	ugaacaac	ggaggccac	aacgccc	ucgacaagg		1260
cggcuggc	cacagcgg	acaucgcc	cugggacg	gacgagcac	ucuucaucg		1320
cgaccggc	aagucgc	ucaaguac	gggcuacc	guggcgccc	ccgagcugg		1380
gagcaucc	cuccagcac	ccaacaucu	cqacgccg	quggccggg	ugccggacg		1440

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cgacgccggc gagcugccgg ccgcgguugu ggugcuggag cacggcaaga ccaugacgga	1500
gaaggagauc gucgacuacg uggccagcca ggugaccacc gccagaagc ugcggggcgg	1560
cgugguguuc guggacgagg ucccgaaggg ccugaccggg aagcucgacg cccggaagau	1620
ccgcgagauc cugaucaagg ccaagaaggg cggcaagauc gccguguaag acuaguuaa	1680
agacugacua gcccgauggg ccucccaacg ggcccuccuc cccuccuugc accgagauua	1740
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aaaaaavgca ucaaaggcuc uuuucagagc cacca	1835

<210> 47
 <211> 1869
 <212> RNA
 <213> artificial

<220>
 <223> mRNA sequence of ppLuc(GC)-ag-A120

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ggugccggggc acgaucgccu ucaccgacgc ccacaucgag gucgacauca ccuacgcgga	180
guacuucgag augagcgugc gccuggccga ggccaugaag cgguacggcc ugaacaccaa	240
ccaccggauc guggugugcu cggagaacag ccugcaguuc uucaugccgg ugcugggcgc	300
ccucuuauc ggcguggccg ugcggccggc gaacgacauc uacaacgagc gggagcugcu	360
gaacagcaug gggauagacc agccgaccgu gguguucgug agcaagaagg gccugcagaa	420
gauccugaac gugcagaaga agcugcccau cauccagaag aucaucaua uggacagcaa	480
gaccgacuac cagggcuucc agucgaugua cacguucgug accagccacc ucccgcggg	540
cuucaacgag uacgacuucg ucccggagag cuucgaccgg gacaagacca ucgcccugau	600
caugaacagc agcggcagca ccggccugcc gaagggggug gccugccgc accggaccgc	660
cugcgugcgc uucucgcacg cccgggaccc caucuucggc aaccagauca ucccggacac	720
cgccauccug agcguugugc cguuccacca cggcuucggc auguucacga cccugggcua	780
ccucaucugc ggcuuuccggg ugguccugau guaccgguuc gaggaggagc uguuccugcg	840
gagccugcag gacuacaaga uccagagcgc gcugcucgug ccgaccugug ucagcuucuu	900
cgccaagagc acccugaucg acaaguacga ccugucgaac cugcacgaga ucgccagcgg	960
gggcgccccg cugagcaagg aggugggcga ggccguggcc aagcggguucc accucccggg	1020
cauccgccag ggcuaaggcc ugaccgagac cacgagcgcg auccugauca cccccgaggg	1080
ggacgacaag ccgggcgcgg ugggcaaggu ggucccgguu uucgaggcca agguuggugga	1140
ccuggacacc ggcaagaccc ugggcgugaa ccagcggggc gagcugugcg ugcggggggc	1200
gaugaucaug agcggcuacg ugaacaaccc ggaggccacc aacgcccua ucgacaagga	1260
cggcuggcug cacagcggcg acaucgccua cugggacgag gacgagcacu ucuucaucgu	1320

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cgacgccggc	gagcugccgg	ccgcgguggu	ggugcuggag	cacggcaaga	ccaugacgga	1500
gaaggagauc	gucgacuacg	uggccagcca	ggugaccacc	gccaagaagc	ugcggggcgg	1560
cgugguguuc	guggacgagg	ucccgaaggg	ccugaccggg	aagcucgacg	cccggaagau	1620
ccgcgagauc	cugaucaagg	ccaagaaggg	cggcaagauc	gccguguaag	acuaguuaa	1680
agacugacua	gcccgauggg	ccucccaacg	ggcccuccuc	cccuccuugc	accgagauua	1740
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aaaaaaaaa	aaaaaaaaa	aaaaaaaaa	aaaaaaaaa	aaaaaaaaa	aaaaaaaaa	1860
aaaaaaaaa						1869

<210> 48
 <211> 1858
 <212> RNA
 <213> artificial

<220>
 <223> mRNA sequence of ppLuc(GC)-ag-A64-ag

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gccaugaagc	gguacgcccu
120	
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ucaccgacgc	ccacaucgag
gucgacauca	ccuacgcgga
180	
guacuucgag	augagcgugc
gccuggccga	ggccaugaag
cgguacggcc	ugaacaccaa
240	
ccaccggauc	guggugugcu
cggagaacag	ccugcaguuc
uucaugccgg	ugcugggcgc
300	
ccucuucauc	ggcguggccg
ucgccccggc	gaacgacauc
uacaacgagc	gggagcugcu
360	
gaacagcaug	gggaucagcc
agccgaccgu	gguguucgug
agcaagaagg	gccugcagaa
420	
gauccugaac	gugcagaaga
agcugcccau	cauccagaag
aucaucauca	uggacagcaa
480	
gaccgacuac	cagggcuucc
agucgaugua	cacguucgug
accagccacc	ucccgccggg
540	
cuucaacgag	uacgacuucg
ucccgagag	cuucgaccgg
gacaagacca	ucgcccugau
600	
caugaacagc	agcggcagca
ccggccugcc	gaagggggug
gcccugccgc	accggaccgc
660	
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cccgggaccc	caucuucggc
aaccagauca	ucccgacac
720	
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cguuccacca	cggcuucggc
auguucacga	cccugggcua
780	
ccucaucugc	ggcuuccggg
ugguuccugau	guaccgguuc
gaggaggagc	uguuccugcg
840	
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uccagagcgc	gcugcucgug
ccgaccugug	ucagcuucuu
900	
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acaaguacga	ccugucgaac
cugcacgaga	ucgccagcgg
960	
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aggugggcga	ggccguggcc
aagcgguucc	accuccggg
1020	
cauccgccag	ggcuaccggc
ugaccgagac	cacgagcgcg
auccugauca	ccccgaggg
1080	
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ugggcaaggu	ggucccgguuc
uucgaggcca	agguggugga
1140	

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ccuggacacc	ggcaagaccc	ugggcgugaa	ccagcggggc	gagcugugcg	ugcggggggcc	1200
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cggcuggcug	cacagcggcg	acaucgccua	cugggacgag	gacgagcacu	ucuucaucgu	1320
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ccgcgagauc	cugaucaagg	ccaagaagg	cggcaagauc	gccguguaag	acuaguuaa	1680
agacugacua	gcccgauggg	ccucccaacg	ggccuccuc	cccuccuugc	accgagauua	1740
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aaaaaaugca	uccugcccga	ugggccuccc	aacggggccu	ccuccccucc	uugcaccg	1858

<210> 49
 <211> 1894
 <212> RNA
 <213> artificial

<220>
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ggugccgggc	acgaucgccu ucaccgacgc ccacaucgag gucgacauca ccuacgcgga 180
guacuucgag	augagcgugc gccuggccga ggccaugaag cgguacggcc ugaacaccaa 240
ccaccggauc	guggugugcu cggagaacag ccugcaguuc uucaugccgg ugcugggcgc 300
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ccucaucugc	ggcuuccggg ugguccugau guaccgguuc gaggaggagc uguuccugcg 840
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cgccaagagc	accugaucg acaaguacga ccugucgaac cugcacgaga ucgccagcgg 960
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gaaggagauc	gucgacuacg	uggccagcca	ggugaccacc	gccaagaagc	ugcggggcg	1560
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ccgcgagauc	cugaucaagg	ccaagaagg	cggcaagauc	gccguguaag	acuaguuaa	1680
agacugacua	gcccgauggg	ccucccaacg	ggccuccuc	cccuccuugc	accgagauua	1740
aaaaaaaaa	aaaaaaaaa	aaaaaaaaa	aaaaaaaaa	aaaaaaaaa	aaaaaaaaa	1800
aaaaaagca	ucaauuccua	cacgugaggc	gcugugauuc	ccuaucccc	uucauucccu	1860
auacauuagc	acagcgccau	ugcauguagg	aaau			1894

<210> 50
 <211> 1909
 <212> RNA
 <213> artificial

<220>
 <223> mRNA sequence of ppLuc(GC)-ag-A64-PolioCL

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	ggugccgggc	acgaucgcu	ucaccgacgc	ccacaucgag	gucgacauca	ccuacgcgga	180
	guacuucgag	augagcgugc	gccuggccga	ggccaugaag	cgguacggcc	ugaacaccaa	240
	ccaccggauc	guggugugcu	cggagaacag	ccugcaguuc	uucaugccgg	ugcugggcgc	300
	ccucuucauc	ggcguggccg	ucgccccggc	gaacgacauc	uacaacgagc	gggagcugcu	360
	gaacagcaug	gggaucagcc	agccgaccgu	gguguucgug	agcaagaagg	gccugcagaa	420
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	gaccgacuac	cagggcuucc	agucgaugua	cacguucgug	accagccacc	ucccgccggg	540
	cuucaacgag	uacgacuucg	ucccgagag	cuucgaccgg	gacaagacca	ucgcccugau	600
	caugaacagc	agcggcagca	ccggccugcc	gaagggggug	gcccugccgc	accggaccgc	660
	cugcgugcgc	uucucgcacg	cccgggaccc	caucuucggc	aaccagauca	ucccggaacac	720
	cgccauccug	agcguuggugc	cguuccacca	cggcuucggc	auguucacga	cccugggcua	780
	ccucaucugc	ggcuuccggg	ugguuccgau	guaccggguu	gaggaggagc	uguuccugcg	840

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gagccugcag gacuacaaga uccagagcgc gcugcucgug ccgacccugu ucagcuucuu	900
cgccaagagc acccugaucg acaaguacga ccugucgaac cugcacgaga ucgccagcgg	960
ggcgccccg cugagcaagg agguuggcga ggccguggcc aagcgguucc accucccggg	1020
cauccgccag ggcuacggcc ugaccgagac cacgagcgcg auccugauca ccccgagggg	1080
ggacgacaag ccgggcgcgcg ugggcaaggu ggucccguuc uucgaggcca agguuggugga	1140
ccuggacacc ggcaagaccc ugggcgugaa ccagcggggc gagcugugcg ugcggggggc	1200
gaugaucaug agcggcuacg ugaacaaccc ggaggccacc aacgcccua ucgacaagga	1260
cggcuggcug cacagcggcg acaucgccua cugggacgag gacgagcacu ucuucaucgu	1320
cgaccggcug aagucgcuga ucaaguacaa gggcuaccag guggcgccgg ccgagcugga	1380
gagcauccug cuccagcacc ccaacaucuu cgacgccggc guggccgggc ugccggacga	1440
cgacgccggc gagcugccgg ccgcgguugu ggugcuggag cacggcaaga ccaugacgga	1500
gaaggagauc gucgacuacg uggccagcca ggugaccacc gccagaagc ugcggggcgg	1560
cgugguguuc guggacgagg ucccgaagg ccugaccggg aagcucgacg cccggaagau	1620
ccgcgagauc cugaucaagg ccaagaagg cggaagauc gccguguaag acuaguuaa	1680
agacugacua gcccgauggg ccucccaacg ggccuccuc ccuuccuugc accgagauua	1740
auaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa	1800
aaaaaavgca ucaauucuaa aacagcucug gguuguuacc caccacagag gccacgugg	1860
cgguacuagc uccgguaug cgguacccuu guacgccugu uuuagaauu	1909

<210> 51
 <211> 1841
 <212> RNA
 <213> artificial

<220>
 <223> mRNA sequence of ppLuc(GC)-ag-A64-G30

<400> 51	
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ggugccgggc acgaucgcu ucaccgacgc ccacaucgag gucgacauca ccuacgcgga	180
guacuucgag augagcgugc gccuggccga ggccaugaag cgguacggcc ugaacaccaa	240
ccaccggauc guggugugcu cggagaacag ccugcaguuc uucaugccgg ugcugggcgc	300
ccucuuauc ggcguggccg ugcggccggc gaacgacauc uacaacgagc gggagcugcu	360
gaacagcaug gggauagacc agccgaccgu gguguucgug agcaagaagg gccugcagaa	420
gauccgaac gugcagaaga agcugcccau cauccagaag aucaucauca uggacagcaa	480
gaccgacuac caggguucc agucgaugua cacguucgug accagccacc ucccgcggg	540
cuucaacgag uacgacuucg ucccggagag cuucgaccgg gacaagacca ucgcccugau	600
caugaacagc agcggcagca ccggccugcc gaagggggug gccugccgc accggaccgc	660

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cugcgugcgc uucucgcacg cccgggaccc caucuucggc aaccagauca ucccggacac	720
cgccaauccug agcguggugc cguuccacca cgguucggc auguucacga cccuggggcua	780
ccucaucugc ggcuuccggg ugguccugau guaccgguuc gaggaggagc uguuccugcg	840
gagccugcag gacuacaaga uccagagcgc gcugcucgug ccgacccugu ucagcuucuu	900
cgccaagagc acccugaucg acaaguacga ccugucgaac cugcacgaga ucgccagcgg	960
gggcgccccg cugagcaagg aggugggcga ggccguggcc aagcggguucc accucccggg	1020
cauccgccag ggcuacggcc ugaccgagac cacgagcgcg auccugauca cccccgaggg	1080
ggacgacaag ccgggcgcgc ugggcaaggu ggucccgguuc uucgaggcca agguggugga	1140
ccuggacacc ggcaagaccc ugggcgugaa ccagcggggc gagcugugcg ugcggggggcc	1200
gaugaucaug agcggcuacg ugaacaaccc ggaggccacc aacgcccua ucgacaagga	1260
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gagcauccug cuccagcacc ccaacaucuu cgacgccggc guggccgggc ugccggacga	1440
cgacgccggc gagcugccgg ccgcgguggu ggugcuggag cacggcaaga ccaugacgga	1500
gaaggagauc gucgacuacg uggccagcca ggugaccacc gccagaagc ugcggggcgg	1560
cgugguguuc guggacgagg ucccgaagg ccugaccggg aagcucgacg cccggaagau	1620
ccgcgagauc cugaucaagg ccaagaagg cggaagauc gccguguaag acuaguuaa	1680
agacugacua gcccgaugg ccucccaacg ggcccuccuc ccuuccuugc accgagauua	1740
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<210> 52
 <211> 1841
 <212> RNA
 <213> artificial

<220>
 <223> mRNA sequence of ppLuc(GC)-ag-A64-U30

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ggugccgggc acgaucgccu uaccgacgc ccacaucgag gucgacauca ccuacgcgga	180
guacuucgag augagcgugc gccuggccga ggccaugaag cgguacggcc ugaacaccaa	240
ccaccggauc guggugugcu cggagaacag ccugcaguuc uucaugccgg ugcugggcgc	300
ccucuuauc ggcguggccg ugcggccggc gaacgacauc uacaacgagc gggagcugcu	360
gaacagcaug gggauagacc agccgaccgu gguguucgug agcaagaagg gccugcagaa	420
gauccugaac gugcagaaga agcugcccau cauccagaag aucaucauca uggacagcaa	480
gaccgacuac cagggcucc agucgaugua cacguucgug accagccacc uccgcggg	540

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cuucaacgag	uacgacuucg	ucccgagag	cuucgaccgg	gacaagacca	ucgcccugau	600
caugaacagc	agcggcagca	ccggccugcc	gaagggggug	gccugccgc	accggaccgc	660
cugcgugcgc	uucucgcacg	cccgggaccc	caucuucggc	aaccagauca	ucccggaacac	720
cgccauccug	agcguggugc	cguuccacca	cggcuucggc	auguucacga	cccuggggcua	780
ccucaucugc	ggcuuccggg	ugguccugau	guaccggguuc	gaggaggagc	uguuccugcg	840
gagccugcag	gacuacaaga	uccagagcgc	gcugcucgug	ccgaccugug	ucagcuucuu	900
cgccaagagc	accugaucg	acaaguacga	ccugucgaac	cugcacgaga	ucgccagcgg	960
gggcgccccg	cugagcaagg	aggugggcga	ggccguggcc	aagcgguucc	accucccggg	1020
cauccgccag	ggcuacggcc	ugaccgagac	cacgagcgcg	auccugauca	cccccgaggg	1080
ggacgacaag	ccgggcgcgc	ugggcaaggu	ggucccgguuc	uucgaggcca	agguggugga	1140
ccuggacacc	ggcaagaccc	ugggcgugaa	ccagcggggc	gagcugugcg	ugcggggggc	1200
gaugaucaug	agcggcuacg	ugaacaaccc	ggaggccacc	aacgcccua	ucgacaagga	1260
cggcuggcug	cacagcggcg	acaucgccua	cugggacgag	gacgagcacu	ucuucaucgu	1320
cgaccggcug	aagucgcuga	ucaaguacaa	gggcuaccag	guggcgccgg	ccgagcugga	1380
gagcauccug	cuccagcacc	ccaacaucuu	cgacgccggc	guggccgggc	ugccggacga	1440
cgacgccggc	gagcugccgg	ccgcgguggu	ggugcuggag	cacggcaaga	ccaugacgga	1500
gaaggagauc	gucgacuacg	uggccagcca	ggugaccacc	gccagaagc	ugcggggcgg	1560
cgugguguuc	guggacgagg	ucccgagggg	ccugaccggg	aagcucgacg	cccgggaagau	1620
ccgcgagauc	cugaucaagg	ccaagaaggg	cggcaagauc	gccguguaag	acuaguuaua	1680
agacugacua	gcccgauggg	ccucccaacg	ggccuccuc	cccuccuugc	accgagauua	1740
auaaaaaaaa	aaaaaaaaaa	aaaaaaaaaa	aaaaaaaaaa	aaaaaaaaaa	aaaaaaaaaa	1800
aaaaaavgca	uuuuuuuuuu	uuuuuuuuuu	uuuuuuuuuu	u		1841

<210> 53
 <211> 1857
 <212> RNA
 <213> artificial

<220>
 <223> mRNA sequence of ppLuc(GC)-ag-A64-SL

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ggugccgggc	acgaucgccu ucaccgacgc ccacaucgag gucgacauca ccuacgcgga 180
guacuucgag	augagcgugc gccuggccga ggccaugaag cgguacggcc ugaacaccaa 240
ccaccggauc	guggugugcu cggagaacag ccugcaguuc uucaugccgg ugcugggcgc 300
ccucuucauc	ggcguggccg ucgccccggc gaacgacauc uacaacgagc gggagcugcu 360
gaacagcaug	gggaucagcc agccgaccgu gguguucgug agcaagaagg gccugcagaa 420

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gauccugaac	gugcagaaga	agcugcccau	cauccagaag	aucaucauca	uggacagcaa	480
gaccgacuac	cagggcuucc	agucgaugua	cacguucgug	accagccacc	ucccgccggg	540
cuucaacgag	uacgacuucg	ucccgagag	cuucgaccgg	gacaagacca	ucgcccugau	600
caugaacagc	agcggcagca	ccggccugcc	gaagggggug	gccugccgc	accggaccgc	660
cugcgugcgc	uucucgcacg	cccgggaccc	caucuucggc	aaccagauca	ucccggaac	720
cgccauccug	agcguggugc	cguuccacca	cgguucggc	auguucacga	cccugggcua	780
ccucaucugc	ggcuuccggg	ugguccugau	guaccgguuc	gaggaggagc	uguuccugcg	840
gagccugcag	gacuacaaga	uccagagcgc	gcugcucgug	ccgaccugug	ucagcuucuu	900
cgccaagagc	accugaucg	acaaguacga	ccugucgaac	cugcacgaga	ucgccagcgg	960
gggcgccccg	cugagcaagg	aggugggcga	ggccguggcc	aagcggguucc	accucccggg	1020
cauccgccag	ggcuacggcc	ugaccgagac	cacgagcgcg	auccugauca	cccccgaggg	1080
ggacgacaag	ccgggcgcgg	ugggcaaggu	ggucccgguuc	uucgaggcca	agguggugga	1140
ccuggacacc	ggcaagaccc	ugggcgugaa	ccagcggggc	gagcugugcg	ugcggggggc	1200
gaugaucaug	agcggcuacg	ugaacaaccc	ggaggccacc	aacgcccua	ucgacaagga	1260
cggcuggcug	cacagcggcg	acaucgccua	cugggacgag	gacgagcacu	ucuucaucgu	1320
cgaccggcug	aagucgcuga	ucaaguacaa	gggcuaccag	guggcgccgg	ccgagcugga	1380
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cgacgccggc	gagcugccgg	ccgcgguggu	ggugcuggag	cacggcaaga	ccaugacgga	1500
gaaggagauc	gucgacuacg	uggccagcca	ggugaccacc	gccaagaagc	ugcggggcgg	1560
cgugguguuc	guggacgagg	ucccgaaggg	ccugaccggg	aagcucgacg	cccgggaagau	1620
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agacugacua	gcccgauggg	ccucccaacg	ggccuccuc	cccuccuugc	accgagauua	1740
auaaaaaaaa	aaaaaaaaaa	aaaaaaaaaa	aaaaaaaaaa	aaaaaaaaaa	aaaaaaaaaa	1800
aaaaaaugca	uuauggcggc	cguguccacc	acggauauca	ccguggugga	cgcggcc	1857

<210> 54
 <211> 1838
 <212> RNA
 <213> artificial

<220>
 <223> ppLuc(GC)-ag-A64-N32

<400> 54	gggagaaagc	uugaggaugg	aggacgcaa	gaacaucaag	aagggcccgg	cgcccuucua	60
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	ggugccgggc	acgaucgccu	ucaccgacgc	ccacaucgag	gucgacauca	ccuacgcgga	180
	guacuucgag	augagcgugc	gccuggccga	ggccaugaag	cgguacggcc	ugaacaccaa	240
	ccaccggauc	guggugugcu	cggagaacag	ccugcaguuc	uucaugccgg	ugcugggcgc	300

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ccucuucauc ggcguggccg ucgccccggc gaacgacauc uacaacgagc gggagcugcu      360
gaacagcaug gggauacagcc agccgaccgu gguguucgug agcaagaagg gccugcagaa      420
gauccugaac gugcagaaga agcugcccac cauccagaag aucaucauca uggacagcaa      480
gaccgacuac cagggcuucc agucgaugua cacguucgug accagccacc ucccgccggg      540
cuucaacgag uacgacuucg ucccggagag cuucgaccgg gacaagacca ucgcccugau      600
caugaacagc agcggcagca ccggccugcc gaagggggug gccugccgc accggaccgc      660
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cgccauccug agcguuggug cguuccacca cggcuucggc auguucacga ccuggggcu      780
ccucaucugc ggcuuuccggg ugguccugau guaccgguuc gaggaggagc uguuccugcg      840
gagccugcag gacuacaaga uccagagcgc gcugcucgug ccgaccucgu ucagcuucuu      900
cgccaagagc acccugaucg acaaguacga ccugucgaac cugcacgaga ucgccagcgg      960
gggcgccccg cugagcaagg agguugggcga ggccguggcc aagcgguucc accuccggg      1020
cauccgccag ggcuaaggcc ugaccgagac cacgagcgcg auccugauca ccccgaggg      1080
ggacgacaag ccgggcgccg ugggcaaggu ggucccgguu uucgaggcca agguugguga      1140
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gaugaucaug agcggcuacg ugaacaaccc ggaggccacc aacgcccua ucgacaagga      1260
cggcuggcug cacagcggcg acaucgccua cugggacgag gacgagcacu ucuucaucgu      1320
cgaccggcug aagucgcuga ucaaguacaa gggcuaccag guggcgccgg ccgagcugga      1380
gagcauccug cuccagcacc ccaacaucuu cgacgccggc guggccgggc ugccggacga      1440
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cgugguguuc guggacgagg ucccgaaggg ccugaccggg aagcucgacg cccggaagau      1620
ccgcgagauc cugaucaagg ccaagaaggg cggcaagauc gccguguaag acuaguuaa      1680
agacugacua gcccgauggg ccucccaacg ggccuccuc cccuccuugc accgagauua      1740
auaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa .aaaaaaaaa      1800
aaaaaavgca uccccucua gacaauugga auuccaau      1838

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<210> 55
<211> 771
<212> RNA
<213> artificial

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<220>
<223> mRNA sequence of MmEPO (GC) -ag-A64-C30

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cugcucaucc cccuggggcu gcccguccuc ugcgcccccc cgcgccugau cugcgacucc      120
cgggugcugg agcgcuaacau ccucgaggcc aaggaggcgg agaacgugac caugggcugc      180

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gccgagggggc cccggcugag cgagaacauc acgguccccg acaccaaggu gaacuucuaac 240
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cugagcgagg ccauccugca ggcgcaggcc cuccuggcca acuccagcca gcccccgag 360
acacugcagc uccacaucga caaggccauc uccgggcugc ggagccugac cuccuccug 420
cgcgugcugg gcgcgcagaa ggagcucaug agcccggccg acacgacccc cccggccccg 480
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cggggcaagc ugaagcucua caccggggag gugugccgcc ggggcgaccg cugaccacua 600
guuauaagac ugacuagccc gauggggccuc ccaacggggc cuccuccccu ccuugcaccg 660
agauuaauaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 720
aaaaaaaaaa aaauuucccc cccccccccc cccccccccc cccccccua g 771

```

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<210> 56
<211> 796
<212> RNA
<213> artificial

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<220>
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```

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<400> 56
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cgggugcugg agcgcuaacu ccucgaggcc aaggaggcgg agaacgugac caugggcugc 180
gccgagggggc cccggcugag cgagaacauc acgguccccg acaccaaggu gaacuucuaac 240
gccuggaagc gcauggaggu ggaggagcag gccaucgagg ucuggcaggg ccugucccuc 300
cugagcgagg ccauccugca ggcgcaggcc cuccuggcca acuccagcca gcccccgag 360
acacugcagc uccacaucga caaggccauc uccgggcugc ggagccugac cuccuccug 420
cgcgugcugg gcgcgcagaa ggagcucaug agcccggccg acacgacccc cccggccccg 480
cugcggaccc ugaccgugga cacguucugc aagcucuucc gcgucuacgc caacuuccug 540
cggggcaagc ugaagcucua caccggggag gugugccgcc ggggcgaccg cugaccacua 600
guuauaagac ugacuagccc gauggggccuc ccaacggggc cuccuccccu ccuugcaccg 660
agauuaauaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa 720
aaaaaaaaaa aaugcauccc cccccccccc cccccccccc cccccccaa aggcucuuuu 780
cagagccacc agaauu 796

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<210> 57
<211> 3040
<212> RNA
<213> Artificial Sequence

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<220>
<223> Trastuzumab(GC) - ag - A64 -C30

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 gacaccuaca uccacugggg gcgccaggcc cccggcaagg gccucgagug ggucgcccgg 240
 aucuacccca cgaacgggua caccgcuaac gccgacagcg ugaagggccg guucaccauc 300
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 cacaccuucc cggccgugcu gcagagcagc ggccucuacu cgcugagcag cguggucacc 660
 gugcccagca gcagccuggg gaccagacg uacaucugca acgugaacca caagcccucg 720
 aacaccaagg ucgacaagaa gguggagccc ccgaagagcu gcgacaagac ccacaccugc 780
 ccgcccugcc ccgccccga gcuccugggc gggcccagcg uguuccuguu cccgcccag 840
 cccaaggaca cgcucaugau cagccgcacc cccgaggua ccugcguggu ggucgacgug 900
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 gccugcccg cgcccaucga gaagaccauc agcaaggcca aggggcagcc ccgggagccg 1140
 cagguguaca ccugcccc cagccgcgac gagcucacga agaaccaggu cagccugacc 1200
 ugccugguga agggcuucua cccucggac aucgccgugg agugggagag caacgggcag 1260
 ccggagaaca acuacaagac cccccgccc guccucgaca gcgacggcag cuucuuccug 1320
 uacagcaagc ugacggugga caagucgcgg uggcagcagg gcaacguguu cagcugcagc 1380
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 cccucucucc ucccccccc cuaacguuac uggccgaagc cgcuuggaau aaggccggug 1620
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 cugcggccaa aagccacgug uauaagauac accugcaaag gcggcacaac cccagugcca 1920
 cguugugagu uggauaguug uggaaagagu caaauggcuc uccucaagcg uauucaacaa 1980
 ggggcugaag gaugcccaga agguacccca uuguauggga ucugaucugg ggccucggug 2040

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cacaugcuuu acguguguuu agucgagguu aaaaaacguc uaggccccc gaaccacggg	2100
gacgugguuu uccuugaaa aacacgauga uaauagaucu accauggccg ugauggcgcc	2160
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