

SEQUENCE LISTING

<110> ModernaTX, Inc.

<120> mRNA Encoding for VEGF and Methods of Use Thereof

<130> 200369-WO-PCT

<150> US 62/346,979

<151> 2016-06-07

<150> US 62/411,091

<151> 2016-10-21

<150> US 62/432,005

<151> 2016-12-09

<160> 9

<170> PatentIn version 3.5

<210> 1

<211> 845

<212> RNA

<213> Artificial Sequence

<220>

<223> Modified RNA encoding VEGF-A

<220>

<221> modified_base

<222> (1)..(1)

<223> 5' 7MeGppp, wherein Me = methyl and p = inorganic phosphate

<220>

<221> misc_feature

<222> (1)..(845)

<223> A = AMP, C = CMP, G = GMP, U = N1-methyl-pseudoUMP

<220>

<221> modified_base

<222> (2)..(2)

<223> G2'OMe, wherein Me is methyl

<220>

<221> modified_base

<222> (845)..(845)

<223> GOH 3'

<400> 1

ggggaaaauaa gagagaaaag aagaguaaga agaaaauauaa gagccaccuau gaacuuucug 60

cugucuuggg ugcauuggag ccuugccuug cugcucuacc uccaccaugc caaguggucc 120

caggcugcac ccauggcaga aggaggaggg cagaaucauc acgaaguggu gaaguucaug	180
gaugucuauc agcgcagcua cugccaacca aucgagaccc ugguggacau cuuccaggag	240
uaccugaug agaucgagua caucucaag ccauccugug ugccccugau gcgaugcggg	300
ggcugcugca augacgaggg ccuggagugu gugcccacug aggaguccaa caucaccaug	360
cagauuaugc ggaucaaacc ucaccaaggc cagcacauag gagagaugag cuuccuacag	420
cacaacaaau gugaaugcag accaaagaaa gauagagcaa gacaagaaaa ucccuguggg	480
ccuugcucag agcggagaaa gcauuuguuu guacaagauc cgagacgug uaaauguucc	540
ugcaaaaaca cagacucgcg uugcaaggcg aggagcuug aguuaaacga acguacuugc	600
agaugugaca agccgaggcg gugauauag gcuggagccu cgguggccau gcuucuugcc	660
ccuugggccu cccccagcc ccuccucucc uuccugcacc cguacccccg uggucuuuga	720
auaaagucug agugggcggc aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa	780
aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa aaaaaaaaaa	840
ucuag	845

<210> 2
 <211> 191
 <212> PRT
 <213> Homo sapiens

<400> 2

Met	Asn	Phe	Leu	Leu	Ser	Trp	Val	His	Trp	Ser	Leu	Ala	Leu	Leu	Leu
1				5					10					15	

Tyr	Leu	His	His	Ala	Lys	Trp	Ser	Gln	Ala	Ala	Pro	Met	Ala	Glu	Gly
			20					25					30		

Gly	Gly	Gln	Asn	His	His	Glu	Val	Val	Lys	Phe	Met	Asp	Val	Tyr	Gln
		35					40					45			

Arg	Ser	Tyr	Cys	His	Pro	Ile	Glu	Thr	Leu	Val	Asp	Ile	Phe	Gln	Glu
	50					55					60				

Tyr	Pro	Asp	Glu	Ile	Glu	Tyr	Ile	Phe	Lys	Pro	Ser	Cys	Val	Pro	Leu
65					70					75					80

Met Arg Cys Gly Gly Cys Cys Asn Asp Glu Gly Leu Glu Cys Val Pro
85 90 95

Thr Glu Glu Ser Asn Ile Thr Met Gln Ile Met Arg Ile Lys Pro His
100 105 110

Gln Gly Gln His Ile Gly Glu Met Ser Phe Leu Gln His Asn Lys Cys
115 120 125

Glu Cys Arg Pro Lys Lys Asp Arg Ala Arg Gln Glu Asn Pro Cys Gly
130 135 140

Pro Cys Ser Glu Arg Arg Lys His Leu Phe Val Gln Asp Pro Gln Thr
145 150 155 160

Cys Lys Cys Ser Cys Lys Asn Thr Asp Ser Arg Cys Lys Ala Arg Gln
165 170 175

Leu Glu Leu Asn Glu Arg Thr Cys Arg Cys Asp Lys Pro Arg Arg
180 185 190

<210> 3
<211> 47
<212> RNA
<213> Artificial Sequence

<220>
<223> Firefly luciferase 5' UTR

<220>
<221> misc_feature
<222> (1)..(47)
<223> A = AMP, C = CMP, G = GMP, U = N1-methyl-pseudoUMP

<400> 3
gggaaaauaag agagaaaaga agaguaagaa gaaauauaag agccacc

47

<210> 4
<211> 1650
<212> RNA
<213> Artificial Sequence

<220>
<223> Firefly luciferase ORF of mRNA construct (excluding the stop

codon)

<220>

<221> misc_feature

<222> (1)..(1650)

<223> A = AMP, C = CMP, G = GMP, U = N1-methyl-pseudoUMP

<400> 4

auggaagaug cgaagaacau caagaaggga ccugccccgu uuuacccuuu ggaggacggu	60
acagcaggag aacagcucca caaggcgaug aaacgcuacg ccugguuccc cggaacgauu	120
gcguuuaccg augcacauau ugagguagac aucacauacg cagaauacuu cgaaaugucg	180
gugaggcugg cggaagcgau gaagagauau ggucuuuaca cuaaucaccg caucguggug	240
uguucggaga acucauugca guuuuucaug ccgguccuug gagcacuuuu caucgggguc	300
gcagucgcgc cagcgaacga caucuacaau gagcgggaac ucuugaauag caugggaauc	360
ucccagccga cggucguguu ugucuccaaa aaggggcugc agaaaauccu caacgugcag	420
aagaagcucc ccauuauuca aaagaucauc auuauaggaua gcaagacaga uuaccaaggg	480
uuccagucga uguauaccuu ugugacaucg cauugccgc caggguuuaa cgaguaugac	540
uucguccccg agucauuuga cagagauaaa accaucgcgc ugauuaugaa uuccucgggu	600
agcaccgguu ugccaaaggg gguggcguug cccaccgca cugcuugugu gcgguucucg	660
cacgcuaggg auccuauuu ugguaaucag aucauucccg acacagcaau ccuguccgug	720
guaccuuuuc aucacgguuu uggcauguuc acgacucucg gcuauuugau uugcgguuuc	780
agggucguac uuauguauug guucgaggaa gaacuguuuu ugagaucuu gcaagauuac	840
aagauccagu cggcccuccu ugugccaacg cuuuucucau ucuuugcgaa aucgacacuu	900
auugauaagu augaccuuuc caaucugcau gagauugccu cagggggagc gccgcuuagc	960
aaggaagucg gggaggcagu ggccaagcgc uuccaccuuc ccggaauucg gcagggauac	1020
gggcucacgg agacaacauc cgcgauccuu aucacgcccg agggugacga uaagccggga	1080
gccgucggaa aagugguccc cuucuuugaa gccaaaggucg uagaccucga cacgggaaaa	1140
accucggag ugaaccagag gggcgagcuc ugcgugagag ggccgaugau caugucaggu	1200
uacgugaaua acccugaagc gacgaauugc cugaucgaca aggaugggug guugcauucg	1260
ggagacauug ccuauuggga ugaggauag cacuucuuua ucguagaucg acuaaagagc	1320
uugaucaau acaaaggcua ucagguagcg ccugccgagc ucgagucaau ccugcuccag	1380

cacccaaca uuuucgacgc cggaguggcc gggugcccg augacgacgc gggugagcug 1440
ccagcggccg ugguaguuccu cgaacauggg aaaacaauga ccgaaaagga gaucguggac 1500
uacguagcau cacaagugac gacugcgaag aaacugaggg gagggguagu cuuuguggac 1560
gaggucccga aaggcuugac ugggaagcuu gacgcucgca aaauccggga aauccugauu 1620
aaggcaaaga aaggcgggaa aaucgcuguc 1650

<210> 5
<211> 119
<212> RNA
<213> Artificial Sequence

<220>
<223> Firefly luciferase 3' UTR

<220>
<221> misc_feature
<222> (1)..(119)
<223> A = AMP, C = CMP, G = GMP, U = N1-methyl-pseudoUMP

<400> 5
ugauauagg cuggagccuc gguggccaug cuucuugccc cuugggccuc cccccagccc 60
cuccucccu uccugcacc guacccccgu ggucuuugaa uaaagucuga gugggcggc 119

<210> 6
<211> 550
<212> PRT
<213> Artificial Sequence

<220>
<223> Firefly luciferase

<400> 6

Met Glu Asp Ala Lys Asn Ile Lys Lys Gly Pro Ala Pro Phe Tyr Pro
1 5 10 15

Leu Glu Asp Gly Thr Ala Gly Glu Gln Leu His Lys Ala Met Lys Arg
20 25 30

Tyr Ala Leu Val Pro Gly Thr Ile Ala Phe Thr Asp Ala His Ile Glu
35 40 45

Val Asp Ile Thr Tyr Ala Glu Tyr Phe Glu Met Ser Val Arg Leu Ala
50 55 60

Glu Ala Met Lys Arg Tyr Gly Leu Asn Thr Asn His Arg Ile Val Val
65 70 75 80

Cys Ser Glu Asn Ser Leu Gln Phe Phe Met Pro Val Leu Gly Ala Leu
85 90 95

Phe Ile Gly Val Ala Val Ala Pro Ala Asn Asp Ile Tyr Asn Glu Arg
100 105 110

Glu Leu Leu Asn Ser Met Gly Ile Ser Gln Pro Thr Val Val Phe Val
115 120 125

Ser Lys Lys Gly Leu Gln Lys Ile Leu Asn Val Gln Lys Lys Leu Pro
130 135 140

Ile Ile Gln Lys Ile Ile Ile Met Asp Ser Lys Thr Asp Tyr Gln Gly
145 150 155 160

Phe Gln Ser Met Tyr Thr Phe Val Thr Ser His Leu Pro Pro Gly Phe
165 170 175

Asn Glu Tyr Asp Phe Val Pro Glu Ser Phe Asp Arg Asp Lys Thr Ile
180 185 190

Ala Leu Ile Met Asn Ser Ser Gly Ser Thr Gly Leu Pro Lys Gly Val
195 200 205

Ala Leu Pro His Arg Thr Ala Cys Val Arg Phe Ser His Ala Arg Asp
210 215 220

Pro Ile Phe Gly Asn Gln Ile Ile Pro Asp Thr Ala Ile Leu Ser Val
225 230 235 240

Val Pro Phe His His Gly Phe Gly Met Phe Thr Thr Leu Gly Tyr Leu
245 250 255

Ile Cys Gly Phe Arg Val Val Leu Met Tyr Arg Phe Glu Glu Glu Leu
260 265 270

Phe Leu Arg Ser Leu Gln Asp Tyr Lys Ile Gln Ser Ala Leu Leu Val
275 280 285

Pro Thr Leu Phe Ser Phe Phe Ala Lys Ser Thr Leu Ile Asp Lys Tyr
290 295 300

Asp Leu Ser Asn Leu His Glu Ile Ala Ser Gly Gly Ala Pro Leu Ser
305 310 315 320

Lys Glu Val Gly Glu Ala Val Ala Lys Arg Phe His Leu Pro Gly Ile
325 330 335

Arg Gln Gly Tyr Gly Leu Thr Glu Thr Thr Ser Ala Ile Leu Ile Thr
340 345 350

Pro Glu Gly Asp Asp Lys Pro Gly Ala Val Gly Lys Val Val Pro Phe
355 360 365

Phe Glu Ala Lys Val Val Asp Leu Asp Thr Gly Lys Thr Leu Gly Val
370 375 380

Asn Gln Arg Gly Glu Leu Cys Val Arg Gly Pro Met Ile Met Ser Gly
385 390 395 400

Tyr Val Asn Asn Pro Glu Ala Thr Asn Ala Leu Ile Asp Lys Asp Gly
405 410 415

Trp Leu His Ser Gly Asp Ile Ala Tyr Trp Asp Glu Asp Glu His Phe
420 425 430

Phe Ile Val Asp Arg Leu Lys Ser Leu Ile Lys Tyr Lys Gly Tyr Gln
435 440 445

Val Ala Pro Ala Glu Leu Glu Ser Ile Leu Leu Gln His Pro Asn Ile
450 455 460

Phe Asp Ala Gly Val Ala Gly Leu Pro Asp Asp Asp Ala Gly Glu Leu
465 470 475 480

Pro Ala Ala Val Val Val Leu Glu His Gly Lys Thr Met Thr Glu Lys
485 490 495

Glu Ile Val Asp Tyr Val Ala Ser Gln Val Thr Thr Ala Lys Lys Leu
500 505 510

Arg Gly Gly Val Val Phe Val Asp Glu Val Pro Lys Gly Leu Thr Gly
515 520 525

Lys Leu Asp Ala Arg Lys Ile Arg Glu Ile Leu Ile Lys Ala Lys Lys
530 535 540

Gly Gly Lys Ile Ala Val
545 550

<210> 7
<211> 3274
<212> RNA
<213> Artificial Sequence

<220>
<223> LacZ nucleotide sequence (5' UTR, ORF, 3' UTR)

<220>
<221> misc_feature
<222> (1)..(3274)
<223> A = AMP, C = CMP, G = GMP, U = N1-methyl-pseudoUMP

<400> 7
ucaagcuuuu ggaccucgu acagaagcua auacgacuca cuauaggga auaagagaga 60
aaagaagagu aagaagaaau auaagagcca ccauggccuu ggcugucguc cugcaaagaa 120
gagauuggga aaauccugga guuacgcaac ugaauagacu cgccgcacau ccaccguucg 180
cguccuggcg aaauagcgaa gaagcgcgga ccgacagacc uucgcagcag cugcgcucuc 240
ucaacgggga auggcgguuc gcaugguuuc cggcuccuga ggcagucccg gaaagcuggc 300
ucgagugcga ccucccgga gccgauacgg ugguggugcc gucaaaugg caaauaug 360
gauacgacgc ccccaucua accaacguca cuuaccuau caccgugaau ccccauucg 420
ucccgacuga gaacccgacu ggaugcuaca gccugaccuu uaacguggac gagucguggc 480
ugcaagaagg gcagacucgc aucauuuucg acggagucua cuccgcuuc caucuuggu 540
guaacggacg guggguggga uacgggcagg acuccaggcu gccgagcgaa uucgacuugu 600

cagccuuccu	gcgcgccggc	gaaaaccgcc	uggcugucau	gguccuuaga	uggucggaug	660
gcucguaccu	ggaggauca	gacaugugga	ggaugucagg	gaucuuccgg	gaugucucgc	720
ugcuccacaa	gccaaacuacc	cagaucuccg	acuuucaugu	ggccacccgc	uucaacgaug	780
acuucagcag	ggcggguucug	gaagccgagg	ugcaaaugug	cggagaacug	agggacuacc	840
uccgcgugac	ugucucgcuc	uggcagggug	aaaccaagu	ggcuucaggc	acugcaccgu	900
ucggaggaga	aaucaucgac	gaacggggag	gauacgccga	ucgcgucacc	cugcgccuca	960
auguggaaaa	uccgaaacug	uggucggcag	aaaucccuaa	uuuguaccgg	gccguggugg	1020
agcugcacac	cgccgacgga	acucugaucg	aggccgaggc	augcgaugug	ggauuccgcg	1080
agguccgc	cgaaaaugga	cugcuucugc	uuaauggcaa	accgcugcuc	auccgcggag	1140
ugaacagaca	cgagcaucac	ccgcugcacg	gucaggucau	ggaugaacag	acuauggugc	1200
aagacauccu	gcugaugaaa	caaaacaacu	ucaacgccgu	ucggugcucc	cauuaccua	1260
aucacccguu	gugguauacc	cuuugcgau	gguacggccu	cuacguggug	gacgaagcga	1320
acaucgagac	ucacggaug	gucccuanga	accgccucac	ugacgacccg	agguggcucc	1380
cggcaauguc	ggaacgagug	acucggaugg	ugcagaggga	ccgcaacc	ccgucgguga	1440
uaaucugguc	gcuggggaac	gaaucuggcc	acggagcu	ccacgaugcg	cuguaccgcu	1500
ggauuaaguc	cguggaccca	agccggcccc	uccaguacga	aggagguggu	gcugauacca	1560
cugcaaccga	caucaucugc	ccaauguaug	cgcgggugga	ugaggaccaa	ccuuucccg	1620
cggugccaaa	gugguccauc	aagaaauggc	ucucgcugcc	cggagaaacg	cgcccgcuga	1680
uccugugcga	auaugcgcac	gcuaugggaa	auucacuggg	gggauuugcg	aaguacuggc	1740
aggcuuuucg	acaguacccg	agacuccagg	guggcuucgu	gugggacugg	guugaccaga	1800
gccucaucaa	auacgaugaa	aacggcaacc	caugguccgc	guacggcgga	gacuuuggag	1860
acaccccuaa	cgaucgccag	uucugcauga	acggccuggu	guucgccgac	agaacuccgc	1920
auccagcccu	uacugaggcu	aagcaccaac	aacaguucuu	ccaguucaga	cugucggggc	1980
aaacgaucga	agugacuucc	gaauaccucu	uccggcauuc	ggacaacgag	uugcugcacu	2040
ggauggucgc	ccuggaugga	aagccccucg	ccuccggaga	agugccgcuc	gacguggcgc	2100
cgcagggaaa	gcaguugauc	gaguugccgg	aacugccaca	gcccgaguca	gcaggacagc	2160
ucuggcuuac	cgucagaguc	gugcagccaa	augccaccgc	cuggucggag	gcaggacaua	2220

uuucagccug gcagcagugg cgccucgccg agaaucugag cgugaccuug ccagcagccu	2280
cacacgccau uccgcaucug accacguccg aaauggacuu uuguaucgaa cuggggaaaua	2340
agcgcuggca guucaaucgg caaucaggcu uccuguccca gauguggauu ggugacaaga	2400
agcagcuccu gaccccgug cgcgaucaгу ucacucgcgc cccacuugac aacgacauug	2460
gcgugagcga ggccacgcgu aucgauccaa acgcuugggu ggagcgcugg aaggcggcug	2520
gccacuauca ggcgagggcc gcgcuccugc aguguaccgc ggauaccuc gcagacgccg	2580
uucugauuac cacggcgcau gccuggcaac accagggaaa gaccuguuu aucagccgca	2640
aaacuuaccg gaucgauggc agcggccaaa uggcgaucaс uguggacguc gagguggcau	2700
cagacacucc acaccagca cggauccgac ucaauugcca acuggcucaa guggcugaga	2760
gagucaauug gcuggggccuc ggcccccaag agaacuaccc ugaucggcuu acugccgcau	2820
gcuuugaccg gugggaucug ccucugucgg auauguacac cccuacgug uucccauccg	2880
agaacggucu gagaugcggu acuagggagu ugaacuacgg accgcaccaa uggagggggg	2940
acuuucaguu caacaucuca agauacagcc agcagcaauu gauggaaacc ugcaccggc	3000
aucucuugca ugcagaggaa gggaccuggc ugaacaucga uggauuccac augggaauug	3060
guggggauga cuccuggucc ccuagcgugu ccgcggaacu ucagcugucc gccggccggu	3120
accacuacca gcucgugugg ugucaaaagu gauaaauaggc uggagccucg guggccaugc	3180
uucuugcccc uugggccucc cccagcccc uccucccuu ccugcacccg uacccccgug	3240
gucuuugaau aaagucugag ugggcggcuc uaga	3274

<210> 8
 <211> 1019
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> LacZ

<400> 8

Met	Ala	Leu	Ala	Val	Val	Leu	Gln	Arg	Arg	Asp	Trp	Glu	Asn	Pro	Gly
1				5				10						15	

Val	Thr	Gln	Leu	Asn	Arg	Leu	Ala	Ala	His	Pro	Pro	Phe	Ala	Ser	Trp
			20					25					30		

Arg Asn Ser Glu Glu Ala Arg Thr Asp Arg Pro Ser Gln Gln Leu Arg
35 40 45

Ser Leu Asn Gly Glu Trp Arg Phe Ala Trp Phe Pro Ala Pro Glu Ala
50 55 60

Val Pro Glu Ser Trp Leu Glu Cys Asp Leu Pro Glu Ala Asp Thr Val
65 70 75 80

Val Val Pro Ser Asn Trp Gln Met His Gly Tyr Asp Ala Pro Ile Tyr
85 90 95

Thr Asn Val Thr Tyr Pro Ile Thr Val Asn Pro Pro Phe Val Pro Thr
100 105 110

Glu Asn Pro Thr Gly Cys Tyr Ser Leu Thr Phe Asn Val Asp Glu Ser
115 120 125

Trp Leu Gln Glu Gly Gln Thr Arg Ile Ile Phe Asp Gly Val Asn Ser
130 135 140

Ala Phe His Leu Trp Cys Asn Gly Arg Trp Val Gly Tyr Gly Gln Asp
145 150 155 160

Ser Arg Leu Pro Ser Glu Phe Asp Leu Ser Ala Phe Leu Arg Ala Gly
165 170 175

Glu Asn Arg Leu Ala Val Met Val Leu Arg Trp Ser Asp Gly Ser Tyr
180 185 190

Leu Glu Asp Gln Asp Met Trp Arg Met Ser Gly Ile Phe Arg Asp Val
195 200 205

Ser Leu Leu His Lys Pro Thr Thr Gln Ile Ser Asp Phe His Val Ala
210 215 220

Thr Arg Phe Asn Asp Asp Phe Ser Arg Ala Val Leu Glu Ala Glu Val
225 230 235 240

Gln Met Cys Gly Glu Leu Arg Asp Tyr Leu Arg Val Thr Val Ser Leu
245 250 255

Trp Gln Gly Glu Thr Gln Val Ala Ser Gly Thr Ala Pro Phe Gly Gly
260 265 270

Glu Ile Ile Asp Glu Arg Gly Gly Tyr Ala Asp Arg Val Thr Leu Arg
275 280 285

Leu Asn Val Glu Asn Pro Lys Leu Trp Ser Ala Glu Ile Pro Asn Leu
290 295 300

Tyr Arg Ala Val Val Glu Leu His Thr Ala Asp Gly Thr Leu Ile Glu
305 310 315 320

Ala Glu Ala Cys Asp Val Gly Phe Arg Glu Val Arg Ile Glu Asn Gly
325 330 335

Leu Leu Leu Leu Asn Gly Lys Pro Leu Leu Ile Arg Gly Val Asn Arg
340 345 350

His Glu His His Pro Leu His Gly Gln Val Met Asp Glu Gln Thr Met
355 360 365

Val Gln Asp Ile Leu Leu Met Lys Gln Asn Asn Phe Asn Ala Val Arg
370 375 380

Cys Ser His Tyr Pro Asn His Pro Leu Trp Tyr Thr Leu Cys Asp Arg
385 390 395 400

Tyr Gly Leu Tyr Val Val Asp Glu Ala Asn Ile Glu Thr His Gly Met
405 410 415

Val Pro Met Asn Arg Leu Thr Asp Asp Pro Arg Trp Leu Pro Ala Met
420 425 430

Ser Glu Arg Val Thr Arg Met Val Gln Arg Asp Arg Asn His Pro Ser
435 440 445

Val Ile Ile Trp Ser Leu Gly Asn Glu Ser Gly His Gly Ala Asn His
450 455 460

Asp Ala Leu Tyr Arg Trp Ile Lys Ser Val Asp Pro Ser Arg Pro Val
465 470 475 480

Gln Tyr Glu Gly Gly Gly Ala Asp Thr Thr Ala Thr Asp Ile Ile Cys
485 490 495

Pro Met Tyr Ala Arg Val Asp Glu Asp Gln Pro Phe Pro Ala Val Pro
500 505 510

Lys Trp Ser Ile Lys Lys Trp Leu Ser Leu Pro Gly Glu Thr Arg Pro
515 520 525

Leu Ile Leu Cys Glu Tyr Ala His Ala Met Gly Asn Ser Leu Gly Gly
530 535 540

Phe Ala Lys Tyr Trp Gln Ala Phe Arg Gln Tyr Pro Arg Leu Gln Gly
545 550 555 560

Gly Phe Val Trp Asp Trp Val Asp Gln Ser Leu Ile Lys Tyr Asp Glu
565 570 575

Asn Gly Asn Pro Trp Ser Ala Tyr Gly Gly Asp Phe Gly Asp Thr Pro
580 585 590

Asn Asp Arg Gln Phe Cys Met Asn Gly Leu Val Phe Ala Asp Arg Thr
595 600 605

Pro His Pro Ala Leu Thr Glu Ala Lys His Gln Gln Gln Phe Phe Gln
610 615 620

Phe Arg Leu Ser Gly Gln Thr Ile Glu Val Thr Ser Glu Tyr Leu Phe
625 630 635 640

Arg His Ser Asp Asn Glu Leu Leu His Trp Met Val Ala Leu Asp Gly
645 650 655

Lys Pro Leu Ala Ser Gly Glu Val Pro Leu Asp Val Ala Pro Gln Gly
660 665 670

Lys Gln Leu Ile Glu Leu Pro Glu Leu Pro Gln Pro Glu Ser Ala Gly
675 680 685

Gln Leu Trp Leu Thr Val Arg Val Val Gln Pro Asn Ala Thr Ala Trp
690 695 700

Ser Glu Ala Gly His Ile Ser Ala Trp Gln Gln Trp Arg Leu Ala Glu
705 710 715 720

Asn Leu Ser Val Thr Leu Pro Ala Ala Ser His Ala Ile Pro His Leu
725 730 735

Thr Thr Ser Glu Met Asp Phe Cys Ile Glu Leu Gly Asn Lys Arg Trp
740 745 750

Gln Phe Asn Arg Gln Ser Gly Phe Leu Ser Gln Met Trp Ile Gly Asp
755 760 765

Lys Lys Gln Leu Leu Thr Pro Leu Arg Asp Gln Phe Thr Arg Ala Pro
770 775 780

Leu Asp Asn Asp Ile Gly Val Ser Glu Ala Thr Arg Ile Asp Pro Asn
785 790 795 800

Ala Trp Val Glu Arg Trp Lys Ala Ala Gly His Tyr Gln Ala Glu Ala
805 810 815

Ala Leu Leu Gln Cys Thr Ala Asp Thr Leu Ala Asp Ala Val Leu Ile
820 825 830

Thr Thr Ala His Ala Trp Gln His Gln Gly Lys Thr Leu Phe Ile Ser
835 840 845

Arg Lys Thr Tyr Arg Ile Asp Gly Ser Gly Gln Met Ala Ile Thr Val
850 855 860

Asp Val Glu Val Ala Ser Asp Thr Pro His Pro Ala Arg Ile Gly Leu
865 870 875 880

Asn Cys Gln Leu Ala Gln Val Ala Glu Arg Val Asn Trp Leu Gly Leu
885 890 895

Gly Pro Gln Glu Asn Tyr Pro Asp Arg Leu Thr Ala Ala Cys Phe Asp
900 905 910

Arg Trp Asp Leu Pro Leu Ser Asp Met Tyr Thr Pro Tyr Val Phe Pro
915 920 925

Ser Glu Asn Gly Leu Arg Cys Gly Thr Arg Glu Leu Asn Tyr Gly Pro
930 935 940

His Gln Trp Arg Gly Asp Phe Gln Phe Asn Ile Ser Arg Tyr Ser Gln
945 950 955 960

Gln Gln Leu Met Glu Thr Ser His Arg His Leu Leu His Ala Glu Glu
965 970 975

Gly Thr Trp Leu Asn Ile Asp Gly Phe His Met Gly Ile Gly Gly Asp
980 985 990

Asp Ser Trp Ser Pro Ser Val Ser Ala Glu Leu Gln Leu Ser Ala Gly
995 1000 1005

Arg Tyr His Tyr Gln Leu Val Trp Cys Gln Lys
1010 1015

<210> 9
<211> 3057
<212> RNA
<213> Artificial Sequence

<220>
<223> LacZ ORF nucleotide sequence

<220>
<221> misc_feature
<222> (1)..(3057)
<223> A = AMP, C = CMP, G = GMP, U = N1-methyl-pseudoUMP

<400> 9
auggccuugg cugucguccu gcaaagaaga gauugggaaa auccuggagu uacgcaacug 60
aauagacucg ccgcacaucc accguucgcg uccuggcgaa auagcgaaga agcgcggacc 120
gacagaccuu cgcagcagcu ggcgcucucuc aacggggaau ggcgguucgc augguuuccg 180

gcuccugagg	cagucccgga	aagcuggcuc	gagugcgacc	ucccggaagc	cgauacggug	240
guggugccgu	caaaauuggca	aaugcaugga	uacgacgccc	ccaucucacac	caacgucacu	300
uacccuauca	ccgugaaucc	cccauucguc	ccgacugaga	acccgacugg	augcuacagc	360
cugaccuuua	acguggacga	gucguggcug	caagaagggc	agacucgcac	cauuuucgac	420
ggagucaacu	ccgcguucca	ucuuuggugu	aacggacggg	gggugggga	cgggcaggac	480
uccaggcugc	cgagcgaauu	cgacuuguca	gccuuccugc	gcgccggcga	aaaccgccug	540
gcugucaugg	uccuuagaug	gucggauggc	ucguaccugg	aggauacagga	cauguggagg	600
augucaggga	ucuuccggga	ugucucgcug	cuccacaagc	caacuaccca	gaucuccgac	660
uuucaugugg	ccacccgcuu	caacgaugac	uucagcaggg	cggauucugga	agccgaggug	720
caaaugugcg	gagaacugag	ggacuaccuc	cgcgugacug	ucucgcucug	gcagggugaa	780
acccaagugg	cuucaggcac	ugcaccguuc	ggaggagaaa	ucaucgacga	acggggagga	840
uacgccgauc	gcgucacccu	gcgccucaau	guggaaaauc	cgaaacugug	gucggcagaa	900
aucccuaauu	uguaccgggc	cgugguggag	cugcacaccg	ccgacggaac	ucugaucgag	960
gccgaggcau	gcgauguggg	auuccgcgag	guccgcaucg	aaaauggacu	gcuucugcuu	1020
aauggcaaac	cgcugcucac	ccgcggagug	aacagacacg	agcaucaccc	gcugcacggg	1080
caggucaugg	augaacagac	uauggugcaa	gacauccugc	ugaugaaaca	aaacaacuuc	1140
aacgccguuc	ggugcuccca	uuaccuauu	cacccguugu	ggauuacccu	uugcgauagg	1200
uacggccucu	acguggugga	cgaagcgaac	aucgagacuc	acggaauugu	cccuaugaac	1260
cgccucacug	acgacccgag	guggcucccg	gcaaugucgg	aacgagugac	ucggauggug	1320
cagagggacc	gcaaccaucc	gucggugaua	aucuggucgc	uggggaacga	aucuggccac	1380
ggagcuaacc	acgaugcgcu	guaccgcugg	auuaaguccg	uggacccaag	ccggcccugc	1440
caguacgaag	gagguggugc	ugauaccacu	gcaaccgaca	ucaucugccc	aauguaugcg	1500
cggguggaug	aggaccaacc	uuucccgcg	gugccaaagu	gguccaucaa	gaaauggcuc	1560
ucgcugcccg	gagaaacgcg	cccgcucauc	cugugcgaau	augcgcacgc	uaugggaaau	1620
ucacuggggg	gauuugcgaa	guacuggcag	gcuuuucgac	aguacccgag	acuccagggg	1680
ggcuucgugu	gggacugggu	ugaccagagc	cucaucaaau	acgaugaaaa	cggcaaccca	1740
ugguccgcgu	acggcggaga	cuuuggagac	accccuaacg	aucgccaguu	cugcaugaac	1800

ggccuggugu	ucgccgacag	aacuccgcau	ccagcccuua	cugaggcuaa	gcaccaacaa	1860
caguucuucc	aguucagacu	gucggggcaa	acgaucgaag	ugacuuccga	auaccucuuc	1920
cggcauucgg	acaacgagu	gcugcacugg	auggucgccc	uggauggaaa	gccccucgcc	1980
uccggagaag	ugccgcucga	cguggcgccg	cagggaaagc	aguugaucga	guugccggaa	2040
cugccacagc	ccgagucagc	aggacagcuc	uggcuuaccg	ucagagucgu	gcagccaaau	2100
gccaccgccu	ggucggaggc	aggacauauu	ucagccuggc	agcaguggcg	ccucgccgag	2160
aaucugagcg	ugaccuugcc	agcagccuca	cacgccauuc	cgcaucugac	cacguccgaa	2220
auggacuuuu	guaucgaacu	ggggaauaag	cgucggcagu	ucaaucggca	aucaggcuuc	2280
cugucccaga	uguggauugg	ugacaagaag	cagcuccuga	ccccgcugcg	cgaucaguuc	2340
acucgcgccc	cacuugacaa	cgacauuggc	gugagcgagg	ccacgcguau	cgauccaaac	2400
gcuuggggugg	agcgcuggaa	ggcggcuggc	cacuaucagg	cggaggccgc	gcuccugcag	2460
uguaccgcgg	auaccucgc	agacgccguu	cugauuacca	cggcgcaugc	cuggcaacac	2520
cagggaaaga	cccuguuuau	cagccgcaaa	acuuaccgga	ucgauggcag	cggccaaaug	2580
gcgaucacug	uggacgucga	gguggcauca	gacacuccac	accagcacg	gaucggacuc	2640
aaaugccaac	uggcucaagu	ggcugagaga	gucaauuggc	ugggccucgg	cccccaagag	2700
aacuaccug	aucggcuuac	ugccgcaugc	uuugaccggu	gggaucugcc	ucugucggau	2760
auguacaccc	ccuacguguu	cccauccgag	aacggucuga	gaugcgguac	uagggaguug	2820
aacuacggac	cgcaccaaug	gaggggggac	uuucaguuca	acaucucaag	auacagccag	2880
cagcaauuga	uggaaaccuc	gcaccggcau	cucuugcaug	cagaggaagg	gaccuggcug	2940
aacaucgaug	gauuccacau	gggaauuggu	ggggaugacu	ccuggucucc	uagcgugucc	3000
gcggaacuuc	agcuguccgc	cggccgguac	cacuaccagc	ucguguggug	uacaaaag	3057