

IOWA_P0117WO-SeqListing
SEQUENCE LISTING

<110> THE UNIVERSITY OF IOWA RESEARCH FOUNDATION

<120> VIRAL RNA SEGMENTS AS IMMUNOMODULATORY AGENTS AND VACCINE COMPONENTS

<130> IOWA.P0117WO

<140> Unknown

<141> 2015-09-09

<150> US 62/051,727

<151> 2014-09-17

<160> 43

<170> PatentIn version 3.5

<210> 1

<211> 9401

<212> DNA

<213> Hepatitis C virus

<400> 1

gccagcccc tgatgggggc gacactccac catgaatcac tcccctgtga ggaactactg	60
tcttcacgca gaaagcgtct agccatggcg ttagtatgag tgtcgtgcag cctccaggac	120
ccccctccc gggagagcca tagtgggtctg cggaaccggt gagtacaccg gaattgccag	180
gacgaccggg tcctttcttg gatcaacccg ctcaatgcct ggagatttgg gcgtgcccc	240
gcaagactgc tagccgagta gtgttgggtc gcgaaaggcc ttgtgggtact gcctgatagg	300
gtgcttgca gtgccccggg aggtctcgta gaccgtgcac catgagcacg aatcctaaac	360
ctcaaaaaaaaa aaacaaacgt aacaccaacc gtcgcccaca ggacgtcaag ttcccgggtg	420
gcggtcagat cgttgggtgga gtttacttgt tgccgcgcag gggccctaga ttgggtgtgc	480
gcgcgacgag aaagacttcc gagcgggtcg aacctcgagg tagacgtcag cctatcccca	540
aggctcgtcg gcccgagggc aggacctggg ctgagcccgg gtacccttgg cccctctatg	600
gcaatgaggg ctgcgggttg gcgggatggc tcctgtctcc ccgtgggtct cggcctagct	660
ggggccccac agacccccgg cgtaggctcg gcaatttggg taaggatcatc gataccctta	720

IOWA_P0117WO-SeqListing

cgtgcggctt cgccgacctc atgggggtaca taccgctcgt cggcgccccct cttggaggcg	780
ctgccagggc cctggcgcat ggcgtccggg ttcttgaaga cggcgtgaac tatgcaacag	840
ggaaccttcc tggttgctct ttctctatct tccttctggc cctgctctct tgcttgactg	900
tgcccgttc ggcctaccaa gtgcgcaact ccacggggct ttaccacgtc accaatgatt	960
gccctaactc gagtattgtg tacgaggcgg ccgatgccat cctgcacact ccgggggtgcg	1020
tcccttgctg tcgtgagggc aacgcctcga ggtgttgggt ggcgatgacc cctacgggtgg	1080
ccaccaggga tggcaaacct cccgcgacgc agcttcgacg tcacatcgat ctgcttgtcg	1140
ggagcgccac cctctgttcg gccctctacg tgggggacct atgcgggtct gtctttcttg	1200
tcggccaact gttcaccttc tctcccaggc gccactggac gacgcaaggt tgcaattgct	1260
ctatctatcc cggccatata acgggtcacc gcatggcatg ggatatgatg atgaactggt	1320
cccctacgac ggcgttggtg atggctcagc tgctccggat ccacacaagcc atcttgga	1380
tgatcgctgg tgctcactgg ggagtcctgg cgggcatagc gtatttctcc atggtgggga	1440
actgggcgaa ggtcctggta gtgctgctgc tatttgccgg cgtcgacgcg gaaaccacg	1500
tcaccggggg aagtgccggc cacactgtgt ctggatttgt tagcctcctc gcaccaggcg	1560
ccaagcagaa cgtccagctg atcaacacca acggcagttg gcacctcaat agcacggccc	1620
tgaactgcaa tgatagcctc aacaccggct ggttggcagg gcttttctat caccacaagt	1680
tcaactcttc aggctgtcct gagaggctag ccagctgccg accccttacc gattttgacc	1740
agggtgggg ccctatcagt tatgccaacg gaagcggccc cgaccagcg ccctactgct	1800
ggcactaccc cccaaaacct tgcggtattg tgcccgcgaa gagtgtgtgt ggtccggtat	1860
attgcttcac tcccagcccc gtggtggtgg gaacgaccga caggtcgggc gcgcccacct	1920
acagctgggg tgaaaatgat acggacgtct tcgtccttaa caataccagg ccaccgctgg	1980
gcaattggtt cggttgatc tggatgaact caactggatt caccaaagtg tgcggagcgc	2040
ctccttgtgt catcggaggg gcgggcaaca acaccctgca ctgccccact gattgcttcc	2100
gcaagcatcc ggacgccaca tactctcggg gcggctccgg tccctggatc acaccaggt	2160

IOWA_P0117WO-SeqListing

gcctggtcga ctacccgtat aggctttggc attatccttg taccatcaac tacaccatat	2220
ttaaaatcag gatgtacgtg ggagggggtcg aacacaggct ggaagctgcc tgcaactgga	2280
cgcggggcga acgttgcgat ctggaagaca gggacaggtc cgagctcagc ccgttactgc	2340
tgaccactac acagtggcag gtcctcccgt gttccttcac aaccctacca gccttgtcca	2400
ccggcctcat ccacctccac cagaacattg tggacgtgca gtacttgtac ggggtggggt	2460
caagcatcgc gtcctgggcc attaatggg agtacgtcgt tctcctgttc cttctgcttg	2520
cagacgcgcg cgtctgctcc tgcttgtgga tgatgctact catatcccaa gcggaggcgg	2580
ctttggagaa cctcgaata cttaatgcag catccctggc cgggacgcac ggtcttgtat	2640
ccttcctcgt gttcttctgc tttgcatggg atttgaaggg taagtgggtg cccggagcgg	2700
tctacacctt ctacgggatg tggcctctcc tcctgctcct gttggcgttg ccccagcggg	2760
cgtacgcgct ggacacggag gtggccgcgt cgtgtggcgg tgttgttctc gtcgggttga	2820
tggcgctgac tctgtcacca tattacaagc gctatatcag ctggtgcttg tggtagcttc	2880
agtattttct gaccagagtg gaagcgcaac tgcacgtgtg gattcccccc ctcaacgtcc	2940
gaggggggcg cgacgccgtc atcttactca tgtgtgctgt acacccgact ctggtatttg	3000
acatcaccaa attgctgctg gccgtcttcg gacccctttg gattcttcaa gccagtttgc	3060
ttaaagtacc ctactttgtg cgcgtccaag gccttctccg gttctgcgcg ttagcgcgga	3120
agatgatcgg aggccattac gtgcaaatgg tcatcattaa gtagggggcg cttactggca	3180
cctatgttta taaccatctc actcctcttc gggactgggc gcacaacggc ttgcgagatc	3240
tggccgtggc tgtagagcca gtcgtcttct cccaaatgga gaccaagctc atcacgtggg	3300
gggcagatac cgccgcgtgc ggtgacatca tcaacggctt gcctgtttcc gcccgcaggg	3360
gccgggagat actgctcggg ccagccgatg gaatggtctc caaggggtgg aggttgctgg	3420
cgcccatcac ggcgtacgcc cagcagacaa ggggcctcct aggggtgcata atcaccagcc	3480
taactggccg ggacaaaaac caagtggagg gtgaggtcca gatttgttca actgctgccc	3540
aaaccttcct ggcaacgtgc atcaatgggg tgtgctggac tgtctaccac ggggccggaa	3600

IOWA_P0117WO-SeqListing

cgaggacat	cgcgtcacc	aagggtcctg	tcatccagat	gtataccaat	gtagaccaag	3660
accttgtggg	ctggcccgt	ccgcaaggta	gccgctcatt	gacaccctgc	acttgcggct	3720
cctcggacct	ttacctggtc	acgaggcacg	ccgatgtcat	tcccgtgcgc	cggcgggggtg	3780
atagcagggg	cagcctgctg	tcgccccggc	ccatttccta	cttgaaaggc	tcctcggggg	3840
gtccgctgtt	gtgccccgcg	gggcacgccg	tgggcatatt	tagggccgcg	gtgtgcaccc	3900
gtggagtggc	taaggcgggtg	gactttatcc	ctgtggagaa	cctagagaca	accatgaggt	3960
ccccggtgtt	cacggataac	tcctctccac	cagtagtgcc	ccagagcttc	caggtggctc	4020
acctccatgc	tcccacaggc	agcggcaaaa	gcaccaaggt	cccggctgca	tatgcagctc	4080
agggctataa	ggtgctagta	ctcaaccctt	ctgttgctgc	aacactgggc	tttgggtgctt	4140
acatgtccaa	ggctcatggg	atcgatccta	acatcaggac	cggggtgaga	acaattacca	4200
ctggcagccc	catcacgtac	tccacctacg	gcaagttcct	tgccgacggc	gggtgctcgg	4260
ggggcgctta	tgacataata	atttgtgacg	agtgccactc	cacggatgcc	acatccatct	4320
tgggcatcgg	cactgtcctt	gaccaagcag	agactgcggg	ggcgagactg	gttgtgctcg	4380
ccaccgccac	ccctccgggc	tccgtcactg	tgccccatcc	caacatcgag	gaggttgctc	4440
tgtccaccac	cggagagatc	ccttttttacg	gcaaggctat	ccccctcgaa	gtaatcaagg	4500
gggggagaca	tctcatcttc	tgtcattcaa	agaagaagtg	cgacgaactc	gccgcaaagc	4560
tggtcgcatt	gggcatcaat	gccgtggcct	actaccgcgg	tcttgacgtg	tccgtcatcc	4620
cgaccagcgg	cgatgttgtc	gtcgtggcaa	ccgatgccct	catgaccggc	tataccggcg	4680
acttcgactc	ggtgatagac	tgcaatacgt	gtgtcaccca	gacagtcgat	ttcagccttg	4740
accctacctt	caccattgag	acaatcacgc	tccccagga	tgctgtctcc	cgcactcaac	4800
gtcggggcag	gactggcagg	gggaagccag	gcatctacag	atttgtggca	ccgggggagc	4860
gccccctcgg	catgttcgac	tcgtccgtcc	tctgtgagtg	ctatgacgca	ggctgtgctt	4920
ggtatgagct	cacgcccgcc	gagactacag	ttaggctacg	agcgtacatg	aacaccccgg	4980
ggcttcccgt	gtgccaggac	catcttgaat	tttgggaggg	cgtctttaca	ggcctcactc	5040

IOWA_P0117WO-SeqListing

atatagatgc ccactttcta tcccagacaa agcagagtgg ggagaacctt ccttacctgg	5100
tagcgtacca agccaccgtg tgcgctaggg ctcaagcccc tcccccatcg tgggaccaga	5160
tgtggaagtg tttgattcgc ctcaagccca ccctccatgg gccaacaccc ctgctataca	5220
gactgggctg tggttcagaat gaaatcaccc tgacgcaccc agtcaccaaa tacatcatga	5280
catgcatgtc ggccgacctg gaggtcgtca cgagcacctg ggtgctcgtt ggcggtcgtcc	5340
tggctgcttt ggccgcgtat tgcctgtcaa caggctgcgt ggtcatagtg ggcagggtcg	5400
tcttgtccgg gaagccggca atcatacctg acaggggaagt cctctaccga gagttcgtatg	5460
agatggaaga gtgctctcag cacttacctg acatcgagca agggatgatg ctgccgagc	5520
agttcaagca gaaggccctc ggcctcctgc agaccgcgtc ccgtcaggca gaggttatcg	5580
cccctgctgt ccagaccaac tggcaaaaac tcgagacctt ctgggcgaag catatgtgga	5640
acttcatcag tgggatacaa tacttggcgg gcttgtcaac gctgcctggt aaccccgcca	5700
ttgcttcatt gatggctttt acagctgctg tcaccagccc actaaccact agccaaaccc	5760
tcctcttcaa catattgggg ggggtgggtgg ctgcccagct cgccgcccc ggtgccgcta	5820
ctgcctttgt gggcgctggc ttagctggcg ccgccatcgg cagtgttgga ctggggaagg	5880
tcctcataga catccttgca gggtatggcg cgggcgtggc gggagctctt gtggcattca	5940
agatcatgag cggtgaggtc ccctccacgg aggacctggt caatctactg cccgccatcc	6000
tctcgcccgg agccctcgta gtcggcgtgg tctgtgcagc aatactgcgc cggcacgttg	6060
gcccgggcga gggggcagtg cagtggatga accggctgat agccttcgcc tcccggggga	6120
accatgtttc cccacgcac tacgtgccgg agagcgatgc agctgcccgc gtcactgcca	6180
tactcagcag cctcactgta acccagctcc tgaggcgact gcaccagtgg ataagctcgg	6240
agtgtaccac tccatgctcc gggtcctggc taaggacat ctgggactgg atatgcgagg	6300
tgttgagcga ctttaagacc tggctaaaag ctaagctcat gccacagctg cctgggatcc	6360
cctttgtgtc ctgccagcg ggggtataagg gggctctggcg agtggacggc atcatgcaca	6420
ctcgtgcca ctgtggagct gagatcactg gacatgtcaa aaacgggacg atgaggatcg	6480

IOWA_P0117WO-SeqListing

tcggtcctag gacctgcagg aacatgtgga gtgggacctt ccccattaat gcctacacca	6540
cgggcccctg tccccccctt cctgcgccga actacacgtt cgcgctatgg aggggtgtctg	6600
cagaggaata tgtggagata aggcagggtg gggacttcca ctacgtgacg ggtatgacta	6660
ctgacaatct caaatgcccg tgccagggtcc catcgcccga atttttcaca gaattggacg	6720
gggtgcgctt acatagggtt gcgccccctt gcaagccctt gctgcgggag gaggtatcat	6780
tcagagtagg actccacgaa taccggtag ggtcgcaatt accttgcgag cccgaaccgg	6840
acgtggccgt gttgacgtcc atgctcactg atccctcca tataacagca gaggcggccg	6900
ggcgaagggt ggcgagggga tcacccccct ctgtggccag ctctcggct agccagctat	6960
ccgctccatc tctcaaggca acttgcaccg ctaaccatga ctcccctgat gctgagctca	7020
tagaggccaa cctcctatgg aggcaggaga tgggcggcaa catcaccagg gttgagtcag	7080
aaaacaaagt ggtgattctg gactccttcg atccgcttgt ggcgaggag gacgagcggg	7140
agatctccgt acccgagaa atcctgcgga agtctcggag attcgcccag gccctgcccg	7200
tttgggcgcg gccggactat aacccccgc tagtggagac gtggaaaaag cccgactacg	7260
aaccacctgt ggtccatggc tgtccgttc cacctcaaaa gtcccctcct gtgcctccgc	7320
ctcgaagaa gcggacggtg gtcctcactg aatcaaccct atctactgcc ttggccgagc	7380
tcgccaccag aagctttggc agctcctcaa cttccggcat tacgggcgac aatacgacaa	7440
catcctctga gcccgcctt tctggctgcc ccccgactc cgacgctgag tcctattcct	7500
ccatgcccc cctggagggg gagcctgggg atccggatct tagcgacggg tcatggtcaa	7560
cggtcagtag tgaggccaac gcggaggatg tcgtgtgctg ctcaatgtct tactcttgga	7620
caggcgcact cgtcaccccg tgcgccgcgg aagaacagaa actgcccac aatgcactaa	7680
gcaactcgtt gctacgtcac cacaatttgg tgtattccac cacctcacgc agtgcttgcc	7740
aaaggcagaa gaaagtcaca tttagacagac tgcaagttct ggacagccat taccaggacg	7800
tactcaagga ggttaaagca gcggcgtcaa aagtgaaggc taacttgcta tccgtagagg	7860
aagcttgacg cctgacgccc ccacactcag ccaaatacaa gtttggttat ggggcaaaag	7920

IOWA_P0117WO-SeqListing

acgtccgttg ccatgccaga aaggccgtaa cccacatcaa ctccgtgtgg aaagaccttc	7980
tggaagacaa tgtaacacca atagacacta ccatcatggc taagaacgag gttttctgcg	8040
ttcagcctga gaaggggggt cgtaagccag ctctgtctcat cgtgttcccc gatctgggcg	8100
tgcgcgtgtg cgaaaagatg gctttgtacg acgtggttac aaagctcccc ttggccgtga	8160
tgggaagctc ctacggattc caatactcac caggacagcg ggttgaattc ctctgcaag	8220
cgtggaagtc caagaaaacc ccaatgggggt tctcgtatga taccgctgc tttgactcca	8280
cagtcactga gagcgacatc cgtacggagg aggcaatcta ccaatgttgt gacctcgacc	8340
cccaagcccc cgtggccatc aagtccctca ccgagaggct ttatgttggg ggccctctta	8400
ccaattcaag ggggggagaac tgcggctatc gcagggtgccg cgcgagcggc gtactgacaa	8460
ctagctgtgg taacaccctc acttgctaca tcaaggcccc ggcagcctgt cgagccgcag	8520
ggctccagga ctgcaccatg ctctgtgtgt gcgacgactt agtcgttatc tgtgaaagcg	8580
cgggggtcca ggaggacgcg gcgagcctga gagccttcac ggaggctatg accaggtact	8640
ccgccccccc tggggacccc ccacaaccag aatacgactt ggagctcata acatcatgct	8700
cctccaacgt gtcagtcgcc cacgacggcg ctggaaagag ggtctactac ctcacccgtg	8760
accctacaac ccccctcgcg agagctgcgt gggagacagc aagacacact ccagtcaatt	8820
cctggctagg caacataatc atgtttgccc ccacactgtg ggcgaggatg atactgatga	8880
cccatttctt tagcgtcctt atagccaggg accagcttga acaggccctc gattgcgaga	8940
tctacggggc ctgctactcc atagaaccac ttgatctacc tccaatcatt caaagactcc	9000
atggcctcag cgcatthttca ctccacagtt actctccagg tgaaattaat aggggtggccg	9060
catgcctcag aaaacttggg gtaccgccct tgcgagcttg gagacaccgg gcccggagcg	9120
tccgcgctag gcttctggcc agaggaggca gggctgccat atgtggcaag tacctcttca	9180
actgggcagt aagaacaaag ctcaaactca ctccaatagc ggccgctggc cagctggact	9240
tgtccggctg gttcacggct ggctacagcg ggggagacat ttatcacagc gtgtctcatg	9300
cccggccccg ctggatctgg ttttgccctac tcctgcttgc tgcaggggta ggcatctacc	9360

IOWA_P0117WO-SeqListing

tcctcccca cccgatgaagg ttggggtaaa cactccggcc t

9401

<210> 2
 <211> 3011
 <212> PRT
 <213> Hepatitis C virus

<400> 2

Met Ser Thr Asn Pro Lys Pro Gln Lys Lys Asn Lys Arg Asn Thr Asn
 1 5 10 15

Arg Arg Pro Gln Asp Val Lys Phe Pro Gly Gly Gly Gln Ile Val Gly
 20 25 30

Gly Val Tyr Leu Leu Pro Arg Arg Gly Pro Arg Leu Gly Val Arg Ala
 35 40 45

Thr Arg Lys Thr Ser Glu Arg Ser Gln Pro Arg Gly Arg Arg Gln Pro
 50 55 60

Ile Pro Lys Ala Arg Arg Pro Glu Gly Arg Thr Trp Ala Gln Pro Gly
 65 70 75 80

Tyr Pro Trp Pro Leu Tyr Gly Asn Glu Gly Cys Gly Trp Ala Gly Trp
 85 90 95

Leu Leu Ser Pro Arg Gly Ser Arg Pro Ser Trp Gly Pro Thr Asp Pro
 100 105 110

Arg Arg Arg Ser Arg Asn Leu Gly Lys Val Ile Asp Thr Leu Thr Cys
 115 120 125

Gly Phe Ala Asp Leu Met Gly Tyr Ile Pro Leu Val Gly Ala Pro Leu
 130 135 140

Gly Gly Ala Ala Arg Ala Leu Ala His Gly Val Arg Val Leu Glu Asp

IOWA_P0117WO-SeqListing

145		150		155		160									
Gly	Val	Asn	Tyr	Ala	Thr	Gly	Asn	Leu	Pro	Gly	Cys	Ser	Phe	Ser	Ile
				165					170					175	
Phe	Leu	Leu	Ala	Leu	Leu	Ser	Cys	Leu	Thr	Val	Pro	Ala	Ser	Ala	Tyr
			180					185					190		
Gln	Val	Arg	Asn	Ser	Thr	Gly	Leu	Tyr	His	Val	Thr	Asn	Asp	Cys	Pro
		195						200				205			
Asn	Ser	Ser	Ile	Val	Tyr	Glu	Ala	Ala	Asp	Ala	Ile	Leu	His	Thr	Pro
	210					215					220				
Gly	Cys	Val	Pro	Cys	Val	Arg	Glu	Gly	Asn	Ala	Ser	Arg	Cys	Trp	Val
225					230					235					240
Ala	Met	Thr	Pro	Thr	Val	Ala	Thr	Arg	Asp	Gly	Lys	Leu	Pro	Ala	Thr
				245					250					255	
Gln	Leu	Arg	Arg	His	Ile	Asp	Leu	Leu	Val	Gly	Ser	Ala	Thr	Leu	Cys
		260						265					270		
Ser	Ala	Leu	Tyr	Val	Gly	Asp	Leu	Cys	Gly	Ser	Val	Phe	Leu	Val	Gly
		275						280				285			
Gln	Leu	Phe	Thr	Phe	Ser	Pro	Arg	Arg	His	Trp	Thr	Thr	Gln	Gly	Cys
	290					295					300				
Asn	Cys	Ser	Ile	Tyr	Pro	Gly	His	Ile	Thr	Gly	His	Arg	Met	Ala	Trp
305					310					315				320	
Asp	Met	Met	Met	Asn	Trp	Ser	Pro	Thr	Thr	Ala	Leu	Val	Met	Ala	Gln
				325					330					335	
Leu	Leu	Arg	Ile	Pro	Gln	Ala	Ile	Leu	Asp	Met	Ile	Ala	Gly	Ala	His

IOWA_P0117WO-SeqListing

340

345

350

Trp Gly Val Leu Ala Gly Ile Ala Tyr Phe Ser Met Val Gly Asn Trp
 355 360 365

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

Thr His Val Thr Gly Gly Ser Ala Gly His Thr Val Ser Gly Phe Val
 385 390 395 400

Ser Leu Leu Ala Pro Gly Ala Lys Gln Asn Val Gln Leu Ile Asn Thr
 405 410 415

Asn Gly Ser Trp His Leu Asn Ser Thr Ala Leu Asn Cys Asn Asp Ser
 420 425 430

Leu Asn Thr Gly Trp Leu Ala Gly Leu Phe Tyr His His Lys Phe Asn
 435 440 445

Ser Ser Gly Cys Pro Glu Arg Leu Ala Ser Cys Arg Pro Leu Thr Asp
 450 455 460

Phe Asp Gln Gly Trp Gly Pro Ile Ser Tyr Ala Asn Gly Ser Gly Pro
 465 470 475 480

Asp Gln Arg Pro Tyr Cys Trp His Tyr Pro Pro Lys Pro Cys Gly Ile
 485 490 495

Val Pro Ala Lys Ser Val Cys Gly Pro Val Tyr Cys Phe Thr Pro Ser
 500 505 510

Pro Val Val Val Gly Thr Thr Asp Arg Ser Gly Ala Pro Thr Tyr Ser
 515 520 525

Trp Gly Glu Asn Asp Thr Asp Val Phe Val Leu Asn Asn Thr Arg Pro

IOWA_P0117W0-SeqListing

530

535

540

Pro Leu Gly Asn Trp Phe Gly Cys Thr Trp Met Asn Ser Thr Gly Phe
545 550 555 560

Thr Lys Val Cys Gly Ala Pro Pro Cys Val Ile Gly Gly Ala Gly Asn
565 570 575

Asn Thr Leu His Cys Pro Thr Asp Cys Phe Arg Lys His Pro Asp Ala
580 585 590

Thr Tyr Ser Arg Cys Gly Ser Gly Pro Trp Ile Thr Pro Arg Cys Leu
595 600 605

Val Asp Tyr Pro Tyr Arg Leu Trp His Tyr Pro Cys Thr Ile Asn Tyr
610 615 620

Thr Ile Phe Lys Ile Arg Met Tyr Val Gly Gly Val Glu His Arg Leu
625 630 635 640

Glu Ala Ala Cys Asn Trp Thr Arg Gly Glu Arg Cys Asp Leu Glu Asp
645 650 655

Arg Asp Arg Ser Glu Leu Ser Pro Leu Leu Leu Thr Thr Thr Gln Trp
660 665 670

Gln Val Leu Pro Cys Ser Phe Thr Thr Leu Pro Ala Leu Ser Thr Gly
675 680 685

Leu Ile His Leu His Gln Asn Ile Val Asp Val Gln Tyr Leu Tyr Gly
690 695 700

Val Gly Ser Ser Ile Ala Ser Trp Ala Ile Lys Trp Glu Tyr Val Val
705 710 715 720

Leu Leu Phe Leu Leu Leu Ala Asp Ala Arg Val Cys Ser Cys Leu Trp

IOWA_P0117WO-SeqListing

725

730

735

Met Met Leu Leu Ile Ser Gln Ala Glu Ala Ala Leu Glu Asn Leu Val
 740 745 750

Ile Leu Asn Ala Ala Ser Leu Ala Gly Thr His Gly Leu Val Ser Phe
 755 760 765

Leu Val Phe Phe Cys Phe Ala Trp Tyr Leu Lys Gly Lys Trp Val Pro
 770 775 780

Gly Ala Val Tyr Thr Phe Tyr Gly Met Trp Pro Leu Leu Leu Leu Leu
 785 790 795 800

Leu Ala Leu Pro Gln Arg Ala Tyr Ala Leu Asp Thr Glu Val Ala Ala
 805 810 815

Ser Cys Gly Gly Val Val Leu Val Gly Leu Met Ala Leu Thr Leu Ser
 820 825 830

Pro Tyr Tyr Lys Arg Tyr Ile Ser Trp Cys Leu Trp Trp Leu Gln Tyr
 835 840 845

Phe Leu Thr Arg Val Glu Ala Gln Leu His Val Trp Ile Pro Pro Leu
 850 855 860

Asn Val Arg Gly Gly Arg Asp Ala Val Ile Leu Leu Met Cys Ala Val
 865 870 875 880

His Pro Thr Leu Val Phe Asp Ile Thr Lys Leu Leu Leu Ala Val Phe
 885 890 895

Gly Pro Leu Trp Ile Leu Gln Ala Ser Leu Leu Lys Val Pro Tyr Phe
 900 905 910

Val Arg Val Gln Gly Leu Leu Arg Phe Cys Ala Leu Ala Arg Lys Met

IOWA_P0117WO-SeqListing

915

920

925

Ile Gly Gly His Tyr Val Gln Met Val Ile Ile Lys Leu Gly Ala Leu
 930 935 940

Thr Gly Thr Tyr Val Tyr Asn His Leu Thr Pro Leu Arg Asp Trp Ala
 945 950 955 960

His Asn Gly Leu Arg Asp Leu Ala Val Ala Val Glu Pro Val Val Phe
 965 970 975

Ser Gln Met Glu Thr Lys Leu Ile Thr Trp Gly Ala Asp Thr Ala Ala
 980 985 990

Cys Gly Asp Ile Ile Asn Gly Leu Pro Val Ser Ala Arg Arg Gly Arg
 995 1000 1005

Glu Ile Leu Leu Gly Pro Ala Asp Gly Met Val Ser Lys Gly Trp
 1010 1015 1020

Arg Leu Leu Ala Pro Ile Thr Ala Tyr Ala Gln Gln Thr Arg Gly
 1025 1030 1035

Leu Leu Gly Cys Ile Ile Thr Ser Leu Thr Gly Arg Asp Lys Asn
 1040 1045 1050

Gln Val Glu Gly Glu Val Gln Ile Val Ser Thr Ala Ala Gln Thr
 1055 1060 1065

Phe Leu Ala Thr Cys Ile Asn Gly Val Cys Trp Thr Val Tyr His
 1070 1075 1080

Gly Ala Gly Thr Arg Thr Ile Ala Ser Pro Lys Gly Pro Val Ile
 1085 1090 1095

Gln Met Tyr Thr Asn Val Asp Gln Asp Leu Val Gly Trp Pro Ala

IOWA_P0117WO-SeqListing

1100

1105

1110

Pro Gln Gly Ser Arg Ser Leu Thr Pro Cys Thr Cys Gly Ser Ser
1115 1120 1125

Asp Leu Tyr Leu Val Thr Arg His Ala Asp Val Ile Pro Val Arg
1130 1135 1140

Arg Arg Gly Asp Ser Arg Gly Ser Leu Leu Ser Pro Arg Pro Ile
1145 1150 1155

Ser Tyr Leu Lys Gly Ser Ser Gly Gly Pro Leu Leu Cys Pro Ala
1160 1165 1170

Gly His Ala Val Gly Ile Phe Arg Ala Ala Val Cys Thr Arg Gly
1175 1180 1185

Val Ala Lys Ala Val Asp Phe Ile Pro Val Glu Asn Leu Glu Thr
1190 1195 1200

Thr Met Arg Ser Pro Val Phe Thr Asp Asn Ser Ser Pro Pro Val
1205 1210 1215

Val Pro Gln Ser Phe Gln Val Ala His Leu His Ala Pro Thr Gly
1220 1225 1230

Ser Gly Lys Ser Thr Lys Val Pro Ala Ala Tyr Ala Ala Gln Gly
1235 1240 1245

Tyr Lys Val Leu Val Leu Asn Pro Ser Val Ala Ala Thr Leu Gly
1250 1255 1260

Phe Gly Ala Tyr Met Ser Lys Ala His Gly Ile Asp Pro Asn Ile
1265 1270 1275

Arg Thr Gly Val Arg Thr Ile Thr Thr Gly Ser Pro Ile Thr Tyr

IOWA_P0117WO-SeqListing

1280

1285

1290

Ser Thr Tyr Gly Lys Phe Leu Ala Asp Gly Gly Cys Ser Gly Gly
 1295 1300 1305

Ala Tyr Asp Ile Ile Ile Cys Asp Glu Cys His Ser Thr Asp Ala
 1310 1315 1320

Thr Ser Ile Leu Gly Ile Gly Thr Val Leu Asp Gln Ala Glu Thr
 1325 1330 1335

Ala Gly Ala Arg Leu Val Val Leu Ala Thr Ala Thr Pro Pro Gly
 1340 1345 1350

Ser Val Thr Val Pro His Pro Asn Ile Glu Glu Val Ala Leu Ser
 1355 1360 1365

Thr Thr Gly Glu Ile Pro Phe Tyr Gly Lys Ala Ile Pro Leu Glu
 1370 1375 1380

Val Ile Lys Gly Gly Arg His Leu Ile Phe Cys His Ser Lys Lys
 1385 1390 1395

Lys Cys Asp Glu Leu Ala Ala Lys Leu Val Ala Leu Gly Ile Asn
 1400 1405 1410

Ala Val Ala Tyr Tyr Arg Gly Leu Asp Val Ser Val Ile Pro Thr
 1415 1420 1425

Ser Gly Asp Val Val Val Val Ala Thr Asp Ala Leu Met Thr Gly
 1430 1435 1440

Tyr Thr Gly Asp Phe Asp Ser Val Ile Asp Cys Asn Thr Cys Val
 1445 1450 1455

Thr Gln Thr Val Asp Phe Ser Leu Asp Pro Thr Phe Thr Ile Glu

IOWA_P0117WO-SeqListing

1460

1465

1470

Thr Ile Thr Leu Pro Gln Asp Ala Val Ser Arg Thr Gln Arg Arg
 1475 1480 1485

Gly Arg Thr Gly Arg Gly Lys Pro Gly Ile Tyr Arg Phe Val Ala
 1490 1495 1500

Pro Gly Glu Arg Pro Ser Gly Met Phe Asp Ser Ser Val Leu Cys
 1505 1510 1515

Glu Cys Tyr Asp Ala Gly Cys Ala Trp Tyr Glu Leu Thr Pro Ala
 1520 1525 1530

Glu Thr Thr Val Arg Leu Arg Ala Tyr Met Asn Thr Pro Gly Leu
 1535 1540 1545

Pro Val Cys Gln Asp His Leu Glu Phe Trp Glu Gly Val Phe Thr
 1550 1555 1560

Gly Leu Thr His Ile Asp Ala His Phe Leu Ser Gln Thr Lys Gln
 1565 1570 1575

Ser Gly Glu Asn Leu Pro Tyr Leu Val Ala Tyr Gln Ala Thr Val
 1580 1585 1590

Cys Ala Arg Ala Gln Ala Pro Pro Pro Ser Trp Asp Gln Met Trp
 1595 1600 1605

Lys Cys Leu Ile Arg Leu Lys Pro Thr Leu His Gly Pro Thr Pro
 1610 1615 1620

Leu Leu Tyr Arg Leu Gly Ala Val Gln Asn Glu Ile Thr Leu Thr
 1625 1630 1635

His Pro Val Thr Lys Tyr Ile Met Thr Cys Met Ser Ala Asp Leu

IOWA_P0117WO-SeqListing

1640

1645

1650

Glu Val Val Thr Ser Thr Trp Val Leu Val Gly Gly Val Leu Ala
 1655 1660 1665

Ala Leu Ala Ala Tyr Cys Leu Ser Thr Gly Cys Val Val Ile Val
 1670 1675 1680

Gly Arg Val Val Leu Ser Gly Lys Pro Ala Ile Ile Pro Asp Arg
 1685 1690 1695

Glu Val Leu Tyr Arg Glu Phe Asp Glu Met Glu Glu Cys Ser Gln
 1700 1705 1710

His Leu Pro Tyr Ile Glu Gln Gly Met Met Leu Ala Glu Gln Phe
 1715 1720 1725

Lys Gln Lys Ala Leu Gly Leu Leu Gln Thr Ala Ser Arg Gln Ala
 1730 1735 1740

Glu Val Ile Ala Pro Ala Val Gln Thr Asn Trp Gln Lys Leu Glu
 1745 1750 1755

Thr Phe Trp Ala Lys His Met Trp Asn Phe Ile Ser Gly Ile Gln
 1760 1765 1770

Tyr Leu Ala Gly Leu Ser Thr Leu Pro Gly Asn Pro Ala Ile Ala
 1775 1780 1785

Ser Leu Met Ala Phe Thr Ala Ala Val Thr Ser Pro Leu Thr Thr
 1790 1795 1800

Ser Gln Thr Leu Leu Phe Asn Ile Leu Gly Gly Trp Val Ala Ala
 1805 1810 1815

Gln Leu Ala Ala Pro Gly Ala Ala Thr Ala Phe Val Gly Ala Gly

IOWA_P0117WO-SeqListing

1820

1825

1830

Leu Ala Gly Ala Ala Ile Gly Ser Val Gly Leu Gly Lys Val Leu
 1835 1840 1845

Ile Asp Ile Leu Ala Gly Tyr Gly Ala Gly Val Ala Gly Ala Leu
 1850 1855 1860

Val Ala Phe Lys Ile Met Ser Gly Glu Val Pro Ser Thr Glu Asp
 1865 1870 1875

Leu Val Asn Leu Leu Pro Ala Ile Leu Ser Pro Gly Ala Leu Val
 1880 1885 1890

Val Gly Val Val Cys Ala Ala Ile Leu Arg Arg His Val Gly Pro
 1895 1900 1905

Gly Glu Gly Ala Val Gln Trp Met Asn Arg Leu Ile Ala Phe Ala
 1910 1915 1920

Ser Arg Gly Asn His Val Ser Pro Thr His Tyr Val Pro Glu Ser
 1925 1930 1935

Asp Ala Ala Ala Arg Val Thr Ala Ile Leu Ser Ser Leu Thr Val
 1940 1945 1950

Thr Gln Leu Leu Arg Arg Leu His Gln Trp Ile Ser Ser Glu Cys
 1955 1960 1965

Thr Thr Pro Cys Ser Gly Ser Trp Leu Arg Asp Ile Trp Asp Trp
 1970 1975 1980

Ile Cys Glu Val Leu Ser Asp Phe Lys Thr Trp Leu Lys Ala Lys
 1985 1990 1995

Leu Met Pro Gln Leu Pro Gly Ile Pro Phe Val Ser Cys Gln Arg

IOWA_P0117WO-SeqListing

2000

2005

2010

Gly Tyr Lys Gly Val Trp Arg Val Asp Gly Ile Met His Thr Arg
2015 2020 2025

Cys His Cys Gly Ala Glu Ile Thr Gly His Val Lys Asn Gly Thr
2030 2035 2040

Met Arg Ile Val Gly Pro Arg Thr Cys Arg Asn Met Trp Ser Gly
2045 2050 2055

Thr Phe Pro Ile Asn Ala Tyr Thr Thr Gly Pro Cys Thr Pro Leu
2060 2065 2070

Pro Ala Pro Asn Tyr Thr Phe Ala Leu Trp Arg Val Ser Ala Glu
2075 2080 2085

Glu Tyr Val Glu Ile Arg Gln Val Gly Asp Phe His Tyr Val Thr
2090 2095 2100

Gly Met Thr Thr Asp Asn Leu Lys Cys Pro Cys Gln Val Pro Ser
2105 2110 2115

Pro Glu Phe Phe Thr Glu Leu Asp Gly Val Arg Leu His Arg Phe
2120 2125 2130

Ala Pro Pro Cys Lys Pro Leu Leu Arg Glu Glu Val Ser Phe Arg
2135 2140 2145

Val Gly Leu His Glu Tyr Pro Val Gly Ser Gln Leu Pro Cys Glu
2150 2155 2160

Pro Glu Pro Asp Val Ala Val Leu Thr Ser Met Leu Thr Asp Pro
2165 2170 2175

Ser His Ile Thr Ala Glu Ala Ala Gly Arg Arg Leu Ala Arg Gly

IOWA_P0117WO-SeqListing

2180

2185

2190

Ser Pro Pro Ser Val Ala Ser Ser Ser Ala Ser Gln Leu Ser Ala
 2195 2200 2205

Pro Ser Leu Lys Ala Thr Cys Thr Ala Asn His Asp Ser Pro Asp
 2210 2215 2220

Ala Glu Leu Ile Glu Ala Asn Leu Leu Trp Arg Gln Glu Met Gly
 2225 2230 2235

Gly Asn Ile Thr Arg Val Glu Ser Glu Asn Lys Val Val Ile Leu
 2240 2245 2250

Asp Ser Phe Asp Pro Leu Val Ala Glu Glu Asp Glu Arg Glu Ile
 2255 2260 2265

Ser Val Pro Ala Glu Ile Leu Arg Lys Ser Arg Arg Phe Ala Gln
 2270 2275 2280

Ala Leu Pro Val Trp Ala Arg Pro Asp Tyr Asn Pro Pro Leu Val
 2285 2290 2295

Glu Thr Trp Lys Lys Pro Asp Tyr Glu Pro Pro Val Val His Gly
 2300 2305 2310

Cys Pro Leu Pro Pro Pro Lys Ser Pro Pro Val Pro Pro Pro Arg
 2315 2320 2325

Lys Lys Arg Thr Val Val Leu Thr Glu Ser Thr Leu Ser Thr Ala
 2330 2335 2340

Leu Ala Glu Leu Ala Thr Arg Ser Phe Gly Ser Ser Ser Thr Ser
 2345 2350 2355

Gly Ile Thr Gly Asp Asn Thr Thr Thr Ser Ser Glu Pro Ala Pro

IOWA_P0117WO-SeqListing

2360

2365

2370

Ser Gly Cys Pro Pro Asp Ser Asp Ala Glu Ser Tyr Ser Ser Met
 2375 2380 2385

Pro Pro Leu Glu Gly Glu Pro Gly Asp Pro Asp Leu Ser Asp Gly
 2390 2395 2400

Ser Trp Ser Thr Val Ser Ser Glu Ala Asn Ala Glu Asp Val Val
 2405 2410 2415

Cys Cys Ser Met Ser Tyr Ser Trp Thr Gly Ala Leu Val Thr Pro
 2420 2425 2430

Cys Ala Ala Glu Glu Gln Lys Leu Pro Ile Asn Ala Leu Ser Asn
 2435 2440 2445

Ser Leu Leu Arg His His Asn Leu Val Tyr Ser Thr Thr Ser Arg
 2450 2455 2460

Ser Ala Cys Gln Arg Gln Lys Lys Val Thr Phe Asp Arg Leu Gln
 2465 2470 2475

Val Leu Asp Ser His Tyr Gln Asp Val Leu Lys Glu Val Lys Ala
 2480 2485 2490

Ala Ala Ser Lys Val Lys Ala Asn Leu Leu Ser Val Glu Glu Ala
 2495 2500 2505

Cys Ser Leu Thr Pro Pro His Ser Ala Lys Ser Lys Phe Gly Tyr
 2510 2515 2520

Gly Ala Lys Asp Val Arg Cys His Ala Arg Lys Ala Val Thr His
 2525 2530 2535

Ile Asn Ser Val Trp Lys Asp Leu Leu Glu Asp Asn Val Thr Pro

IOWA_P0117WO-SeqListing

2540

2545

2550

Ile Asp Thr Thr Ile Met Ala Lys Asn Glu Val Phe Cys Val Gln
 2555 2560 2565

Pro Glu Lys Gly Gly Arg Lys Pro Ala Arg Leu Ile Val Phe Pro
 2570 2575 2580

Asp Leu Gly Val Arg Val Cys Glu Lys Met Ala Leu Tyr Asp Val
 2585 2590 2595

Val Thr Lys Leu Pro Leu Ala Val Met Gly Ser Ser Tyr Gly Phe
 2600 2605 2610

Gln Tyr Ser Pro Gly Gln Arg Val Glu Phe Leu Val Gln Ala Trp
 2615 2620 2625

Lys Ser Lys Lys Thr Pro Met Gly Phe Ser Tyr Asp Thr Arg Cys
 2630 2635 2640

Phe Asp Ser Thr Val Thr Glu Ser Asp Ile Arg Thr Glu Glu Ala
 2645 2650 2655

Ile Tyr Gln Cys Cys Asp Leu Asp Pro Gln Ala Arg Val Ala Ile
 2660 2665 2670

Lys Ser Leu Thr Glu Arg Leu Tyr Val Gly Gly Pro Leu Thr Asn
 2675 2680 2685

Ser Arg Gly Glu Asn Cys Gly Tyr Arg Arg Cys Arg Ala Ser Gly
 2690 2695 2700

Val Leu Thr Thr Ser Cys Gly Asn Thr Leu Thr Cys Tyr Ile Lys
 2705 2710 2715

Ala Arg Ala Ala Cys Arg Ala Ala Gly Leu Gln Asp Cys Thr Met

IOWA_P0117WO-SeqListing

2720

2725

2730

Leu Val Cys Gly Asp Asp Leu Val Val Ile Cys Glu Ser Ala Gly
 2735 2740 2745

Val Gln Glu Asp Ala Ala Ser Leu Arg Ala Phe Thr Glu Ala Met
 2750 2755 2760

Thr Arg Tyr Ser Ala Pro Pro Gly Asp Pro Pro Gln Pro Glu Tyr
 2765 2770 2775

Asp Leu Glu Leu Ile Thr Ser Cys Ser Ser Asn Val Ser Val Ala
 2780 2785 2790

His Asp Gly Ala Gly Lys Arg Val Tyr Tyr Leu Thr Arg Asp Pro
 2795 2800 2805

Thr Thr Pro Leu Ala Arg Ala Ala Trp Glu Thr Ala Arg His Thr
 2810 2815 2820

Pro Val Asn Ser Trp Leu Gly Asn Ile Ile Met Phe Ala Pro Thr
 2825 2830 2835

Leu Trp Ala Arg Met Ile Leu Met Thr His Phe Phe Ser Val Leu
 2840 2845 2850

Ile Ala Arg Asp Gln Leu Glu Gln Ala Leu Asp Cys Glu Ile Tyr
 2855 2860 2865

Gly Ala Cys Tyr Ser Ile Glu Pro Leu Asp Leu Pro Pro Ile Ile
 2870 2875 2880

Gln Arg Leu His Gly Leu Ser Ala Phe Ser Leu His Ser Tyr Ser
 2885 2890 2895

Pro Gly Glu Ile Asn Arg Val Ala Ala Cys Leu Arg Lys Leu Gly

IOWA_P0117W0-SeqListing

2900

2905

2910

Val Pro Pro Leu Arg Ala Trp Arg His Arg Ala Arg Ser Val Arg
2915 2920 2925

Ala Arg Leu Leu Ala Arg Gly Gly Arg Ala Ala Ile Cys Gly Lys
2930 2935 2940

Tyr Leu Phe Asn Trp Ala Val Arg Thr Lys Leu Lys Leu Thr Pro
2945 2950 2955

Ile Ala Ala Ala Gly Gln Leu Asp Leu Ser Gly Trp Phe Thr Ala
2960 2965 2970

Gly Tyr Ser Gly Gly Asp Ile Tyr His Ser Val Ser His Ala Arg
2975 2980 2985

Pro Arg Trp Ile Trp Phe Cys Leu Leu Leu Leu Ala Ala Gly Val
2990 2995 3000

Gly Ile Tyr Leu Leu Pro Asn Arg
3005 3010

<210> 3

<211> 50

<212> DNA

<213> Artificial sequence

<220>

<223> Synthetic nucleic acid

<400> 3

ctcacgccaagggtgcctgatcgactacccc tacaggctctggcattatcc

50

<210> 4

<211> 51

<212> DNA

<213> Artificial sequence

IOWA_P0117WO-SeqListing

<220>

<223> Synthetic nucleic acid

<400> 4

ctcacgccaagggtgcctgatcgactacccc tacaggctctggcattaccc c

51

<210> 5

<211> 27

<212> DNA

<213> Artificial sequence

<220>

<223> Synthetic nucleic acid

<400> 5

gacaacaacc tttaaaaact acatggt

27

<210> 6

<211> 17

<212> PRT

<213> Hepatitis C virus

<400> 6

Leu Thr Pro Arg Cys Leu Ile Asp Tyr Pro Tyr Arg Leu Trp His Tyr

1

5

10

15

Pro

<210> 7

<211> 51

<212> DNA

<213> Hepatitis C virus

<400> 7

ctcacgccaagggtgcctgatcgactacccc tacaggctctggcattaccc c

51

<210> 8

<211> 51

<212> DNA

<213> Hepatitis C virus

IOWA_P0117WO-SeqListing

<400> 8
ttgacacctc gctgcatggt cgactatcca taccggcttt ggcattaccc a 51

<210> 9
<211> 51
<212> DNA
<213> Hepatitis C virus

<400> 9
ctcacaaaaa ggtgcctgat cgactacccc tacaggctct ggcattacaa a 51

<210> 10
<211> 140
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic nucleic acid

<400> 10
gccgccagtg tgctggaatt cggctttcct gataccactt acctcaaagc cggctctggg 60
ccctggctca cgccaagggtg cctgatcgac tacccttaca ggctctggca ttacccttgc 120
acactgtagg caccatcaat 140

<210> 11
<211> 22
<212> RNA
<213> Hepatitis C virus

<400> 11
caaaugccaa auagugauua ga 22

<210> 12
<211> 22
<212> RNA
<213> Hepatitis C virus

<400> 12
cccuacagg cucuggcauu ac 22

<210> 13

IOWA_P0117WO-SeqListing

<211> 22
 <212> RNA
 <213> Hepatitis C virus

<400> 13
 auaaugccag ugaauguugc ug 22

<210> 14
 <211> 22
 <212> RNA
 <213> Hepatitis C virus

<400> 14
 ccccuacagg cucuggcauu ac 22

<210> 15
 <211> 65
 <212> RNA
 <213> Hepatitis C virus

<400> 15
 cccucacgc augacggaca aguacagauc gacuaacccu acuguacuug uccgucaugc 60
 accccc 65

<210> 16
 <211> 9
 <212> PRT
 <213> Yellow fever virus

<400> 16
 Asp Asn Asn Leu Tyr Lys Leu His Gly
 1 5

<210> 17
 <211> 9
 <212> PRT
 <213> Yellow fever virus

<400> 17
 Phe Gly Asp Ser Tyr Ile Ile Val Gly
 1 5

IOWA_P0117WO-SeqListing

<210> 18
 <211> 11
 <212> RNA
 <213> Yellow fever virus

<400> 18
 auuuuguaaa a 11

<210> 19
 <211> 11
 <212> RNA
 <213> Yellow fever virus

<400> 19
 cuuuacaaaa c 11

<210> 20
 <211> 9
 <212> RNA
 <213> Yellow fever virus

<400> 20
 cuuguaaaa 9

<210> 21
 <211> 9
 <212> RNA
 <213> Yellow fever virus

<400> 21
 cuuuacaaa 9

<210> 22
 <211> 9
 <212> RNA
 <213> Yellow fever virus

<400> 22
 uuuacaaaa 9

<210> 23

IOWA_P0117WO-SeqListing

```

<211> 12
<212> DNA
<213> Yellow fever virus

<400> 23
ccuuuacaaa ct 12

<210> 24
<211> 12
<212> DNA
<213> Yellow fever virus

<400> 24
ccuuutcaaaa ct 12

<210> 25
<211> 12
<212> DNA
<213> Yellow fever virus

<400> 25
ccuugccaaa ct 12

<210> 26
<211> 12
<212> DNA
<213> Yellow fever virus

<400> 26
ccuugccaaa ct 12

<210> 27
<211> 1089
<212> DNA
<213> Hepatitis C virus

<400> 27
gaaacccatg tgaccggcgg caacgcgggc cgtaccaccg cgggcctggt gggcctgctg 60
accccgggcg cgaaacagaa cattcagctg attaacacca acggcagctg gcatattaac 120
agcaccgcgc tgaactgcaa cgaaagcctg aacaccggct ggctggcggg cctgttttat 180
cagcataaat ttaacagcag cggctgcccc gaacgtctgg cgagctgccg tcgtctgacc 240

```

IOWA_P0117WO-SeqListing

gatttttgcgc agggctgggg cccgattagc tatgcgaacg gcagcggcct ggatgaacgt	300
ccgtattgct ggcattatcc gccgcgtccg tgcggcattg tgccggcgaa aagcgtgtgc	360
ggcccgggtgt attgctttac cccgagcccc gtggtggtgg gcaccaccga tcgtagcggc	420
gcgccgacct atagctgggg cgcgaacgat accgatgtgt ttgtgctgaa caacacccgt	480
ccgccgctgg gcaactgggt tggctgcacc tggatgaaca gcaccggctt taccaaagt	540
tgcggcgcg cgcgtgcgt gattggcggc gtgggcaaca acaccctgct gtgcccga	600
gattgctttc gtaaatatcc ggaagcgacc tatagccgtt gcggcagcgg cccgcgtatt	660
accccgcggt gcatggtgga ttatccgtat cgtctgtggc attatccgtg caccattaac	720
tataaccattt ttaaagtgcg tatgtatgtg ggccggcgtg aacatcgtct ggaagcggcg	780
tgcaactgga cccgtggcga acgttgcgat ctggaagatc gtgatcgtag cgaactgagc	840
ccgctgctgc tgagcaccac ccagtggcag gtgctgccgt gcagctttac caccctgccg	900
gcgctgagca ccggcctgat tcatctgcat cagaacattg tggatgtgca gtatctgtat	960
ggcgtgggca gcagcattgc gagctgggcg attaaatggg aatatgtggt gctgctgttt	1020
ctgctgctgg cggatgcgcg tgtgtgcagc tgcctgtgga tgatgctgct gattagccag	1080
gcggaagcg	1089

<210> 28

<211> 1479

<212> DNA

<213> Yellow fever virus

<400> 28

gctcactgca ttggaattac tgacagggat ttcattgagg gggatgcatgg aggaacttgg	60
gtttcagcta ccctggagca agacaagtgt gtcactgtta tggcccctga caagccttca	120
ttggacatct cactagagac agtagccatt gatagacctg ctgagggtgag gaaagtgtgt	180
tacaatgcag ttctcactca tgtgaagatt aatgacaagt gccccagcac tggagaggcc	240
cacctagctg aagagaacga aggggacaat gcgtgcaagc gcacttattc tgatagaggc	300

IOWA_P0117WO-SeqListing

tggggcaatg gctgtggcct atttgggaaa gggagcattg tggcatgcgc caaattcact	360
tgtgccaaat ccatgagttt gtttgagggt gatcagacca aaattcagta tgtcatcaga	420
gcacaattgc atgtaggggc caagcaggaa aattggaata ccgacattaa gactctcaag	480
tttgatgccc tgtcaggctc ccaggaagtc gagttcattg ggtatggaaa agctacactg	540
gaatgccagg tgcaaaactgc ggtggacttt ggtaacagtt acatcgctga gatggaaaca	600
gagagctgga tagtggacag acagtgggcc caggacttga ccctgccatg gcagagtgga	660
agtggcgggg tgtggagaga gatgcatcat cttgtcgaat ttgaacctcc gcatgccgcc	720
actatcagag tactggccct gggaaaccag gaaggctcct tgaaaacagc tcttactggc	780
gcaatgaggg ttacaaagga cacaaatgac aacaaccttt acaaactaca tgggtggacat	840
gtttcttgca gagtgaaatt gtcagctttg acactcaagg ggacatccta caaaatatgc	900
actgacaaaa tgttttttgt caagaacca actgacactg gccatggcac tgttgtgatg	960
caggtgaaaag tgtcaaaaagg agccccctgc aggattccag tgatagtagc tgatgatctt	1020
acagcggcaa tcaataaagg ctttttggtt acagttaacc ccatcgctc aaccaatgat	1080
gatgaagtgc tgattgaggt gaaccacct tttggagaca gctacattat cgttgggaga	1140
ggagattcac gtctcactta ccagtggcac aaagaggga gctcaatagg aaagttgttc	1200
actcagacca tgaaaggcgt ggaacgcctg gccgtcatgg gagacaccgc ctgggatttc	1260
agctccgctg gagggttctt cacttcggtt gggaaaggaa ttcatacggg gtttggctct	1320
gcctttcagg ggctatttgg cggcttgaac tggataacaa aggtcatcat gggggcggta	1380
cttatatggg ttggcatcaa cacaagaaac atgacaatgt ccatgagcat gatcttggtg	1440
ggagtgatca tgatgttttt gtctctagga gttggggcg	1479

<210> 29

<211> 22

<212> DNA

<213> Artificial sequence

<220>

<223> Synthetic primer

IOWA_P0117WO-SeqListing

<400> 29
ctccacccaa tgaatcactc cc 22

<210> 30
<211> 20
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic primer

<400> 30
gaggtttagg attcgtgctc 20

<210> 31
<211> 20
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic primer

<400> 31
cgttagtatg agtgtcgtgc 20

<210> 32
<211> 20
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic primer

<400> 32
gatgcacggc ctacgagacc 20

<210> 33
<211> 20
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic primer

IOWA_P0117WO-SeqListing

<400> 33
atcccatcac catcttccag 20

<210> 34
<211> 19
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic primer

<400> 34
ccatcacgcc acagtttcc 19

<210> 35
<211> 17
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic primer

<400> 35
attgatggtg cctacag 17

<210> 36
<211> 21
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic primer

<400> 36
tcctgatacc acttacctca a 21

<210> 37
<211> 27
<212> DNA
<213> Yellow fever virus

<400> 37
gacaacaacc uuuacaaact acatggt 27

IOWA_P0117WO-SeqListing

<210> 38
 <211> 9
 <212> DNA
 <213> Artificial sequence

<220>
 <223> Synthetic nucleic acid

<400> 38
 gcattatcc 9

<210> 39
 <211> 9
 <212> RNA
 <213> Artificial sequence

<220>
 <223> Synthetic nucleic acid

<400> 39
 gcauuaucc 9

<210> 40
 <211> 10
 <212> DNA
 <213> Artificial sequence

<220>
 <223> Synthetic nucleic acid

<400> 40
 gcattacccc 10

<210> 41
 <211> 10
 <212> RNA
 <213> Artificial sequence

<220>
 <223> Synthetic nucleic acid

<400> 41
 gcauuacccc 10

IOWA_P0117WO-SeqListing

<210> 42
<211> 10
<212> RNA
<213> Artificial sequence

<220>
<223> Synthetic nucleic acid

<400> 42
cuuuacaaaa 10

<210> 43
<211> 9
<212> DNA
<213> Artificial sequence

<220>
<223> Synthetic nucleic acid

<400> 43
ctttacaaa 9