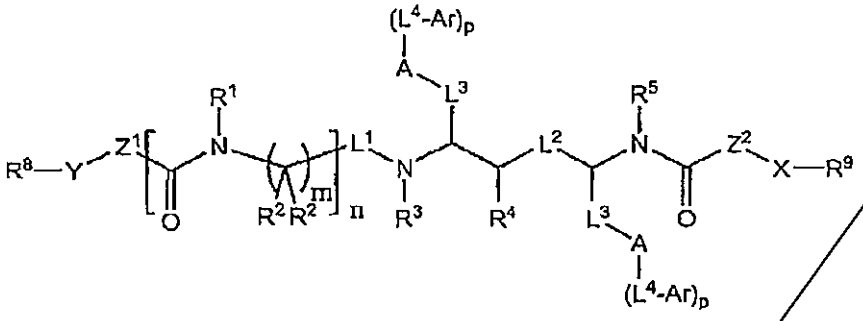
What is Claimed:

1. A compound of formula I,



Formula I

or a pharmaceutically acceptable salt, solvate, and/or ester thereof, wherein,

L^1 is selected from the group consisting of -$C(R^6)2$-, -C(O)-, -$S(O_2)$-, -$N(R^7)$-C(O)-, and -O-C(O)-;

L^2 is a covalent bond, -$C(R^6)_2$- or -C(O)-;

each L^3 is independently a covalent bond, an alkylene, or substituted alkylene;

each L^4 is independently selected from the group consisting of a covalent bond, alkylene, substituted alkylene, -O-, -CH_2-O-, and -NH-;

each A is independently selected from the group consisting of H, alkyl, substituted alkyl, aryl, substituted aryl, heterocyclyl, and substituted heterocyclyl, with the proviso that when A is H, p is 0;

Z^1 and Z^2 are each independently -O- or -$N(R^7)$-;

Y and X are independently selected from the group consisting of heterocyclyl and heterocyclylalkyl;

each Ar is independently selected from the group consisting of aryl, substituted aryl, heteroaryl, and substituted heteroaryl;

R^1, R^3, and R^5 are each independently selected from the group consisting of H, alkyl, substituted alkyl, arylalkyl, and substituted arylalkyl;

each R^2 is independently selected from the group consisting of H, alkyl, substituted alkyl, alkoxyalkyl, hydroxyalkyl, arylheteroalkyl, substituted arylheteroalkyl, arylalkyl, substituted arylalkyl, heterocyclylalkyl, substituted heterocyclylalkyl, aminoalkyl, substituted aminoalkyl, -alkylene-C(O)-OH, - alkylene-C(O)-Oalkyl, -alkylene-C(O)amino, -alkylene-C(O)-alkyl;

R^4 and R^6 are independently selected from the group consisting of H, alkyl, substituted alkyl, and heteroalkyl;
each R^7 is independently selected from the group consisting of H, alkyl, substituted alkyl, heteroalkyl, carbocyclyl, substituted carbocyclyl, heterocyclyl, and substituted heterocyclyl;
R^8 and R^9 are each one or more substituents independently selected from the group consisting of H, alkyl, substituted alkyl, halogen, aryl, substituted aryl, heterocyclyl, substituted heterocyclyl, and -CN;
m is 1 or 2;
n is 0 or 1; and
each p is independently 0 or 1.

2. The compound of claim 1, wherein n is 1.

3. The compound of claim 2, wherein L^2 is $-CH(R^6)-$.

4. The compound of claim 2, wherein Y is heterocyclylalkyl.

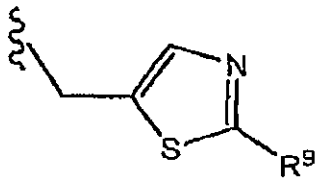
5. The compound of claim 2, wherein X is heterocyclylalkyl.

6. The compound of claim 2, wherein Z^1 is $-N(R^7)-$.

7. The compound of claim 2, wherein each A is independently aryl or substituted aryl.

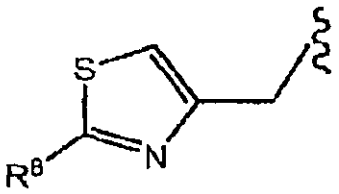
8. The compound of claim 1, wherein:
L^1 is -C(O)-;
each A is independently aryl or substituted aryl;
R^1 is H or alkyl;
each R^2 is independently H, alkyl, substituted alkyl, or heteroalkyl;
R^3, R^4, R^5, and R^6 are each H;
each R^7 is independently H, alkyl, or carbocyclyl;
R^8 is H or alkyl;
R^9 is H;

X-R^9 is



;

Y-R^8 is

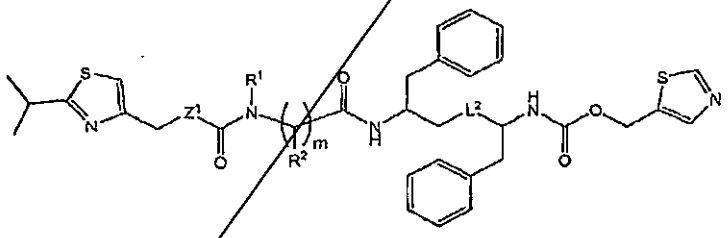


;

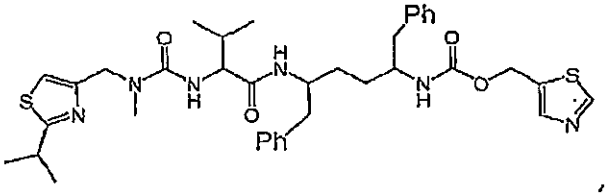
Z^2 is -O-; and

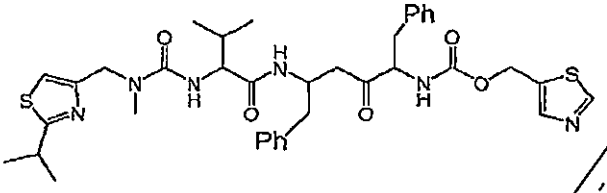
p is O.

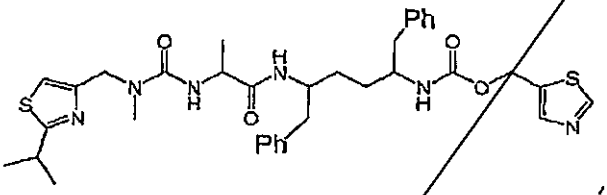
9. The compound of claim 8, having the following formula:

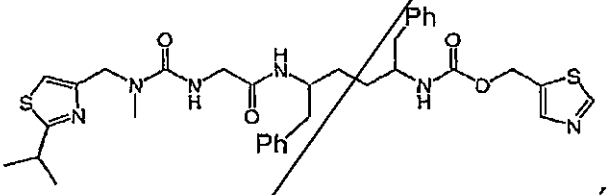


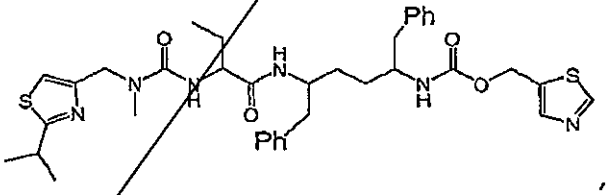
10. A compound selected from the group consisting of:

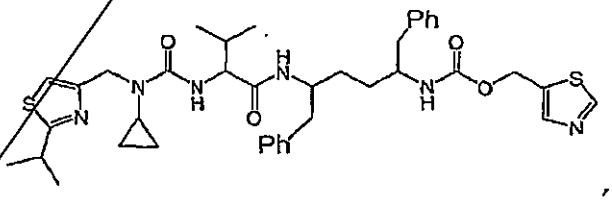


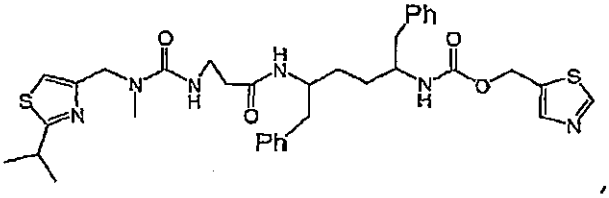


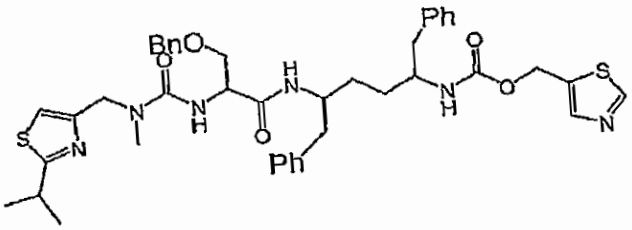


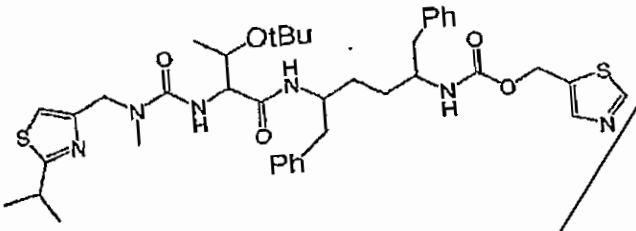


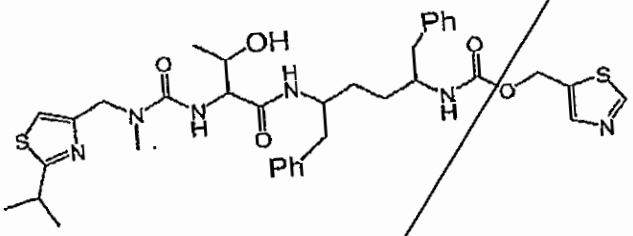


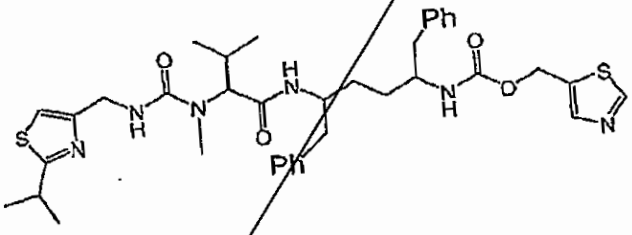


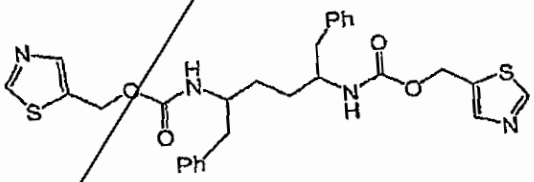


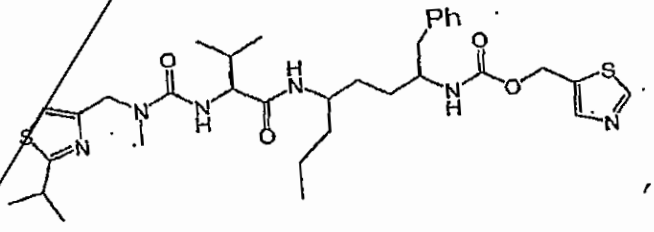


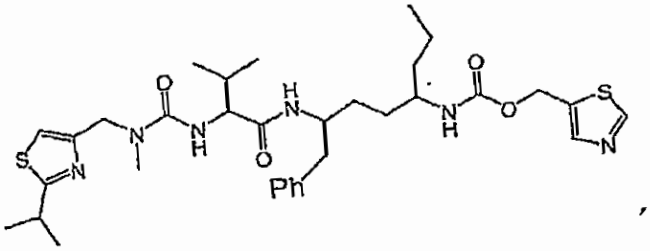


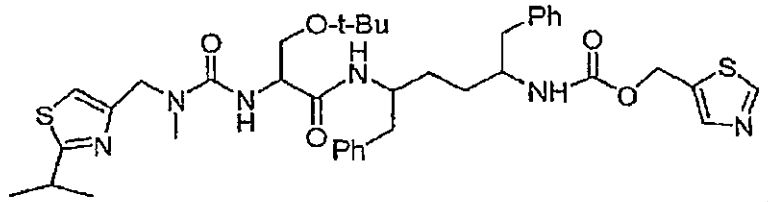


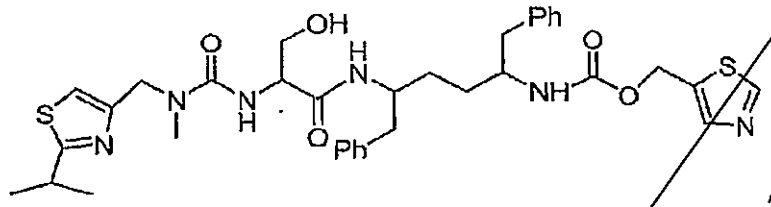


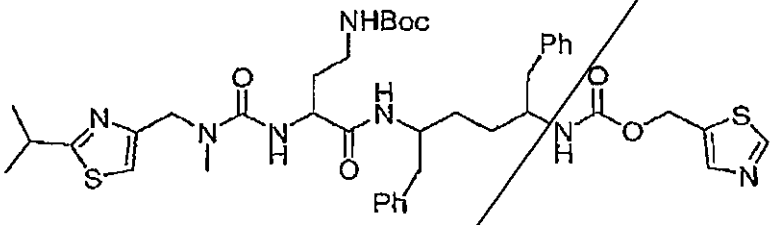


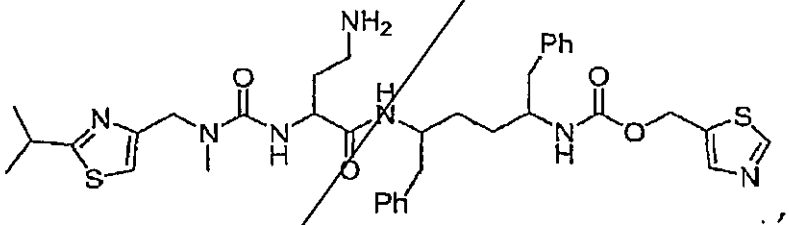


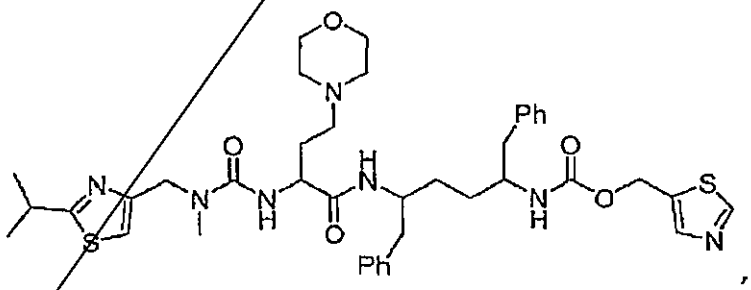


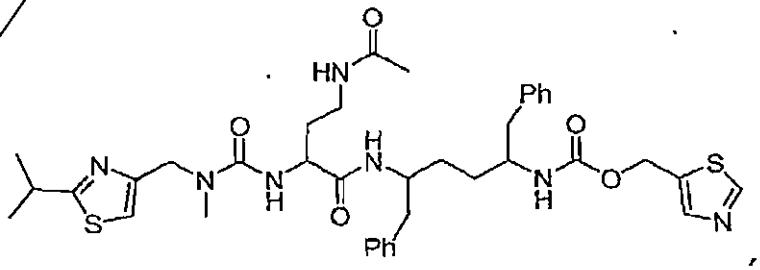


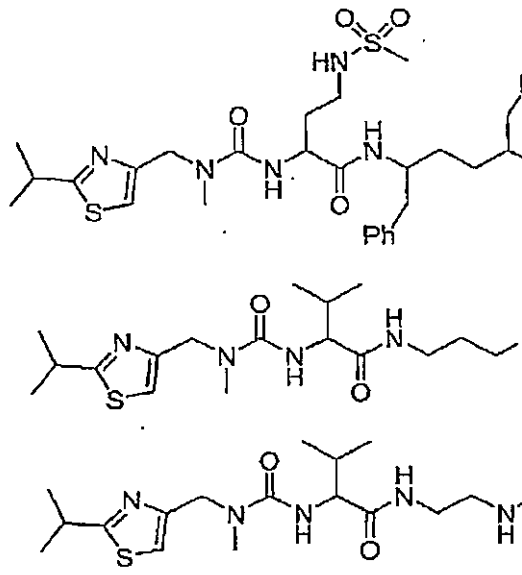


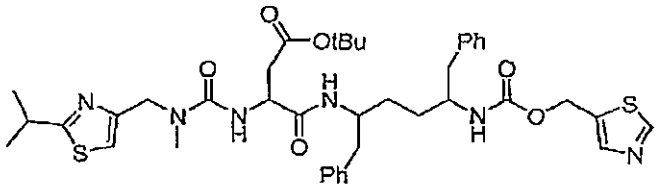


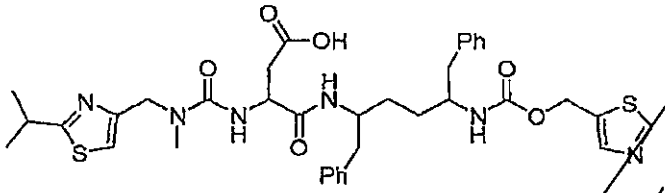


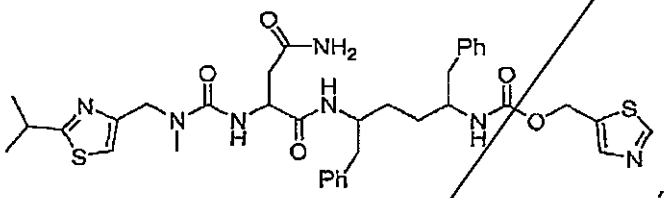


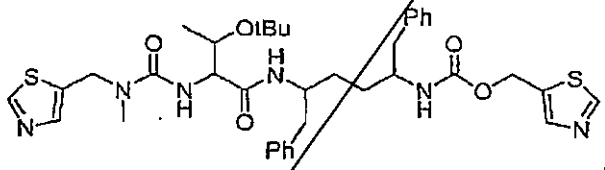


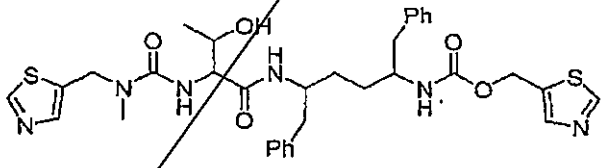


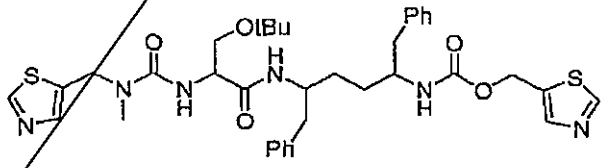


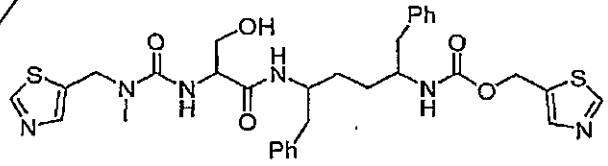


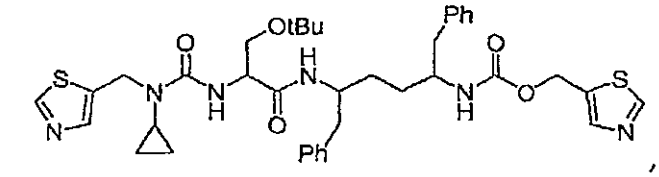


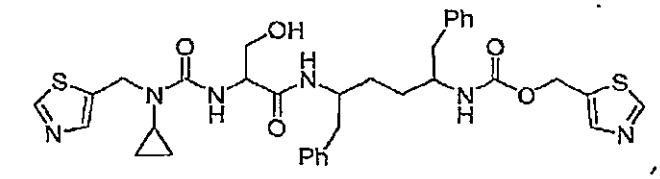


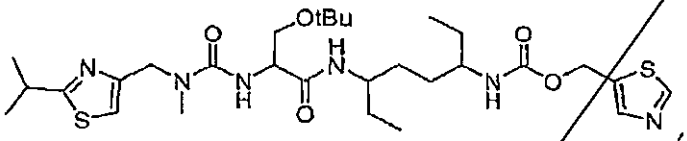


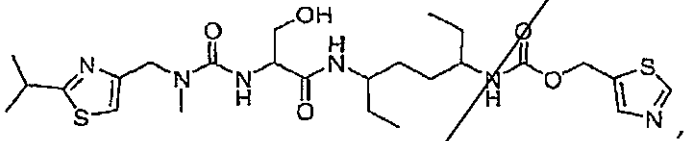


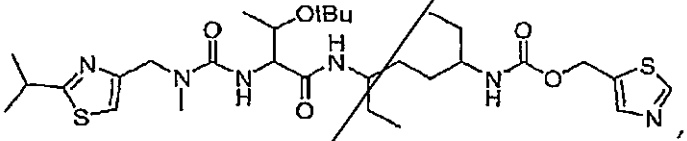


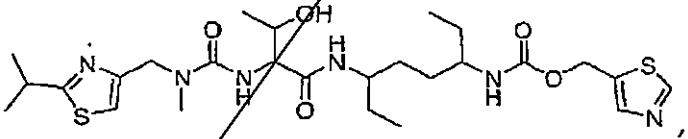


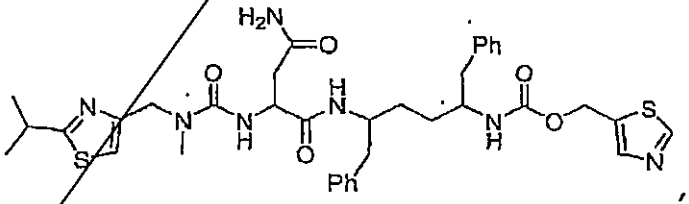


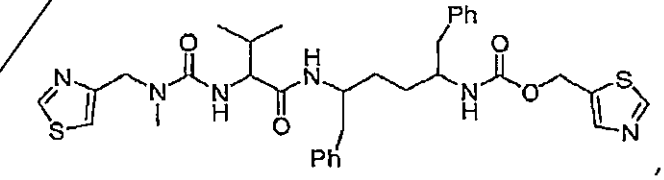


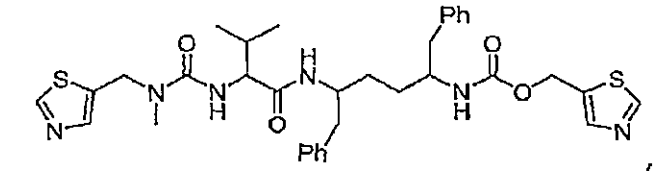


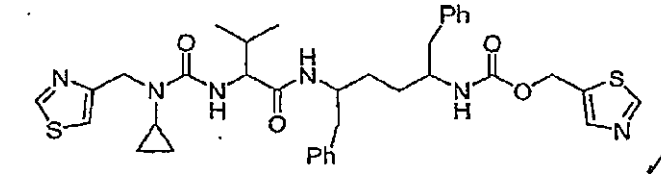


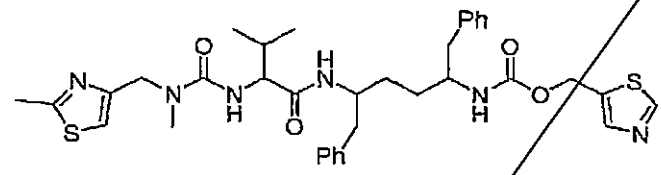


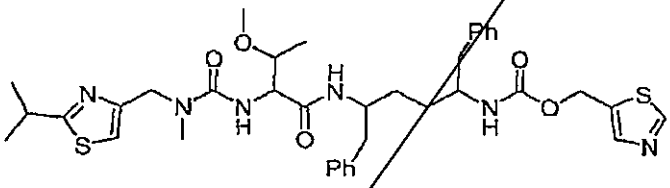


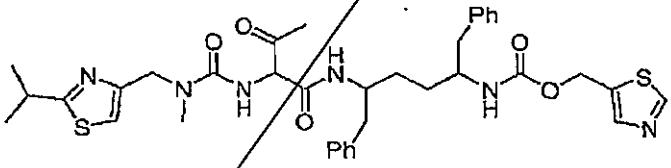


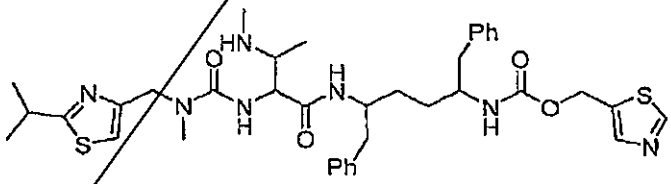


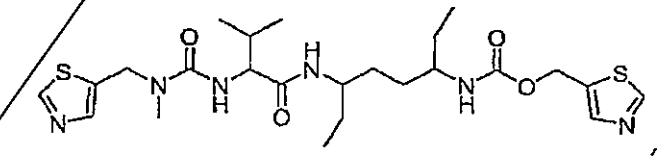


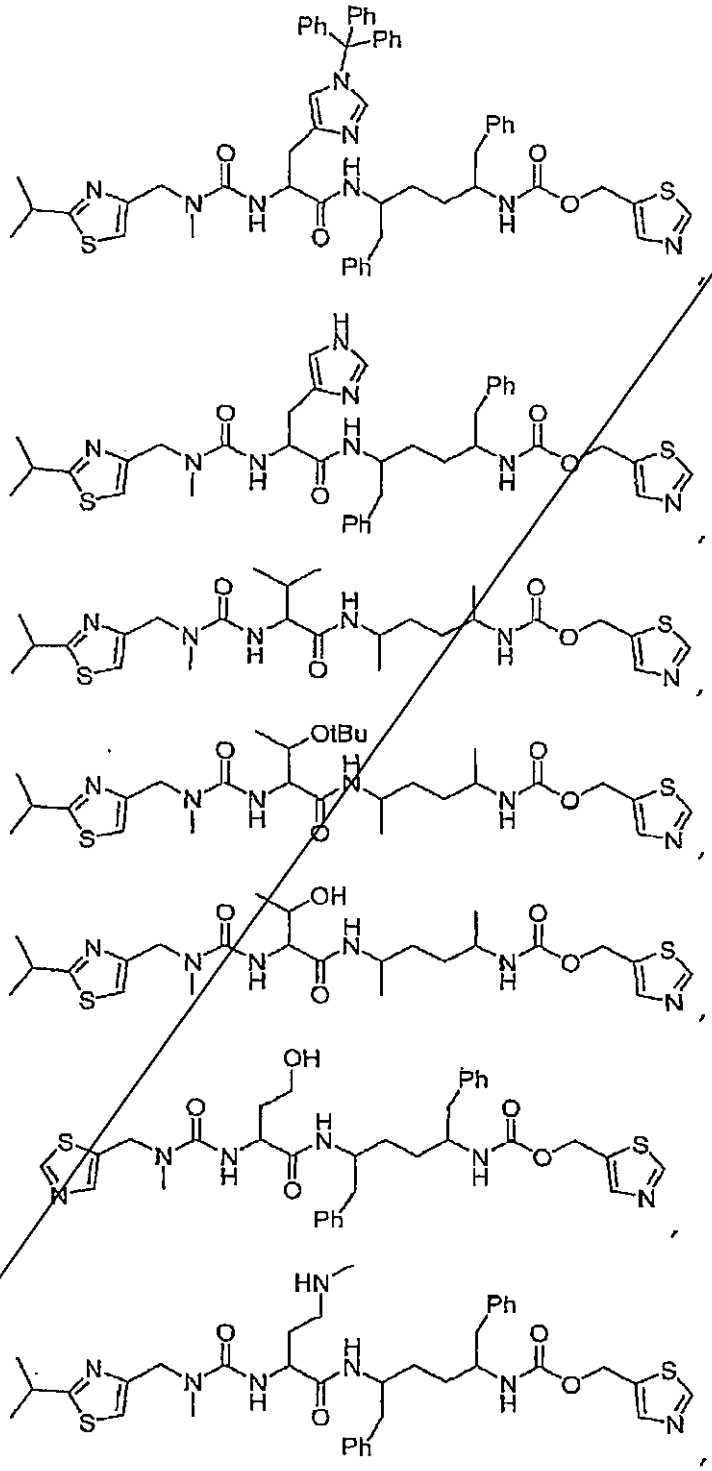


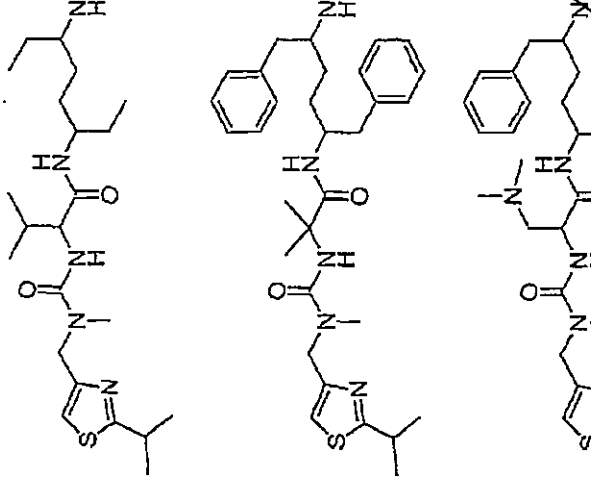


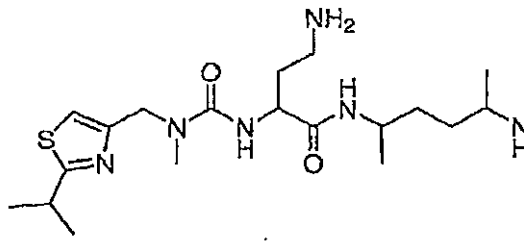


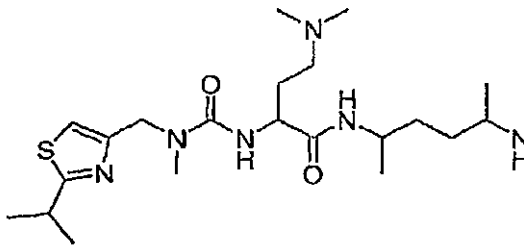




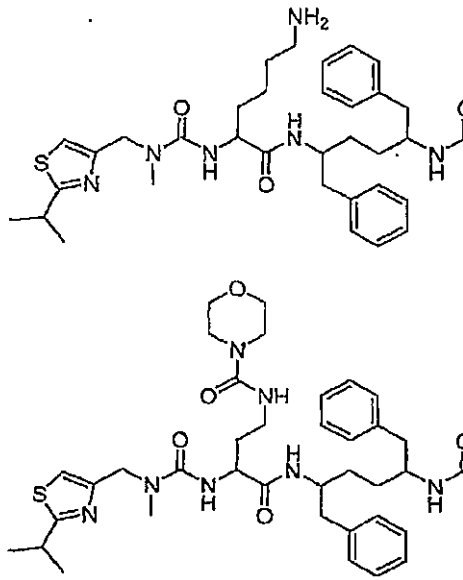


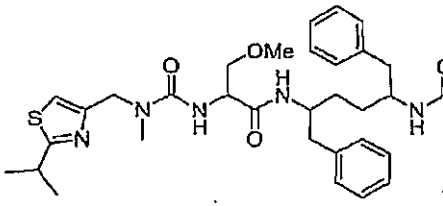


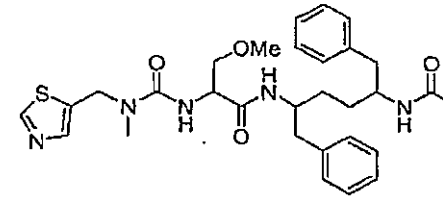


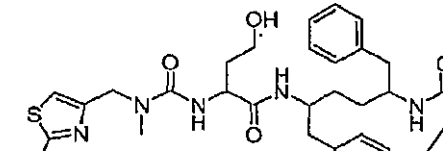


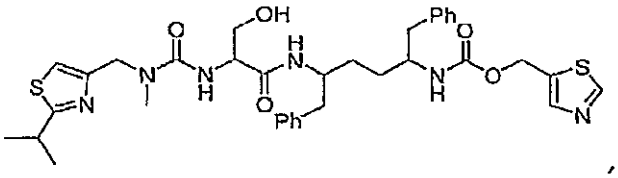


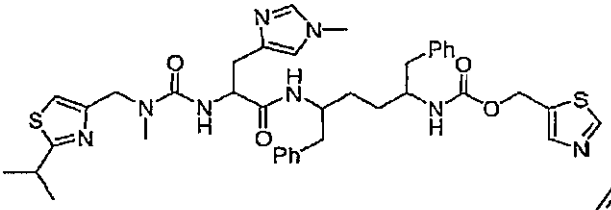


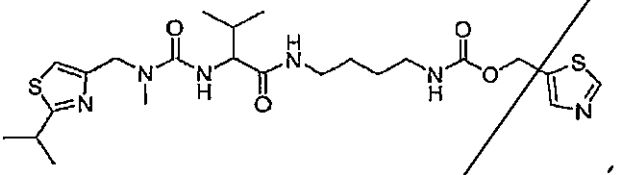

OMe
S
N
O
H
N

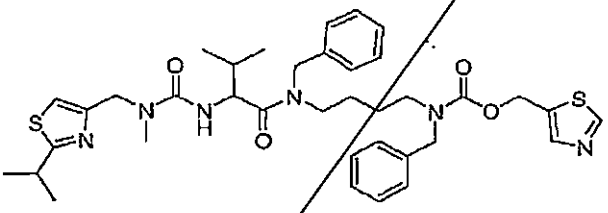

OMe
S
N
O
H
N

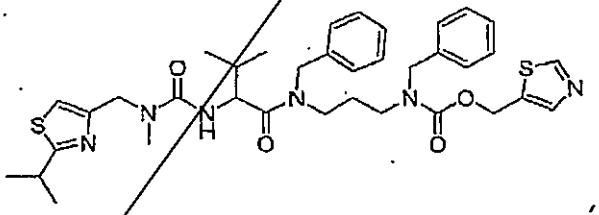

OH
S
N
O
H
N

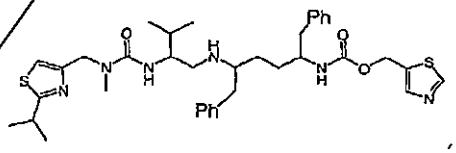


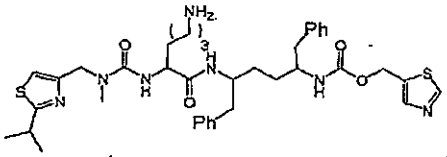




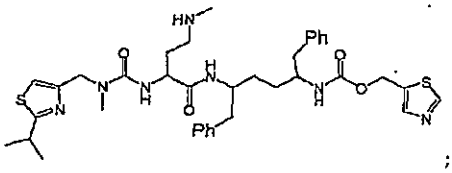








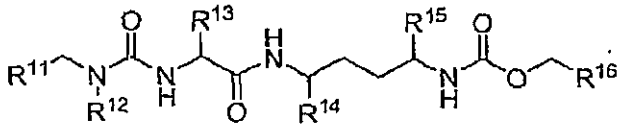
, and



; or

pharmaceutically acceptable salts, solvates, esters, and/or stereoisomers thereof.

11. A compound of formula IIA:



Formula IIA

or a pharmaceutically acceptable salt, solvate, stereoisomer and/or ester thereof, wherein:

R^{11} and R^{16} are each independently heterocyclyl or substituted heterocyclyl; and

R^{12}, R^{13}, R^{14}, and R^{15} are each independently H, -C_{1-4} alkyl, -C_{1-4} substituted alkyl, arylalkyl, or substituted arylalkyl.

12. The compound of claim 11, wherein:

R^{13} is H, -C_{1-4} alkyl, -$(CH_2)_{0-1}CR^{17}R^{18}OR^{19}$, -$(CH_2)_{0-3}CR^{17}R^{18}NR^{20}R^{21}$, -$(CH_2)_{0-3}CR^{17}R^{18}NR^{17}C(O)NR^{20}R^{21}$, -$(CH_2)_{1-3}COR^{22}$, -$(CH_2)_{1-3}S(O)_2R^{22}$, or -$(CH_2)_{1-3}$-$R^{23}$;

R^{14} and R^{15} are each independently H, -C_{1-4} alkyl or arylalkyl;

R^{17} and R^{18} are each independently H or -C_{1-3} alkyl;

R^{19} is H, -C_{1-4} alkyl or arylalkyl;

R^{20} and R^{21} are each independently H, -C_{1-3} alkyl, $-C(O)R^{17}$ or $-S(O)_2R^{17}$, or

R^{20} and R^{21}, taken together with the nitrogen atom to which they are attached, form an substituted or unsubstituted 5-6 membered heterocyclyl ring containing 1-2 heteroatoms selected from the group consisting of N and O;

R^{22} is H, -C_{1-3} alkyl, OR^{19} or $NR^{20}R^{21}$; and

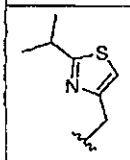
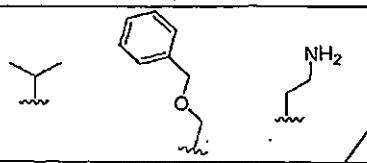
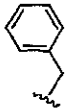
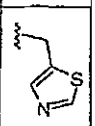
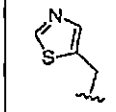
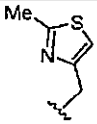
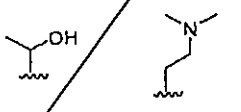
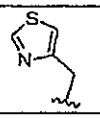
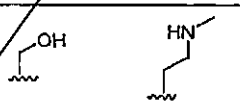
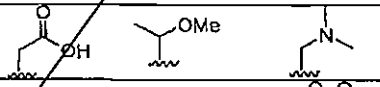
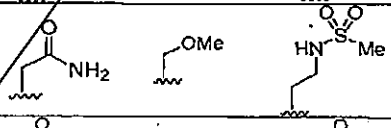
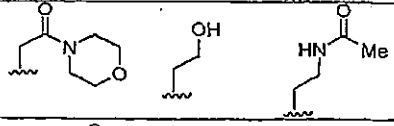
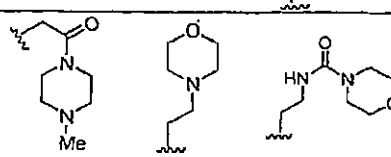
R^{23} is an unsubstituted or substituted 5-6 membered heterocyclyl ring containing 1-2 heteroatoms selected from the group consisting of N and O.

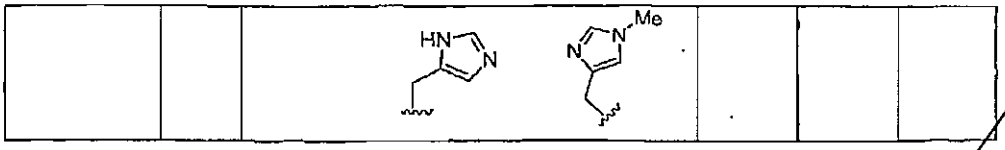
13. The compound of claim 12, wherein said unsubstituted or substituted 5-6 membered heterocyclyl ring formed by R^{20} and R^{21} and said unsubstituted or substituted 5-6 membered heterocyclyl ring of R^{23} are each independently unsubstituted or substituted with a C_{1-2} alkyl.

14. The compound of claim 12, wherein:
R^{13} is $-(CH_2)_{0-1}CR^{17}R^{18}NR^{20}R^2$.

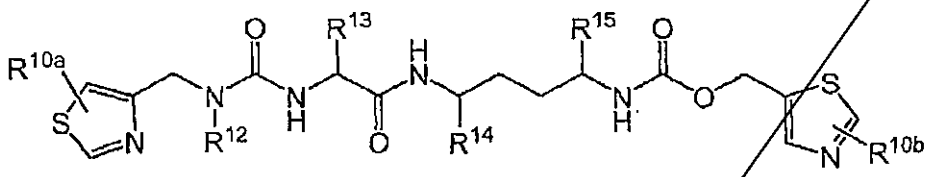
15. The compound of claim 12, wherein:
R^{13} is $-(CH_2)_{0-3}CR^{17}R^{18}NR^{20}R^{21}$ or $-(CH_2)_{0-3}CR^{17}R^{18}C(O)\text{-}NR^{20}R^{21}$.

16. The compound of claim 12, wherein:
R^{11}, R^{12}, R^{13}, R^{14}, R^{15} and R^{16} are each independently selected from the following Table:

R^{11}	R^{12}	R^{13}	R^{14}	R^{15}	R^{16}
	H				
	Me	Me 			
		H 	Et	Et	
		Et 	Me	Me	
			H	H	
					
					
					



17. A compound of formula IIB:



Formula IIB

or a pharmaceutically acceptable salt, solvate, stereoisomer and/or ester thereof, wherein

R^{10a} and R^{10b} are each independently H, -C_{1-4} alkyl;

R^{12} is H or $-CH_3$;

R^{13} is H, -C_{1-4} alkyl, -$(CH_2)_{0-1}CR^{17}R^{18}OR^{19}$, -$(CH_2)_{0-3}CR^{17}R^{18}NR^{20}R^{21}$, -$(CH_2)_{0-3}CR^{17}R^{18}NR^{17}C(O)NR^{20}R^{21}$, -$(CH_2)_{1-3}COR^{22}$, -$(CH_2)_{1-3}S(O)_2R^{22}$, or -$(CH_2)_{1-3}$-$R^{23}$;

R^{14} and R^{15} are each independently H, -C_{1-4} alkyl or arylalkyl or substituted arylalkyl;

R^{17} and R^{18} are each independently H or -C_{1-3} alkyl;

R^{19} is H, -C_{1-4} alkyl or arylalkyl;

R^{20} and R^{21} are each independently H, -C_{1-3} alkyl, $-C(O)R^{17}$ or $-S(O)_2R^{17}$, or

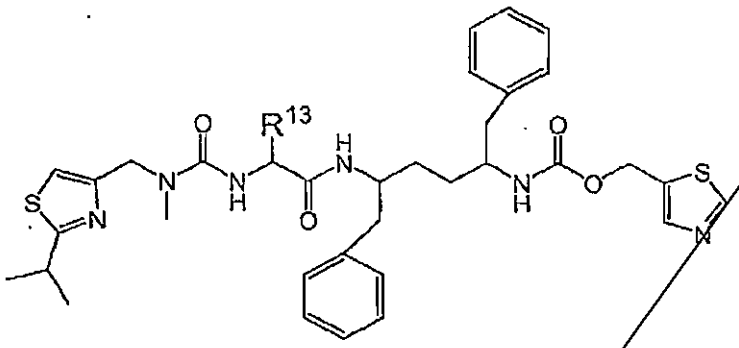
R^{20} and R^{21}, taken together with the nitrogen atom to which they are attached, form an unsubstituted or substituted or 5-6 membered heterocyclyl ring containing 1-2 heteroatoms selected from the group consisting of N and O;

R^{22} is H, -C_{1-3} alkyl, -OR^{19} or $NR^{20}R^{21}$; and

R^{23} is an unsubstituted or substituted 5-6 membered heterocyclyl ring containing 1-2 heteroatoms selected from the group consisting of N and O.

18. The compound of claim 17, wherein said unsubstituted or substituted 5-6 membered heterocyclyl ring formed by R^{20} and R^{21} and said unsubstituted or substituted 5-6 membered heterocyclyl ring of R^{23} are each independently unsubstituted or substituted with a C_{1-2} alkyl.

19. A compound of formula IIC:



Formula IIC

or a pharmaceutically acceptable salt, solvate, stereoisomer and/or ester thereof, wherein

R^{13} is H, -C_{1-4} alkyl, -$(CH_2)_{0-1}CR^{17}R^{18}OR^{19}$, -$(CH_2)_{0-3}CR^{17}R^{18}NR^{20}R^{21}$, -$(CH_2)_{0-3}CR^{17}R^{18}NR^{17}C(O)NR^{20}R^{21}$, -$(CH_2)_{1-3}COR^{22}$ or -$(CH_2)_{1-3}$-R^{23};

R^{17} and R^{18} are each independently H or -C_{1-3} alkyl;

R^{19} is H, -C_{1-4} alkyl or arylalkyl;

R^{20} and R^{21} are each independently H, -C_{1-3} alkyl, $-C(O)R^{17}$ or $-S(O)_2R^{17}$, or

R^{20} and R^{21}, taken together with the nitrogen atom to which they are attached, form a 5-6 membered heterocyclyl ring containing 1-2 heteroatoms selected from the group consisting of N and O;

R^{22} is H, -C_{1-3} alkyl, -OR^{19} or $NR^{20}R^{21}$; and

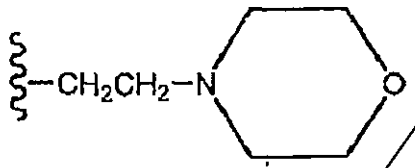
R^{23} is a 5-6 membered heterocyclyl ring containing 1-2 heteroatoms selected from the group consisting of N and O.

20. The compound of claim 19, wherein said unsubstituted or substituted 5-6 membered heterocyclyl ring formed by R^{20} and R^{21} and said unsubstituted or substituted 5-6 membered heterocyclyl ring of R^{23} are each independently unsubstituted or substituted with a C_{1-2} alkyl.

21. The compound of claim 19, wherein:

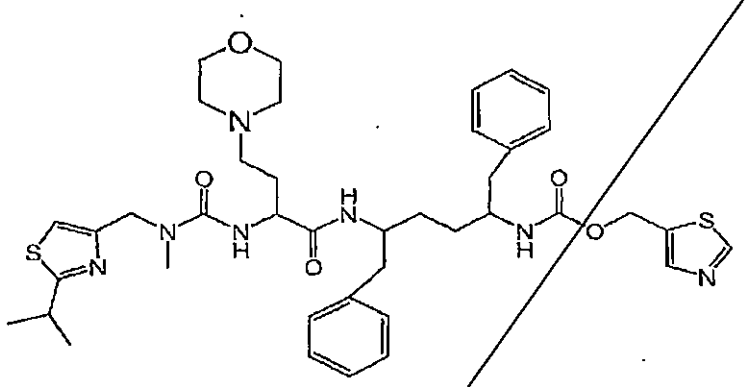
R^{13} is -$(CH_2)_{0-3}CR^{17}R^{18}NR^{20}R^{21}$ or -$(CH_2)_{0-3}CR^{17}R^{18}NR^{17}C(O)NR^{20}R^{21}$).

22. The compound of claim 19, wherein



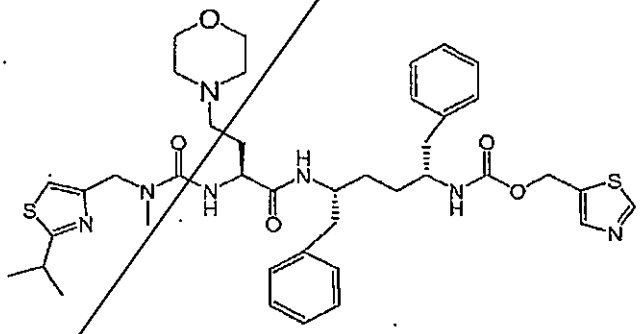
R^{13} is CH_2OH, $-CH_2CH_2NHC(O)CH_3$ or

23. A compound which is



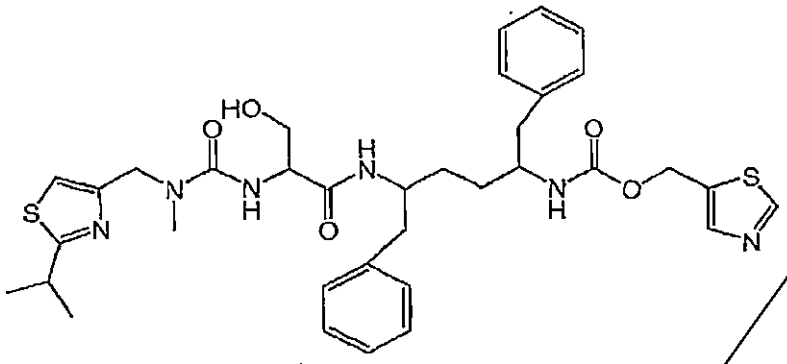
or a pharmaceutically acceptable salt, stereoisomer and/or solvate thereof.

24. A compound which is:



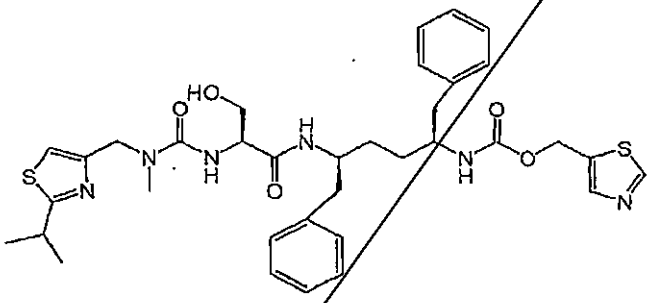
or a pharmaceutically acceptable salt and/or solvate thereof.

25. A compound which is:



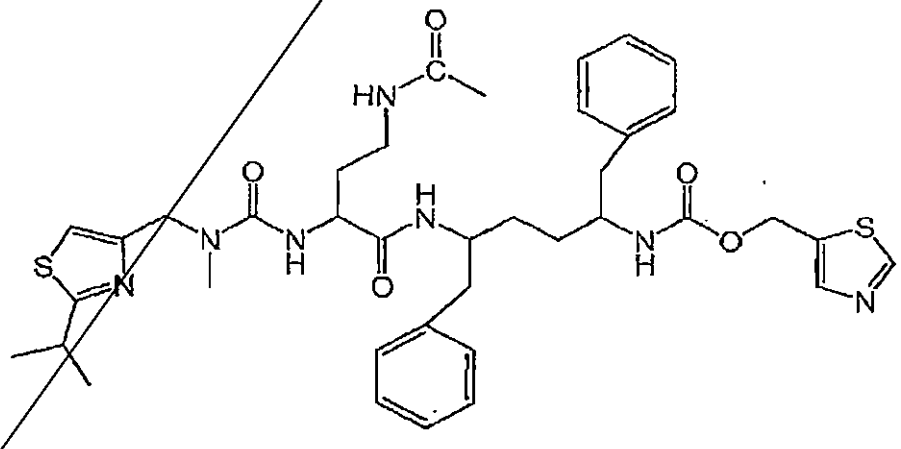
or a pharmaceutically acceptable salt, solvate, stereoisomer and/or ester thereof.

26. A compound which is



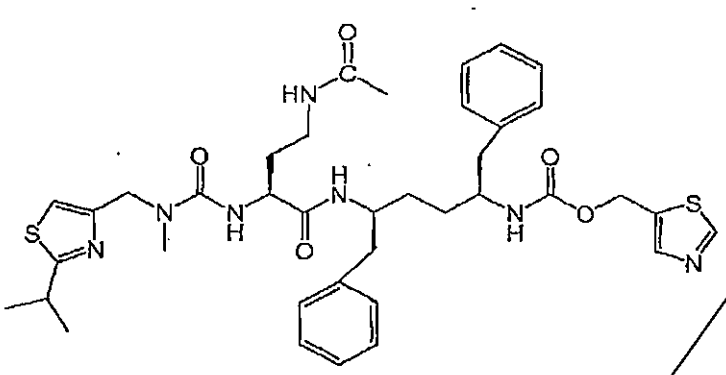
or a pharmaceutically acceptable salt, solvate and/or ester thereof.

27. A compound which is:



or a pharmaceutically acceptable salt, stereoisomer and/or solvate thereof.

28. A compound which is:



or a pharmaceutically acceptable salt and/or solvate thereof.

29. A method for improving the pharmacokinetics of a drug which is metabolized by cytochrome P450 monooxygenase, comprising administering to a ' patient treated with said drug, a therapeutically effective amount of a compound of claim 1, or a pharmaceutically acceptable salt, solvate, and/or ester thereof.

30. The method of claim 29 wherein said administering comprises administering a therapeutically effective amount of a combination comprising said drug and the compound of Formula I or a pharmaceutically acceptable salt, solvate, and/or ester of the compound of Formula I.

31. A method for improving the pharmacokinetics of a drug which is metabolized by cytochrome P450 monooxygenase, comprising administering to a patient treated with said drug, a therapeutically effective amount of a compound of claim 11, or a pharmaceutically acceptable salt, solvate, and/or ester thereof.

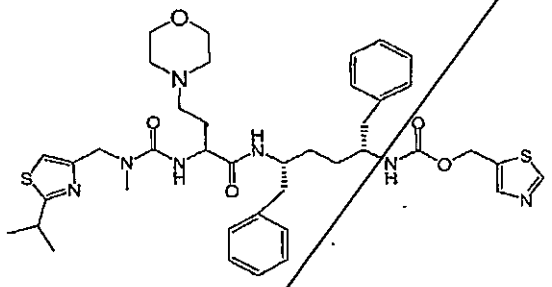
32. The method of claim 31, wherein the drug metabolized by cytochrome P450 is an HIV protease inhibiting compound, an HIV non-nucleoside inhibitor of reverse transcriptase, an HIV nucleoside inhibitor of reverse transcriptase, HIV nucleotide inhibitor of reverse transcriptase, an HIV integrase inhibitor, a gp41 inhibitor, a CXCR4 inhibitor, a gpl20 inhibitor, a CCR5 inhibitor, capsid polymerization inhibitors, other drugs for treating HIV, an interferon, ribavirin analog, NS3 protease inhibitor, alpha-glucosidase 1 inhibitor, hepatoprotectant, non-nucleoside inhibitor of HCV,

NS5a inhibitors, NS5b polymerase inhibitors, other drugs for treating HCV, or mixtures thereof.

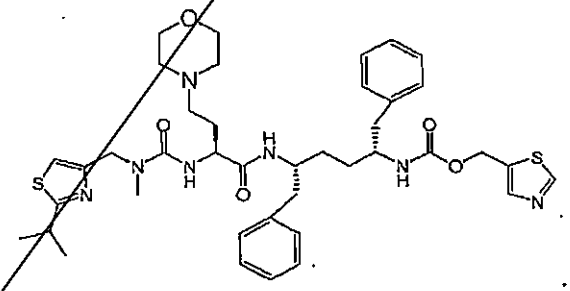
33. The method of claim 32, wherein the drug is 6-(3-chloro-2-fluorobenzyl)-1-((2S)-1-hydroxy-3-methylbutan-2-yl)-7-methoxy-4- oxo-1,4-dihydroquinoline-3-carboxylic acid.

34. The method of claim 32, wherein the drug is atazanavir.

35. The method of 33, wherein the compound is:



36. The method of 34, wherein the compound is:



37. The method of claim 31, wherein the drug and the compound or salt of claim 11 is administered as a single composition to the patient.

38. A method for increasing blood plasma levels of a drug which is metabolized by cytochrome P450 monooxygenase, comprising administering to a patient treated with said drug, a therapeutically effective amount of a compound of claim 1, or a pharmaceutically acceptable salt, solvate, and/or ester thereof.

39. The method of claim 38, wherein said administering comprises administering a therapeutically effective amount of a combination comprising said drug and the compound of Formula I or a pharmaceutically acceptable salt, solvate, and/or ester of the compound of Formula I.

40. The method of claim 38, wherein the amount of the compound of Formula I administered is effective to inhibit cytochrome P450 monooxygenase.

41. A method for inhibiting cytochrome P450 monooxygenase in a patient comprising administering to a patient in need thereof an amount of a compound of claim 1, or a pharmaceutically acceptable salt, solvate, and/or ester thereof, effective to inhibit cytochrome P450 monooxygenase.

42. A method for inhibiting cytochrome P450 monooxygenase in a patient comprising administering to a patient in need thereof an amount of a compound of claim 11, or a pharmaceutically acceptable salt, solvate, and/or ester thereof, effective to inhibit cytochrome P450 monooxygenase.

43. A method for treating an HIV infection comprising administering to a patient in need thereof a therapeutically effective amount of a compound of claim 1, or a pharmaceutically acceptable salt, solvate, and/or ester thereof, in combination with a therapeutically effective amount of one or more additional therapeutic agents selected from the group consisting of HIV protease inhibiting compounds, HIV non-nucleoside inhibitors of reverse transcriptase, HIV nucleoside inhibitors of reverse transcriptase, HIV nucleotide inhibitors of reverse transcriptase, HIV integrase inhibitors, gp41 inhibitors, CXCR4 inhibitors, gpl20 inhibitors, G6PD and NADH-oxidase inhibitors, CCR5 inhibitors, other drugs for treating HIV, and mixtures thereof.

44. A method for treating an HIV infection comprising administering to a patient in need thereof a therapeutically effective amount of a compound of claim 11, or a pharmaceutically acceptable salt, solvate, and/or ester thereof, in combination with a therapeutically effective amount of one or more additional therapeutic agents

selected from the group consisting of HIV protease inhibiting compounds, HIV non-nucleoside inhibitors of reverse transcriptase, H3V nucleoside inhibitors of reverse transcriptase, HIV nucleotide inhibitors of reverse transcriptase, HIV integrase inhibitors, gp41 inhibitors, CXCR4 inhibitors, gpl20 inhibitors, G6PD and NADH-oxidase inhibitors, CCR5 inhibitors, other drugs for treating HIV, and mixtures thereof.

45. The method of claim 44, wherein:

(1) said HIV protease inhibitors are selected from the group consisting of amprenavir, atazanavir, fosamprenavir, indinavir, lopinavif, ritonavir, nelfinavir, saquinavir, tipranavir, brecanavir, darunavir, TMC-126, TMC-114, mozenavir (DMP-450), JE-2147 (AG1776), L-756423, RO0334649, KNI-272, DPC-681, DPC- 684, GW640385X, DG17, PPL-100, DG35, and AG 1859;

(2) said HIV non-nucleoside inhibitors of reverse transcriptase are selected from the group consisting of capravirine, emivirine, delaviridine, efavirenz, nevirapine, (+) calanolide A, etravirine, GW5634, DPC-083, DPC-961, DPC-963, MIV-150, and TMC-120, TMC-278 (rilpivirene), efavirenz, BILR 355 BS, VRX 840773, UK-453061, and RDEA806;

(3) said HIV nucleoside inhibitors of reverse transcriptase are selected from the group consisting of zidovudine, emtricitabine, didanosine, stavudine, zalcitabine, lamivudine, abacavir, amdoxovir, elvucitabine, alovudine, MIV-210, racivir (±-FTC), D-d4FC, emtricitabine, phosphazide, fozivudine tidoxil, apridtibine (AVX754), amdoxovir, KP-1461, and fosalvudine tidoxil (formerly HDP 99.0003), ;

(4) said HIV nucleotide inhibitors of reverse transcriptase are selected from the group consisting of tenofovir and adefovir;

(5) said HIV integrase inhibitors are selected from the group consisting of curcumin, derivatives of curcumin, chicoric acid, derivatives of chicoric acid, 3,5-dicaffeoylquinic acid, derivatives of 3,5-dicaffeoylquinic acid, aurintricarboxylic acid, derivatives of aurintricarboxylic acid, caffeic acid phenethyl ester, derivatives of caffeic acid phenethyl ester, tyrphostin, derivatives of tyrphostin, quercetin, derivatives of quercetin, S-1360, zintevir (AR-177), L-870812, and L-870810, MK-0518 (raltegravir), BMS-538158, GSK364735C, BMS-707035, MK-2048, and BA 011;

(6) said gp41 inhibitor are selected from the group consisting of enfuvirtide, sifuvirtide, FB006M, and TRI-1144;

(7) said CXCR4 inhibitor is AMD-070;

(8) said entry inhibitor is SP0IA;

(9) said gp120 inhibitor is BMS-488043 or BlockAide/ CR;

(10) said G6PD and NADH-oxidase inhibitor is immunitin;

(11) said CCR5 inhibitors are selected from the group consisting of aplaviroc, vicriviroc, maraviroc, PRO-140, INCB 15050, PF-232798 (Pfizer), and CCR5mAb004;

(12) said other drugs for treating HIV are selected from the group consisting of BAS-100, SPI-452, REP 9, SP-OIA, TNX-355, DES6, ODN-93, ODN- 112, VGV-I, PA-457 (bevirimat), Ampligen, HRG214, Cytolin, VGX-410, KD-247, AMZ 0026, CYT 99007A-221 HIV, DEBIO-025, BAY 50-4798, MDXOIO (ipilimumab), PBS 119, ALG 889, and PA-1050040 (PA-040).

46. A method for treating an HCV infection comprising administering to a patient in need thereof a therapeutically effective amount of a compound of claim 1, or a pharmaceutically acceptable salt, solvate, and/or ester thereof, in combination with a therapeutically effective amount of one or more additional therapeutic agents selected from the group consisting of interferons, ribavirin analogs, NS3 protease inhibitors, alpha-glucosidase 1 inhibitors, hepatoprotectants, non-nucleoside inhibitors of HCV, and other drugs for treating HCV, or mixtures thereof.

47. A method for treating an HCV infection comprising administering to a patient in need thereof a therapeutically effective amount of a compound of claim 11, or a pharmaceutically acceptable salt, solvate, and/or ester thereof, in combination with a therapeutically effective amount of one or more additional therapeutic agents selected from the group consisting of interferons, ribavirin analogs, NS5b polymerase inhibitors, NS3 protease inhibitors, alpha-glucosidase 1 inhibitors, hepatoprotectants, non-nucleoside inhibitors of HCV, and other drugs for treating HCV, or mixtures thereof.

48. The method of claim 46, wherein:

(1) said interferons are selected from the group consisting of pegylated rIFN-alpha 2b, pegylated rIFN-alpha 2a, rIFN-alpha 2b, rIFN-alpha 2a, consensus IFN alpha (inf ergen), feron, reaferon, intermax alpha, r-IFN-beta, infergen + actimmune, IFN-omega with DUROS, albuferon, locteron, Albuferon, Rebif, Oral interferon alpha, IFNalpha-2b XL, AVI-005, PEG-Infergen, and Pegylated IFN- beta;

(2) said ribavirin analogs are selected from the group consisting of rebetol, copegus, and viramidine (taribavirin);

(3) said NS5b polymerase inhibitors are selected from the group consisting of NM-283, valopicitabine, R1626, PSI-6130 (R1656), HCV-796, BILB 1941, XTL-2125, MK-0608, NM- 107, R7128 (R4048), VCH-759, PF-868554, and GSK625433;

(4) said NS3 protease inhibitor are selected from the group consisting of SCH-503034 (SCH-7), VX-950 (telaprevir), BILN-2065, BMS-605339, and ITMN-191;

(5) said alpha-glucosidase 1 inhibitors are selected from the group consisting of MX-3253 (celgosivir) and UT-231B; (6) said hepatoprotectants are selected from the group consisting of IDN-
6556, ME 3738, LB-84451, and MitoQ;

(7) said non-nucleoside inhibitors of HCV are selected from the group consisting of benzimidazole derivatives, benzo-1,2,4-thiadiazine derivatives, phenylalanine derivatives, A-831, and A-689; and

(8) said other drugs for treating HCV are selected from the group consisting of zadaxin, nitazoxanide (alinea), BIVN-401 (virostat), PYN-17
(altirex), KPE02003002, actilon (CPG-10101), KRN-7000, civadr, GI-5005, ANA-975, XTL-6865, ANA 971, NOV-205, tarvacin, EHC-18, NIM811, DEBIO-025, VGX-410C, EMZ-702, AVI 4065, Bavituximab, Oglufanide, and VX-497 (merimepodib) .

49. A pharmaceutical composition comprising a compound of claim 1, or a pharmaceutically acceptable salt, solvate, and/or ester thereof, and a pharmaceutically acceptable carrier or exipient.

50. The pharmaceutical composition of claim 49, further comprising at least one additional therapeutic agent.

51. A pharmaceutical composition of claim 50, wherein said at least one additional therapeutic agent is metabolized by cytochrome P450 monooxygenase.

52. The pharmaceutical composition of claim 50, wherein the at least one additional therapeutic agent is selected from the group consisting of

HIV protease inhibiting compounds, HIV non-nucleoside inhibitors of reverse transcriptase, HIV nucleoside inhibitors of reverse transcriptase, HIV nucleotide inhibitors of reverse transcriptase, HIV integrase inhibitors, gp41 inhibitors, CXCR4 inhibitors, gpl20 inhibitors, CCR5 inhibitors, capsid polymerization inhibitors, interferons, ribavirin analogs, NS3 protease inhibitors, alpha-glucosidase 1 inhibitors, hepatoprotectants, nón-nucleoside inhibitors of HCV, other drugs for treating HCV, and combinations thereof.

53. The pharmaceutical composition of claim 52, wherein:

(1) said HIV protease inhibitors are selected from the group consisting of amprenavir, atazanavir, fosamprenavir, indinavir, lopinavir, ritonavir, nelfinavir, saquinavir, tipranavir, brecanavir, darunavir, TMC-126, TMC-114, mozenavir (DMP-450), JE-2147 (AG1776), L-756423, RO0334649, KNI-272, DPC-681, DPC- 684, GW640385X, DGI 7, PPL-100, DG35, and AG 1859;

(2) said HIV non-nucleoside inhibitors of reverse transcriptase are selected from the group consisting of capravirine, emivirine, delaviridine, efavirenz, nevirapine, (+) calanolide A, etravirine, GW5634, DPC-083, DPC-961, DPC-963, MIV-150, and TMC-120, TMC-278 (rilpivirene), efavirenz, BILR 355 BS, VRX 840773, UK-453061, and RDEA806;

(3) said HIV nucleoside inhibitors of reverse transcriptase are selected from the group consisting of zidovudine, emtricitabine, didanosine, stavudine, zalcitabine, lamivudine, abaca vir, amdoxovir, elvucitabine, alovudine, MIV-210, racivir (±-FTC), D-d4FC, emtricitabine, phosphazide, fozivudine tidoxil, apricitibine (AVX754), amdoxovir, KP-1461, and fosalvudine tidoxil (formerly HDP 99.0003), ;

(4) said H-V nucleotide inhibitors of reverse transcriptase are selected from the group consisting of tenofovir and adefovir;

(5) said HIV integrase inhibitors are selected from the group consisting of curcumin, derivatives of curcumin, chicoric acid, derivatives of chicoric acid, 3,5-dicaffeoylquinic acid, derivatives of 3,5-dicaffeoylquinic acid, aurintricarboxylic acid,

derivatives of aurintricarboxylic acid, caffeic acid phenethyl ester, derivatives of caffeic acid phenethyl ester, tyrphostin, derivatives of tyrphostin, quercetin, derivatives of quercetin, S-1360, zintevir (AR-177), L-870812, and L-870810, MK-0518 (raltegravir), BMS-538158, GSK364735Q BMS-707035, MK-2048, and BA-011;

(6) said gp41 inhibitor are selected from the group consisting of enfuvirtide, sifuvirtide, FB006M, and TRI-1144;

(7) said CXCR4 inhibitor is AMD-070;

(8) said entry inhibitor is SPOIA;

(9) said gpl20 inhibitor is BMS-488043 or BlockAide/ CR;

(10) said G6PD and NADH-oxidase inhibitor is immunitin;

(11) said CCR5 inhibitors are selected from the group consisting of aplaviroc, vicriviroc, maraviroc, PRO-140, INCB15050, PF-232798 (Pfizer), and CCR5mAb004;

(12) said other drugs for treating HIV are selected from the group consisting of BAS-100, SPI-452, REP 9, SP-OIA, TNX-355, DES6, ODN-93, ODN- 112, VGV-I, PA-457 (bevirimat), Ampligen, HRG214, Cytolin, VGX-410, KD-247, AMZ 0026, CYT 99007A-221 HIV, DEBIO-025, BAY 50-4798, MDXOIO (ipilimumab), PBS 119, ALG 889, and PA-1050040 (PA-040);

(13) said interferons are selected from the group consisting of pegylated rIFN-alpha 2b, pegylated rIFN-alpha 2a, rIFN-alpha 2b, rIFN-alpha 2a, consensus IFN alpha (infergen), feron, reaferon, intermax alpha, r-IFN-beta, infergen + actimmune, IFN-omega with DUROS, albuferon, locteron, Albuferon, Rebif, Oral interferon alpha, IFNalpha-2b XL, AVI-005, PEG-Infergen, and Pegylated IFN- beta;

(14) said ribavirin analogs are selected from the group consisting of rebetol, copegus, and viramidine (taribavirin);

(15) said NS5b polymerase inhibitors are selected from the group consisting of NM-283, valopicitabine, R1626, PSI-6130 (R1656), HCV-796, BILB 1941, XTL-2125, MK-0608, NM-107, R7128 (R4048), VCH-759, PF-868554, and GSK625433;

(16) said NS3 protease inhibitor are selected from the group consisting of SCH-503034 (SCH-7), VX-950 (telaprevir), BILN-2065, BMS-605339, and ITMN-191;

(17) said alpha-glucosidase 1 inhibitors are selected from the group consisting of MX-3253 (celgosivir) and UT-231B;

(18) said hepatoprotectants are selected from the group consisting of IDN-6556, ME 3738, LB-84451, and MitoQ;

(19) said non-nucleoside inhibitors of HCV are selected from the group consisting of benzimidazole derivatives, benzo-l,2,4-thiadiazine derivatives, phenylalanine derivatives, A-831, and A-689; and

(20) said other drugs for treating HCV are selected from the group consisting of zadaxin, nitazoxanide (alinea), BIVN-401 (virostat), PYN-17 (altirex), KPE02003002, actilon (CPG-10101), KRN-7000, civacir, GI-5005, ANA- 975, XTL-6865, ANA 971, NOV-205, tarvacin, EHC-18, NIM811, DEBIO-025, VGX-410C, EMZ-702, AVI 4065, Bavituximab, Oglufanide, and VX-497 (merimepodib).

54. A compound of table 12.

55. A new compound, substantially as described herein.

56. A new pharmaceutical composition or use for the preparation of a medicament, substantially as described herein.

57. A compound of claim 1 as a therapeutic substance.

58. The use of a compound of claim 1 for the manufacture of a medicament for improving the pharmacokinetics of a drug which is metabolized by cytochrome P450 monooxygenase, increasing the blood plasma level of a drug which is metabolized by cytochrome P450 monooxygenase, inhibiting cytochrome P450 monooxygenase, treating and HIV infection, or treating an HCV infection in a patient.

59. The use of claim 58, wherein said drug which is metabolized by cytochrome P450 monooxygenase is an HIV protease inhibiting compounds, HIV non-nucleoside inhibitors of reverse transcriptase, HIV nucleoside inhibitors of reverse transcriptase, HIV nucleotide inhibitors of reverse transcriptase, HIV integrase inhibitors, gp41 inhibitors, CXCR4 inhibitors, gpl20 inhibitors, G6PD and NADH-oxidase inhibitors, CCR5 inhibitors, other drugs for treating HIV, an interferon, ribavirin analog, NS3 protease inhibitor, alpha-glucosidase 1 inhibitor, hepatoprotectant, non-nucleoside inhibitor of HCV, and other drugs for treating HCV, or mixtures thereof.

60. The use of claim 59, wherein said medicament is a combination of a compound of claim 1 and one or more additional therapeutic agents selected from the group consisting of HIV protease inhibiting compounds, HIV non- nucleoside inhibitors of reverse transcriptase, HIV nucleoside inhibitors of reverse transcriptase, HIV nucleotide inhibitors of reverse transcriptase, HIV integrase inhibitors, gp41 inhibitors, CXCR4 inhibitors, gpl20 inhibitors, G6PD and NADH-oxidase inhibitors, CCR5 inhibitors, other drugs for treating HIV, interferons, ribavirin analogs, NS5b polymerase inhibitors, NS3 protease inhibitors, alpha-glucosidase 1 inhibitors, hepatoprotectants, non-nucleoside inhibitors of HCV, and other drugs for treating HCV, and mixtures thereof.

61. The use of claim 60, wherein:

(1) said HIV protease inhibitors are selected from the group consisting of amprenavir, atazanavir, fosamprenavir, indinavir, lopinavir, ritonavir, nelfinavir, saquinavir, tipranavir, brecanavir, darunavir, TMC-126, TMC-114, mozenavir (DMP-450), JE-2147 (AGl 776), L-756423, RO0334649, KNI-272, DPC-681, DPC- 684, GW640385X, DG17, PPL-100, DG35, and AG 1859;

(2) said HIV non-nucleoside inhibitors of reverse transcriptase are selected from the group consisting of capravirine, emivirine, delaviridine, efavirenz, nevirapine, (+) calanolide A, etravirine, GW5634, DPC-083, DPC-961, DPC-963, MIV-150, and TMC-120, TMC-278 (rilpivirene), efavirenz, BILR 355 BS, VRX 840773, UK-453061, and RDEA806;

(3) said HIV nucleoside inhibitors of reverse transcriptase are selected from the group consisting of zidovudine, emtricitabine, didanosine, stavudine, zalcitabine, lamivudine, abacavir, amdoxovir, elvucitabine, alovudine, MIV-210, racivir (±-FTC), D-d4FC, emtricitabine, phosphazide, fozivudine tidoxil, apricitibine (AVX754), amdoxovir, KP-1461, and fosalvudine tidoxil (formerly HDP 99.0003), ;

(4) said HIV nucleotide inhibitors of reverse transcriptase are selected from the group consisting of tenofovir and adefovir;

(5) said HIV integrase inhibitors are selected from the group consisting of curcumin, derivatives of curcumin, chicoric acid, derivatives of chicoric add, 3,5-dicaffeoylquinic acid, derivatives of 3,5-dicaffeoylquinic acid, aurintricarboxylic acid, derivatives of aurintricarboxylic acid, caffeic acid phenethyl ester, derivatives of caffeic acid phenethyl ester, tyrphostin, derivatives of tyrphostin, quercetin,

derivatives of quercetin, S-1360, zintevir (AR-177), L-870812, and L- 870810, MK-0518 (raltegravir), BMS-538158, GSK364735C, BMS-707035, MK-2048, and BA 011;

(6) said gp41 inhibitor are selected from the group consisting of enfuvirtide, sifuvirtide, FB006M, and TRI-1144;

(7) said CXCR4 inhibitor is AMD-070;

(8) said entry inhibitor is SPOIA;

(9) said gpl20 inhibitor is BMS-488043 or BlockAide/ CR;

(10) said G6PD and NADH-oxidase inhibitor is immunitin;

(11) said CCR5 inhibitors are selected from the group consisting of aplaviroc, vicriviroc, maraviroc, PRO-140, INCB15050, PF-232798 (Pfizer), and CCR5mAb004;

(12) said other drugs for treating HIV are selected from the group consisting of BAS-100, SPI-452, REP 9, SP-OIA, TNX-355, DES6, ODN-93, ODN- 112, VGV-I, PA-457 (bevirimat), Ampligen, HRG214, Cytolin, VGX-410, KD-247, AMZ 0026, CYT 99007A-221 HIV, DEBIO-025, BAY 50-4798, MDXOIO (ipilimumab), PBS 119, ALG 889, and PA-1050040 (PA-040);

(13) said interferons are selected from the group consisting of pegylated rIFN-alpha 2b, pegylated rIFN-alpha 2a, rIFN-alpha 2b, rIFN-alpha 2a, consensus IFN alpha (infergen), feron, reaferon, intermax alpha, r-IFN-beta, infergen + actimmune, IFN-omega with DUROS, albuferon, locteron, Albuferon, Rebif, Oral interferon alpha, IFNalpha-2b XL, AVI-005, PEG-Infergen, and Pegylated IFN- beta;

(14) said ribavirin analogs are selected from the group consisting of rebetol, copegus, and viramidine (taribavirin);

(15) said NS5b polymerase inhibitors are selected from the group consisting of NM-283, valopidtabine, R1626, PSI-6130 (R1656), HCV-796, BILB 1941, XTL-2125, MK-0608, NM-107, R7128 (R4048), VCH-759, PF-868554, and GSK625433;

(16) said NS3 protease inhibitor are selected from the group consisting of SCH-503034 (SCH-7), VX-950 (telaprevir), BILN-2065, BMS-605339, and ITMN-191;

(17) said alpha-ghicosidase 1 inhibitors are selected from the group consisting of MX-3253 (celgosivir) and UT-231B;

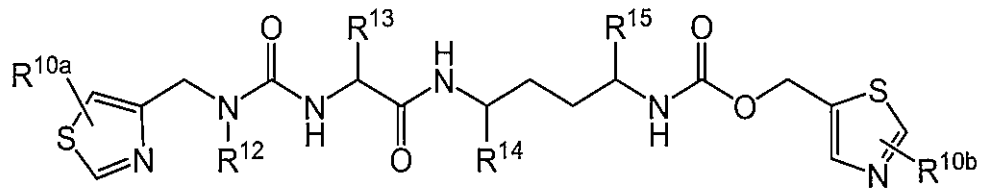
(18) said hepatoprotectants are selected from the group consisting of IDN-6556, ME 3738, LB-84451, and MitoQ;

(19) said non-nucleoside inhibitors of HCV are selected from the group consisting of benzimidazole derivatives, benzo-l,2,4-thiadiazine derivatives, phenylalanine derivatives, A-831, and A-689; and

(20) said other drugs for treating HCV are selected from the group consisting of zadaxin, nitazoxanide (alinea), BIVN-401 (virostat), PYN-17 (altirex), KPE02003002, actilon (CPG-10101), KRN-7000, civadr, GI-5005, ANA- 975, XTL-6865, ANA 971, NOV-205, tarvacin, EHC-18, NIM811, DEBIO-025, VGX-410C, EMZ-702, AVI 4065, Bavituximab, Oglufanide, and VX-497 (merimepodib).

What is claimed:

1. A compound of formula IIB:



Formula IIB

or a pharmaceutically acceptable salt, solvate, stereoisomer or ester thereof, wherein:

R^{10a} and R^{10b} are each independently H or -C_{1-4} alkyl;

R^{12} is H or -CH_3;

R^{13} is H, -C_{1-4} alkyl, -$(CH_2)_{0-1}CR^{17}R^{18}OR^{19}$, -$(CH_2)_{0-3}CR^{17}R^{18}NR^{20}R^{21}$, -$(CH_2)_{0-3}CR^{17}R^{18}NR^{17}C(O)$ $NR^{20}R^{21}$, -$(CH_2)_{1-3}C(O)R^{22}$, -$(CH_2)_{1-3}S(O)_2R^{22}$ or -$(CH_2)_{1-3}$-R^{23};

R^{14} and R^{15} are each independently H, -C_{1-4} alkyl or arylalkyl;

R^{17} and R^{18} are each independently H or -C_{1-3} alkyl;

R^{19} is H, -C_{1-4} alkyl or arylalkyl;

R^{20} and R^{21} are each independently H, -C_{1-3} alkyl, -$C(O)R^{17}$ or -$S(O)_2R^{17}$; or

R^{20} and R^{21}, taken together with the nitrogen atom to which they are attached, form an unsubstituted or substituted 5-6 membered heterocyclyl ring containing 1-2 heteroatoms selected from the group consisting of N and O;

R^{22} is H, -C_{1-3}alkyl, -OR^{19} or -$NR^{20}R^{21}$; and

R^{23} is an unsubstituted or substituted 5-6 membered heterocyclyl ring containing 1-2 heteroatoms selected from the group consisting of N and O;

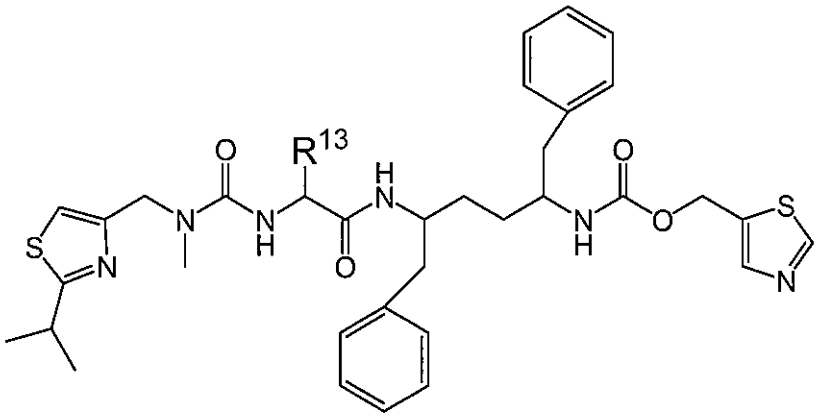
wherein said unsubstituted or substituted 5-6 membered heterocyclyl ring formed by R^{20} and R^{21} and said unsubstituted or substituted 5-6 membered heterocyclyl ring of R^{23} are each independently unsubstituted or substituted with a C_{1-2} alkyl.

2. A compound of claim 1 or a pharmaceutically acceptable salt, solvate, stereoisomer or ester thereof wherein R^{13} is -$(CH_2)_{0-3}CR^{17}R^{18}NR^{20}R^{21}$, -$(CH_2)_{0-3}CR^{17}R^{18}NR^{17}C(O)NR^{20}R^{21}$ or -$(CH_2)_{1-3}$-R^{23}.

3. A compound of claim 2 or a pharmaceutically acceptable salt, solvate,

stereoisomer or ester thereof, wherein R^{13} is $-(CH_2)_{0-3}CR^{17}R^{18}NR^{20}R^{21}$ or $-(CH_2)_{0-3}CR^{17}R^{18}NR^{17}C(O)-NR^{20}R^{21}$.

4. A compound of claim 1 of formula IIC:



Formula IIC

or a pharmaceutically acceptable salt, solvate, stereoisomer or ester thereof, wherein:

R^{13} is H, $-C_{1-4}$ alkyl, $-(CH_2)_{0-1}CR^{17}R^{18}OR^{19}$, $-(CH_2)_{0-3}CR^{17}R^{18}NR^{20}R^{21}$, $-(CH_2)_{0-3}CR^{17}R^{18}NR^{17}C(O)\ NR^{20}R^{21}$, $-(CH_2)_{1-3}C(O)R^{22}$ or $-(CH_2)_{1-3}-R^{23}$;

R^{17} and R^{18} are each independently H or C_{1-3} alkyl;

R^{19} is H, $-C_{1-4}$ alkyl or arylalkyl;

R^{20} and R^{21} are each independently H, $-C_{1-3}$ alkyl, $-C(O)R^{17}$ or $-S(O)_2R^{17}$; or

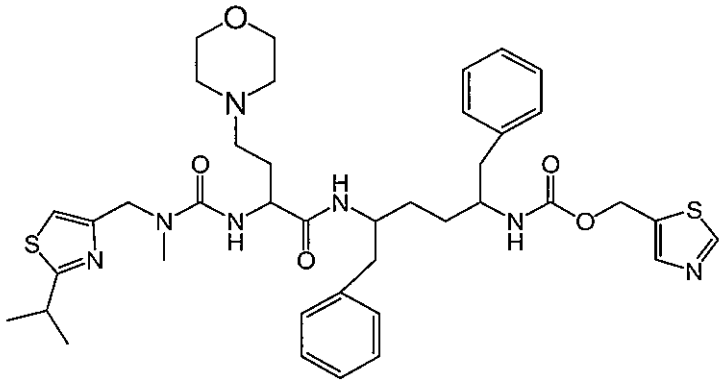
R^{20} and R^{21}, taken together with the nitrogen atom to which they are attached, form an unsubstituted or substituted 5-6 membered heterocyclyl ring containing 1-2 heteroatoms selected from the group consisting of N and O;

R^{22} is H, $-C_{1-3}$alkyl, $-OR^{19}$ or $-NR^{20}R^{21}$; and

R^{23} is an unsubstituted or substituted 5-6 membered heterocyclyl ring containing 1-2 heteroatoms selected from the group consisting of N and O;

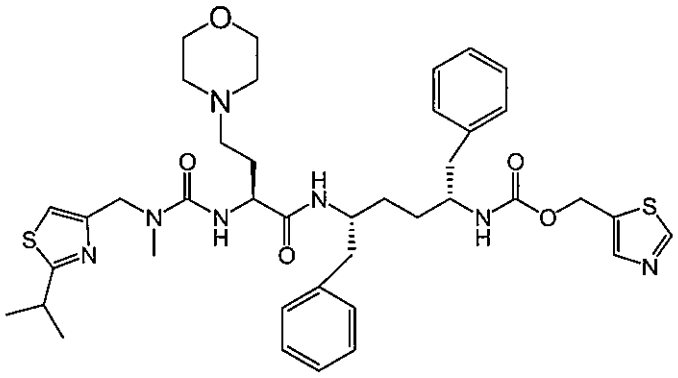
wherein said unsubstituted or substituted 5-6 membered heterocyclyl ring formed by R^{20} and R^{21} and said unsubstituted or substituted 5-6 membered heterocyclyl ring of R^{23} are each independently unsubstituted or substituted with a C_{1-2} alkyl.

5. A compound of claim 1 of the formula



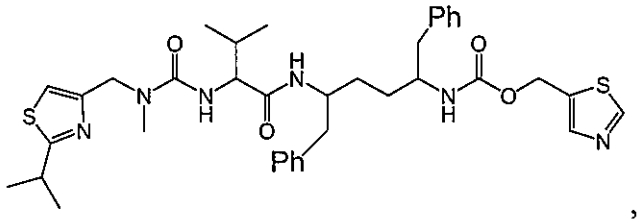
or a pharmaceutically acceptable salt , stereoisomer or solvate thereof.

6. The compound of claim 5 which is:

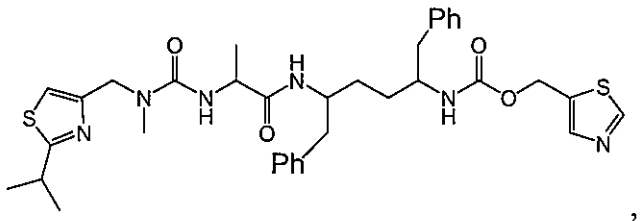


or a pharmaceutically acceptable salt thereof.

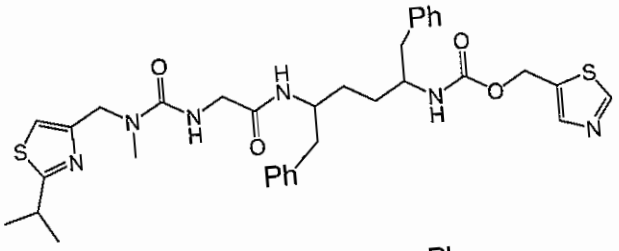
7. A compound of claim 1 selected from the group consisting of:

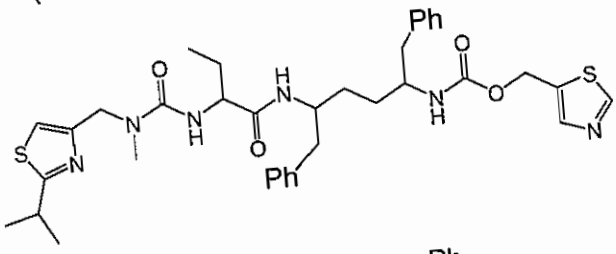


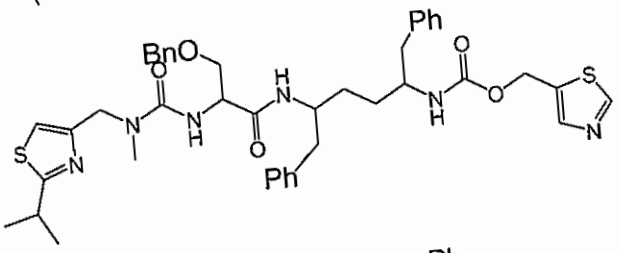
,

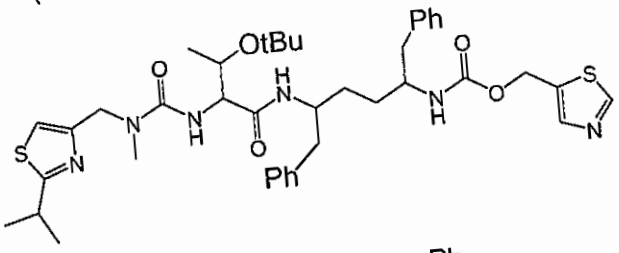


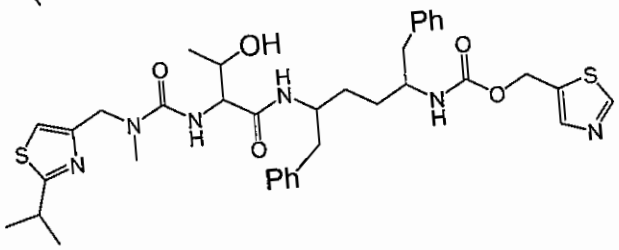
,

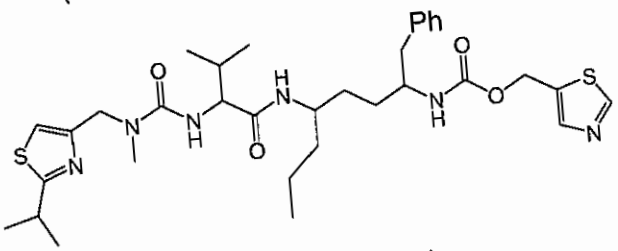

,

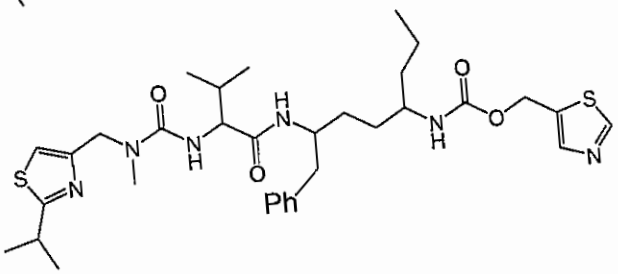

,


,


,

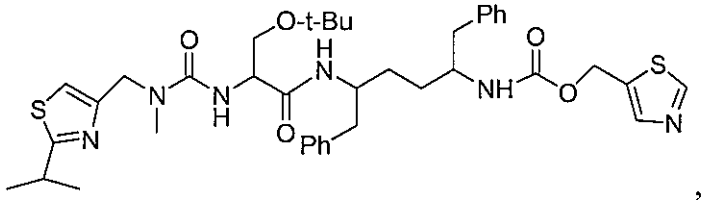

,

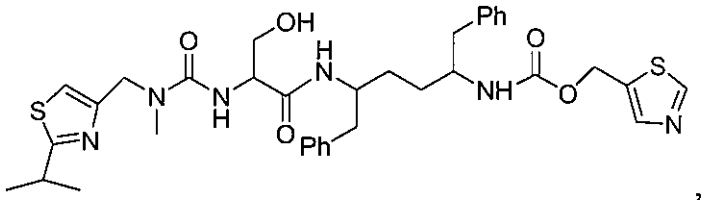

, and

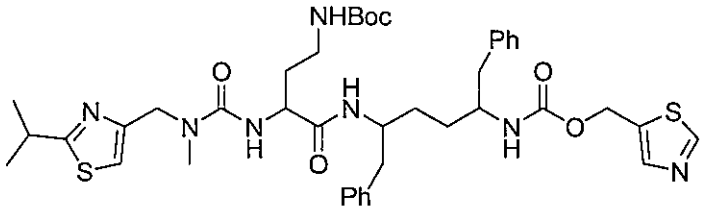

, or

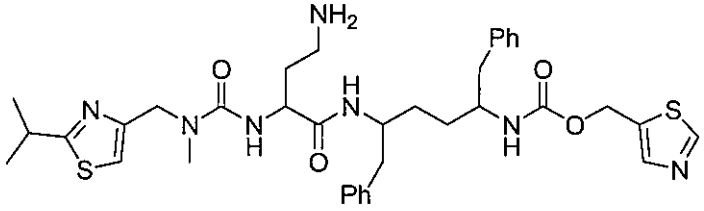
pharmaceutically acceptable salts, solvates, stereoisomers or esters thereof.

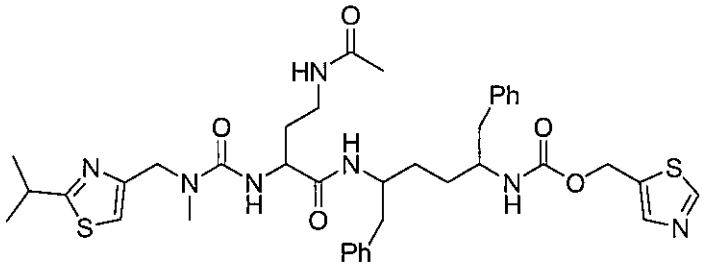
8. A compound of claim 1 selected from the group consisting of

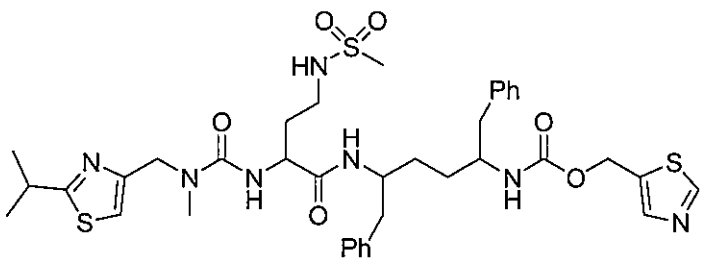

,

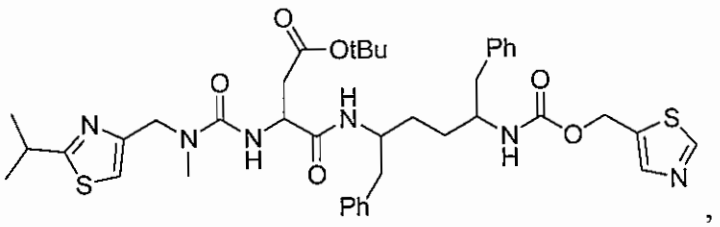

,


,

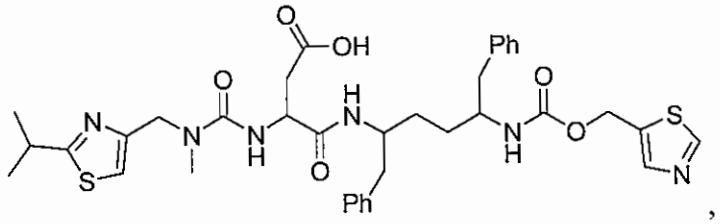

,


,

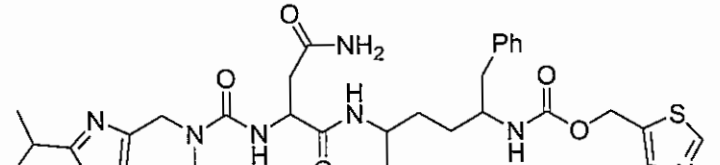

,

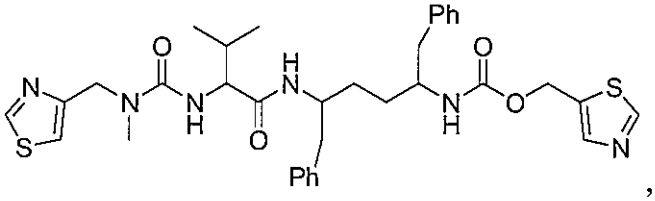

O
OtBu
Ph
N
S
O
H
N
Ph

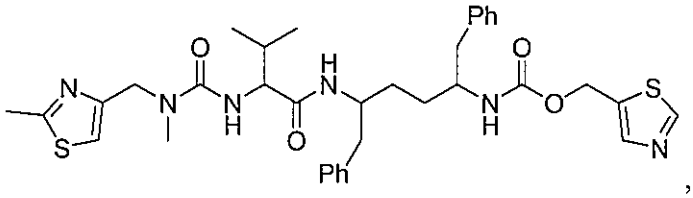
,

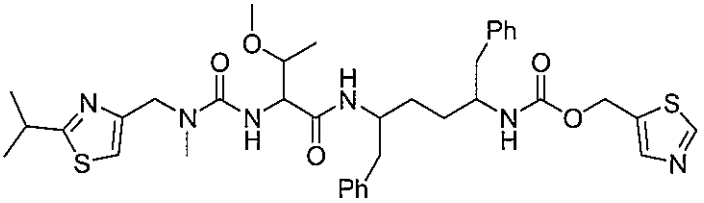

O
OH
Ph
N
S
O
H
N
Ph

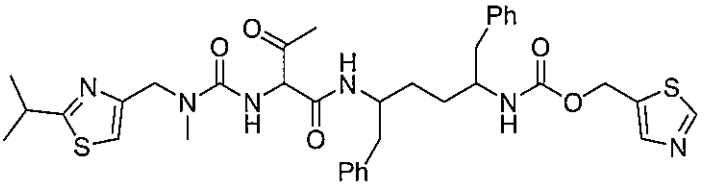
,

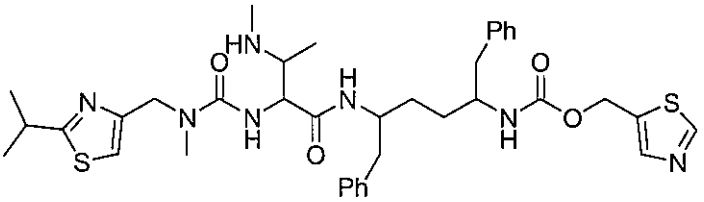

O
NH2
Ph
N
S
O
H
N

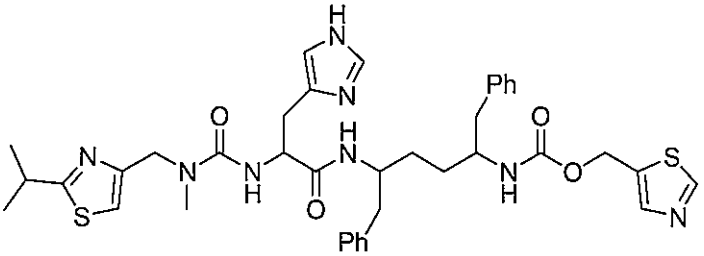

,

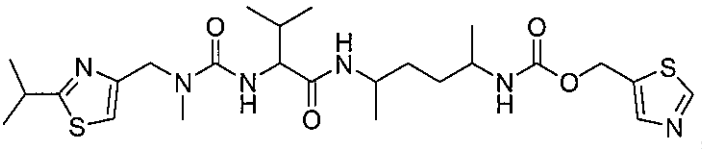

,

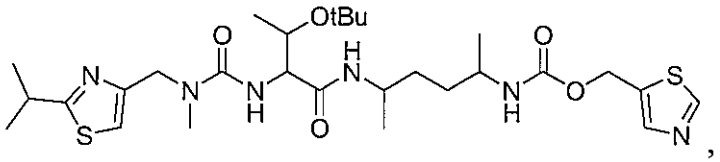
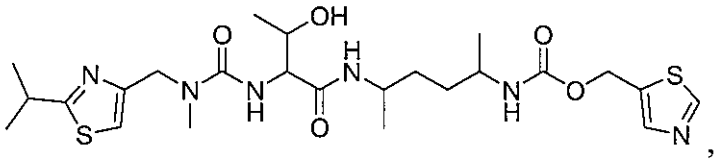
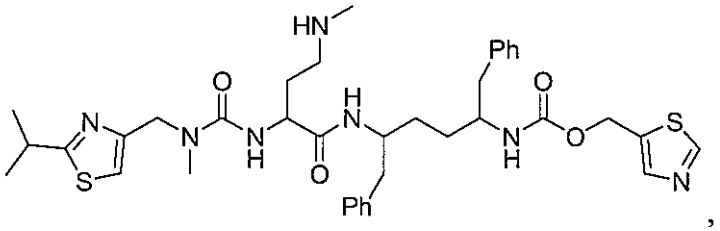
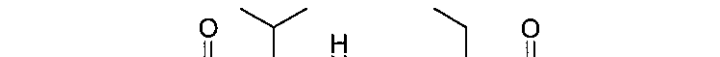

,

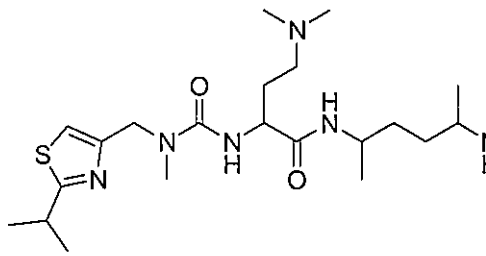

,

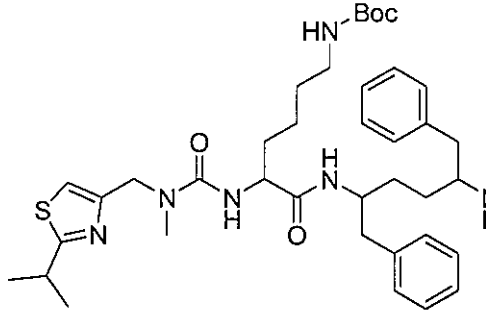

,


,

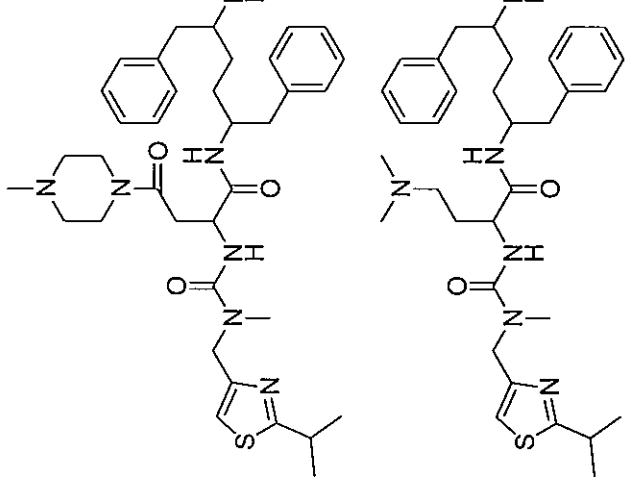

,

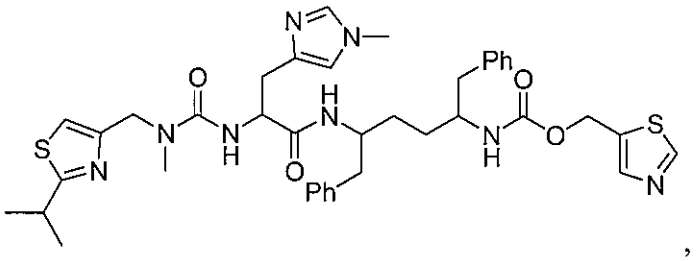

,

,

,




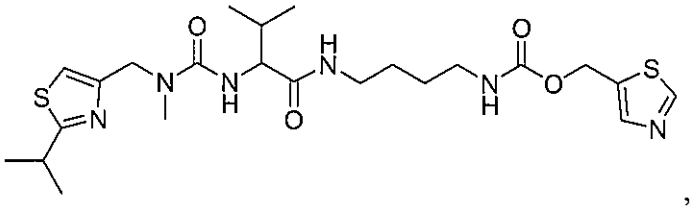

HN
Boc


NH2

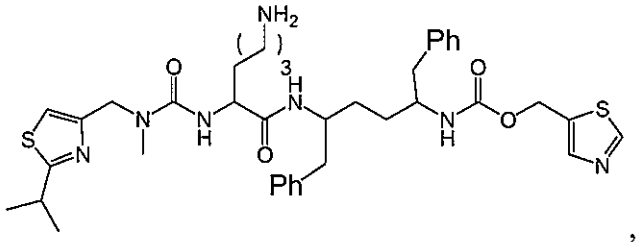




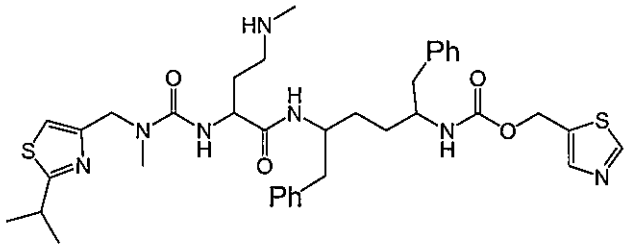
,



,



, and



; or

pharmaceutically acceptable salts, solvates, stereoisomers or esters thereof.

9. A compound of any one of claims 1 to 8 or a pharmaceutically acceptable salt, solvate, stereoisomer or ester thereof for use in therapy.

10. A compound of any one of claims 1 to 8 or a pharmaceutically acceptable salt, solvate, stereoisomer or ester thereof for use in improving the pharmacokinetics of a drug which is metabolized by cytochrome P450 monooxygenase, increasing the blood plasma level of a drug which is metabolized by cytochrome P450 monooxygenase, inhibiting cytochrome P450 monooxygenase, treating an HIV infection, or treating an HCV infection in a patient.

11. A compound for use according to claim 10 or a pharmaceutically acceptable salt,

solvate, stereoisomer or ester thereof, wherein the cytochrome P450 monooxygenase is cytochrome P450 monooxygenase 3A.

12. A pharmaceutical composition comprising a compound of any one of claims 1 to 8, or a pharmaceutically acceptable salt, solvate, or ester thereof, and a pharmaceutically acceptable carrier or excipient for use in treating an HIV infection, or treating an HCV infection in a patient.

13. The pharmaceutical composition of claim 12, further comprising at least one additional therapeutic agent.

14. The pharmaceutical composition of claim 13, wherein the at least one additional therapeutic agent is metabolized by cytochrome P450 monooxygenase.

15. The pharmaceutical composition of claim 13, wherein the least one additional therapeutic agent is selected from the group consisting of HIV protease inhibiting compounds, HIV non-nucleoside inhibitors of reverse transcriptase, HIV nucleoside inhibitors of reverse transcriptase, HIV nucleotide inhibitors of reverse transcriptase, HIV integrase inhibitors, gp41 inhibitors, CXCR4 inhibitors, entry inhibitor, gp120 inhibitors, G6PD and NADH-oxidase inhibitors, CCR5 inhibitors, other drugs for treating HIV, interferons, rebetol, copegus, viramidine (taribavirin), NS5b polymerase inhibitors, NS3 protease inhibitors, alpha-glucosidase 1 inhibitors, hepatoprotectants, non-nucleoside inhibitors of HCV, and other drugs for treating HCV, and combinations thereof.

16. The pharmaceutical composition of claim 15, wherein

(1) said HIV protease inhibitors are selected from the group consisting of amprenavir, atazanavir, fosamprenavir, indinavir, lopinavir, ritonavir, nelfinavir, saquinavir, tipranavir, brecanavir, darunavir, TMC-126, TMC-114, mozenavir (DMP-450), JE-2147 (AG1776), L-756423, RO0334649, KNI-272, DPC-681, DPC-684, GW640385X, DG17, PPL-100, DG35, and AG 1859;

(2) said HIV non-nucleoside inhibitors of reverse transcriptase are selected from the group consisting of capravirine, emivirine, delaviridine, efavirenz, nevirapine, (+) calanolide A,

etravirine, GW5634, DPC-083, DPC-961, DPC-963, MIV-150, TMC-120, TMC-278 (rilpivirene), BILR 355 BS, VRX 840773, UK-453061, and RDEA806;

(3) said HIV nucleoside inhibitors of reverse transcriptase are selected from the group consisting of zidovudine, emtricitabine, didanosine, stavudine, zalcitabine, lamivudine, abacavir, amdoxovir, elvucitabine, alovudine, MIV-210, racivir (±-FTC), D-d4FC, phosphazide, fozivudine tidoxil, apricitibine (AVX754), KP-1461, and fosalvudine tidoxil (formerly HDP 99.0003);

(4) said HIV nucleotide inhibitors of reverse transcriptase are selected from the group consisting of tenofovir and adefovir;

(5) said HIV integrase inhibitors are selected from the group consisting of curcumin, chicoric acid, 3,5-dicaffeoylquinic acid, aurintricarboxylic acid, caffeic acid phenethyl ester, tyrphostin, quercetin, S-1360, zintevir (AR-177), elvitegravir, L-870812, and L-870810, MK-0518 (raltegravir), BMS-538158, GSK364735C, BMS-707035, MK-2048, and BA 011;

(6) said gp41 inhibitor are selected from the group consisting of enfuvirtide, sifuvirtide, FB006M, and TRI-1144;

(7) said CXCR4 inhibitor is AMD-070;

(8) said entry inhibitor is SP01A;

(9) said gp120 inhibitor is BMS-488043 or BlockAide/ CR;

(10) said G6PD and NADH-oxidase inhibitor is immunitin;

(11) said CCR5 inhibitors are selected from the group consisting of aplaviroc, vicriviroc, maraviroc, PRO-140, INCB15050, PF-232798 (Pfizer), and CCR5mAb004;

(12) said other drugs for treating HIV are selected from the group consisting of BAS-100, SPI-452, REP 9, SP-01A, TNX-355, DES6, ODN-93, ODN-112, VGV-1, PA-457 (bevirimat), Ampligen, HRG214, Cytolin, VGX-410, KD-247, AMZ 0026, CYT 99007A-221 HIV, DEBIO-025, BAY 50-4798, MDX010 (ipilimumab), PBS 119, ALG 889, and PA-1050040 (PA-040);

(13) said interferons are selected from the group consisting of pegylated rIFN-alpha 2b, pegylated rIFN-alpha 2a, rIFN-alpha 2b, rIFN-alpha 2a, consensus IFN alpha (infergen), feron, reaferon, intermax alpha, r-IFN-beta, infergen + actimmune, IFN-omega with DUROS, albuferon, locteron, Rebif, Oral interferon alpha, IFNalpha-2b XL, AVI-005, PEG-Infergen, and Pegylated IFN-beta;

(14) said NS5b polymerase inhibitors are selected from the group consisting of NM-283, valopicitabine, R1626, PSI-6130 (R1656), HCV-796, BILB 1941, XTL-2125, MK-0608, NM-107, R7128 (R4048), VCH-759, PF-868554, and GSK625433;

(15) said NS3 protease inhibitor are selected from the group consisting of SCH-503034 (SCH-7), VX-950 (telaprevir), BILN-2065, BMS-605339, and ITMN-191;

(16) said alpha-ghicosidase 1 inhibitors are selected from the group consisting of MX-

3253 (celgosivir) and UT-231B;

(17) said hepatoprotectants are selected from the group consisting of IDN-6556, ME 3738, LB-84451, and MitoQ;

(18) said non-nucleoside inhibitors of HCV are selected from the group consisting of benzimidazole, benzo-1,2,4-thiadiazine, phenylalanine, A-831, and A-689; and

(19) said other drugs for treating HCV are selected from the group consisting of zadaxin, nitazoxanide (alinea), BIVN-401 (virostat), PYN-17 (altirex), KPE02003002, actilon (CPG-10101), KRN-7000, civacir, GI-5005, ANA-975, XTL-6865, ANA 971, NOV-205, tarvacin, EHC-18, NIM811, DEBIO-025, VGX-410C, EMZ-702, AVI 4065, Bavituximab, Oglufanide, and VX-497 (merimepodib).

17. The pharmaceutical composition of claim 13, wherein the at least one additional therapeutic agent is darunavir.

18. The pharmaceutical composition of claim 13, wherein the at least one additional therapeutic agent is atazanavir.

19. The pharmaceutical composition of claim 13, wherein the at least one additional therapeutic agent is elvitegravir.

20. The pharmaceutical composition of claim 13, wherein the at least one additional therapeutic agent is GS-7340.

21. The pharmaceutical composition of claim 13, wherein the at least one additional therapeutic agent is tenofovir.

22. The pharmaceutical composition of claim 13, wherein the at least one additional therapeutic agent is tenofovir disoproxil fumarate.