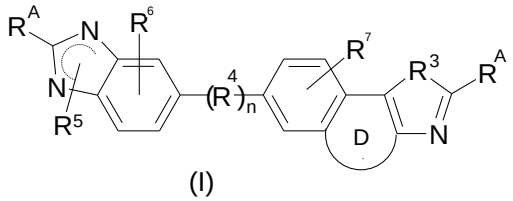
Claims

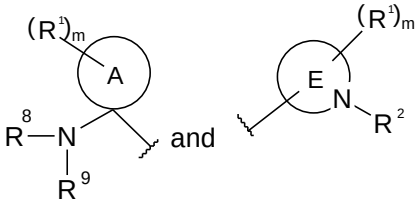
1. A compound of formula I or its pharmaceutically acceptable salts,



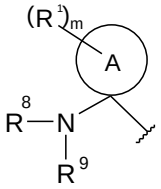
(I)

wherein, in the compound of formula I,

R^A is independently selected at each occurrence from-



, such that at least once it is selected as



Ring 'A' is selected from 3 to 6 membered carbocycle and 3 to 6 membered heterocycle containing 1 to 2 heteroatom(s) selected from N, S, and O, the ring 'A' may further be annulated with 3 to 6 membered carbocycle, 3 to 6 membered heterocycle containing 1 to 2 heteroatom(s) selected from N, S, and O, 6 membered aromatic carbocycle, or 5 to 6 membered aromatic heterocycle containing 1 to 2 heteroatom(s) selected from N, S, and O;

ring D is selected from 5 to 10 membered carbocycle optionally substituted with 1 to 2 substituents selected from the group consisting of oxo, halogen, $C_{1\text{-}6}$ alkyl, $C_{1\text{-}6}$ alkyl-O-, ($C_{1\text{-}6}$ alkyl)(H)N-, and ($C_{1\text{-}6}$ alkyl)$_2$N-, 6 membered aromatic carbocycle optionally substituted with 1 to 2 substituents selected from the group consisting of halogen, nitro, cyano, hydroxy, $C_{1\text{-}6}$ alkyl, perhalo $C_{1\text{-}6}$ alkyl, $C_{1\text{-}6}$ alkyl-O-, H_2N-, ($C_{1\text{-}6}$ alkyl)(H)N-, ($C_{1\text{-}6}$ alkyl)$_2$N-, ($C_{1\text{-}6}$ alkyl)SO_2-, and $H_2NC(=O)$-, 5 to 10 membered heterocycles containing 1 to 3 heteroatom(s)/group(s) selected from N(R^{10}), S(O)$_p$, O, or C(=O), optionally

substituted with 1 to 2 substituents selected from the group consisting of oxo, halogen, C_{1-6} alkyl, C_{1-6} alkyl-O-, (C_{1-6} alkyl)(H)N-, and (C_{1-6} alkyl)$_2$N-, and 5 to 6 membered aromatic heterocycle containing 1-2 heteroatom(s) selected from N, S, or O, optionally substituted with 1 to 2 substituents selected from the group consisting of halogen, nitro, cyano, hydroxy, C_{1-6} alkyl, perhalo C_{1-6} alkyl, C_{1-6} alkyl-O-, H_2N-, (C_{1-6} alkyl)(H)N-, (C_{1-6} alkyl)$_2$N-, and (C_{1-6} alkyl)-SO_2-;

Ring 'E' is 5 to 10 membered heterocycle, the ring 'E' may be monocyclic, fused bicyclic, bridged bicyclic, or spiro bicyclic;

R^1 is selected independently at each occurrence from the group consisting of halogen C_{1-6} alkyl, and $R^{10}O$-, ; or two R^1s taken together may form an oxo (=O) group;

R^2 is selected independently at each occurrence from the group consisting of C_{1-6} alkyl, $R^{10a}C(=O)$-, $R^{10a}OC(=O)$-, $R^{10}(R^{11})NC(=O)$-, $R^{10a}OC(=O)N(R^{11})C(R^a)(R^b)C(=O)$-, and $R^{10a}OC(=O)N(R^{11})C(R^a)(R^b)C(R^c)(R^d)C(=O)$-;

R^3 is selected from O and $N(R^{13})$;

R^4 is selected independently at each occurrence form $CR^a(R^b)$, 3 to 6 membered carbocycle, 3 to 6 membered heterocycle containing 1 to 2 heteroatom(s) selected from N, S, and O, 6 membered arylene, and 5 to 6 membered heteroarylene containing 1 to 2 heteroatom(s) selected from N, S and O, wherein, said carbocycle, heterocycle, arylene, and heteroarylene are optionally substituted with halogen, C_{1-6} alkyl, or C_{1-6} alkyl-O-;

R^5 is selected from hydrogen and C_{1-6} alkyl;

R^6 and R^7 are independently selected from the group consisting of hydrogen, halogen, C_{1-6} alkyl, and $R^{10}O$-;

R^8 is selected from hydrogen and C_{1-6} alkyl;

R^9 is selected from the group consisting of hydrogen, C_{1-6} alkyl, $R^{10a}C(=O)$-, $R^{10a}OC(=O)$-, $(R^{10})(R^{11})NC(=O)$-, $R^{10a}OC(=O)N(R^{11})CR^a(R^b)C(=O)$-, and $R^{10a}OC(=O)N(R^{11})CR^a(R^b)C(R^c)(R^d)C(=O)$-;

R^{10}, R^{11}, R^{11a} and R^{12} are independently selected from hydrogen and C_{1-6} alkyl;

R^{10a} is C_{1-6} alkyl;

R^{13} is selected from hydrogen and C_{1-6} alkyl group;

R^a, R^b, R^c and R^d, are independently selected from hydrogen, halogen, C_{1-6} alkyl, and C_{3-6} cycloalkyl, or R^a, R^b, R^c and R^d together with the carbon atom(s) to which they are attached forming 3 to 6 membered carbocycle, or 3 to 6 membered heterocycle containing 1 to 2 heteroatom(s) selected from N, S and O;

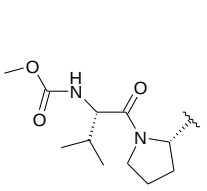
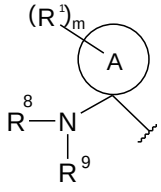
m is an integer ranging between 0 to 2, selected independently at each occurrence;

n is an integer ranging between 0 and 2;

p is an integer ranging between 0 and 2;

when n = 2 and R^4 is selected as $CR^a(R^b)$ for both the occurrences, two R^as together can form a bond to form a alkenylene linkage or two R^as and two R^bs together can form bonds to form alkynylene linkage.

2. The compound of formula I or its pharmaceutically acceptable salts, as claimed in claim 1, wherein R^A is selected independently at each occurrence from -


and

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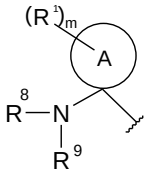
where, ring A is 3 to 6 membered carbocycle, such that at least once it is selected as

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3. The compound of formula I or its pharmaceutically acceptable salts, as claimed in any one of claims 1 and 2, wherein R^3 is selected as NH.

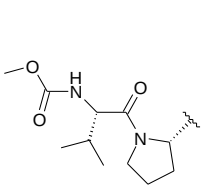
4. The compound of formula I or its pharmaceutically acceptable salts, as claimed in any one of claims 1-3, wherein R^4 is selected from phenylene and five membered heteroarylene containing 1 or 2 heteroatoms selected from N and S, when n is selected as 1.

5. The compound of formula I or its pharmaceutically acceptable salts, as claimed in any one of claims 1-3, wherein R^4 is selected as CR^aR^b, when n is selected as 2 to form an ethylene or ethynylene linkage.

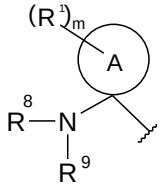
6. The compound of formula I or its pharmaceutically acceptable salts, as claimed in any one of claims 1-6, wherein R^5, R^6 and R^7 are selected as hydrogen.

7. The compound of formula I or its pharmaceutically acceptable salts, as claimed in any one of claims 1-6, wherein Ring D is selected from the group consisting of 6 membered aromatic carbocycle, six membered carbocycle, seven membered carbocycle, and seven membered heterocycle containing one heteroatom particularly selected as oxygen.

8. The compound of formula I or its pharmaceutically acceptable salts, as claimed in any one of claims 1-7, wherein, R^A is selected independently at each occurrence from -



and



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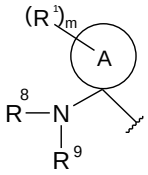
where, ring A is 3 to 6 membered carbocycle, such that at least once it is selected as  ; R^3 is selected as NH; R^4 is selected from the group consisting of CR^aR^b, phenylene and five membered heteroarylene containing 1 or 2 heteroatoms selected from N and S; n is selected from 0, 1 and 2; R^5, R^6 and R^7 are selected as hydrogen; and Ring D is selected from the group consisting of aromatic carbocycle, six membered carbocycle, seven membered carbocycle, and seven membered heterocycle containing one heteroatom particularly selected as oxygen.

9. The compound of formula I or its pharmaceutically acceptable salts, as claimed in any one of claims 1-8, wherein the compound is selected from the group consisting of:

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-4,5-dihydro-1H-benzo[2,3]oxepino[4,5-d]imidazol-8-yl)-1H-benzo[d]imidazol-2-yl)cyclobutyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-4,5-dihydro-1H-benzo[2,3]oxepino[4,5-d]imidazol-8-yl)phenyl)-1H-benzo[d]imidazol-2-yl)cyclobutyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-4,5-dihydro-1H-naphtho[1,2-d]imidazol-7-yl)phenyl)-1H-benzo[d]imidazol-2-yl)cyclobutyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-1,4,5,6-tetrahydrobenzo[3,4]cyclohepta[1,2-d]imidazol-8-yl)phenyl)-1H-benzo[d]imidazol-2-yl)cyclobutyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-1H-

naphtho[1,2-d]imidazol-7-yl)phenyl)-1H-benzo[d]imidazol-2-yl)cyclobutyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-4,5-dihydro-1H-benzo[2,3]oxepino[4,5-d]imidazol-8-yl)phenyl)-1H-benzo[d]imidazol-2-yl)cyclopentyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-1,4,5,6-tetrahydrobenzo[3,4]cyclohepta[1,2-d]imidazol-8-yl)phenyl)-1H-benzo[d]imidazol-2-yl)cyclopentyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-4,5-dihydro-1H-naphtho[1,2-d]imidazol-7-yl)phenyl)-1H-benzo[d]imidazol-2-yl)cyclopentyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-1H-naphtho[1,2-d]imidazol-7-yl)phenyl)-1H-benzo[d]imidazol-2-yl)cyclopentyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-4,5-dihydro-1H-benzo[2,3]oxepino[4,5-d]imidazol-8-yl)phenyl)-1H-benzo[d]imidazol-2-yl)cyclopropyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-1,4,5,6-tetrahydrobenzo[3,4]cyclohepta[1,2-d]imidazol-8-yl)phenyl)-1H-benzo[d]imidazol-2-yl)cyclopropyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-4,5-dihydro-1H-benzo[2,3]oxepino[4,5-d]imidazol-8-yl)phenyl)-1H-benzo[d]imidazol-2-yl)cyclohexyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-1,4,5,6-tetrahydrobenzo[3,4]cyclohepta[1,2-d]imidazol-8-yl)phenyl)-1H-benzo[d]imidazol-2-yl)cyclohexyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-1H-naphtho[1,2-d]imidazol-7-yl)phenyl)-1H-benzo[d]imidazol-2-yl)cyclohexyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-4,5-dihydro-1H-naphtho[1,2-d]imidazol-7-yl)phenyl)-1H-benzo[d]imidazol-2-yl)cyclohexyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-4,5-dihydro-1H-naphtho[1,2-d]imidazol-7-yl)phenyl)-1H-benzo[d]imidazol-2-yl)cyclobutyl)-N-ethyl-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-4,5-dihydro-1H-naphtho[1,2-d]imidazol-7-yl)phenyl)-1H-benzo[d]imidazol-2-yl)cyclobutyl)-N,3-dimethylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-1H-naphtho[1,2-d]imidazol-7-yl)phenyl)-1H-benzo[d]imidazol-2-yl)cyclobutyl)-N,3-dimethylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(8-(4-(2-(1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanamido)cyclopentyl)-1H-benzo[d]imidazol-6-yl)phenyl)-4,5-dihydro-1H-benzo[2,3]oxepino[4,5-d]imidazol-2-yl)cyclopentyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(4-(2-(1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanamido)cyclohexyl)-4,5-

dihydro-1H-benzo[2,3]oxepino[4,5-d]imidazol-8-yl)phenyl)-1H-benzo[d]imidazol-2-yl)cyclopentyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(8-(4-(2-(1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanamido)cyclohexyl)-1H-benzo[d]imidazol-6-yl)phenyl)-4,5-dihydro-1H-benzo[2,3]oxepino[4,5-d]imidazol-2-yl)cyclohexyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(8-(4-(2-(1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanamido)cyclohexyl)-1H-benzo[d]imidazol-6-yl)phenyl)-4,5-dihydro-1H-benzo[2,3]oxepino[4,5-d]imidazol-2-yl)cyclopentyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(5-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-1H-naphtho[1,2-d]imidazol-7-yl)thiophen-2-yl)-1H-benzo[d]imidazol-2-yl)cyclobutyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(5-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-4,5-dihydro-1H-naphtho[1,2-d]imidazol-7-yl)thiophen-2-yl)-1H-benzo[d]imidazol-2-yl)cyclohexyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-((2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-4,5-dihydro-1H-naphtho[1,2-d]imidazol-7-yl)ethynyl)-1H-benzo[d]imidazol-2-yl)cyclohexyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(6-(2-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-4,5-dihydro-1H-naphtho[1,2-d]imidazol-7-yl)ethyl)-1H-benzo[d]imidazol-2-yl)cyclohexyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(5-(5-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-4,5-dihydro-1H-benzo[2,3]oxepino[4,5-d]imidazol-8-yl)thiazol-2-yl)-1H-benzo[d]imidazol-2-yl)cyclohexyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(8-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-1H-benzo[d]imidazol-6-yl)phenyl)-4,5-dihydro-1H-benzo[2,3]oxepino[4,5-d]imidazol-2-yl)cyclopentyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(8-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-1H-benzo[d]imidazol-6-yl)phenyl)-4,5-dihydro-1H-benzo[2,3]oxepino[4,5-d]imidazol-2-yl)cyclohexyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(7-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-1H-benzo[d]imidazol-6-yl)phenyl)-4,5-dihydro-1H-naphtho[1,2-d]imidazol-2-yl)cyclobutyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(7-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-1H-benzo[d]imidazol-6-yl)phenyl)-1H-naphtho[1,2-d]imidazol-2-yl)cyclobutyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(7-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-1H-benzo[d]imidazol-6-yl)phenyl)-4,5-dihydro-1H-naphtho[1,2-d]imidazol-2-yl)cyclohexyl)-3-methylbutanamide;

(S)-2-(methoxycarbonyl)amino-N-(1-(7-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-1H-benzo[d]imidazol-6-yl)phenyl)-1H-naphtho[1,2-d]imidazol-2-yl)cyclohexyl)-3-methylbutanamide; and

(S)-2-(methoxycarbonyl)amino-N-(1-(8-(4-(2-((S)-1-((S)-2-((methoxycarbonyl)amino)-3-methylbutanoyl)pyrrolidin-2-yl)-1H-benzo[d]imidazol-6-yl)phenyl)-4,5-dihydro-1H-benzo[2,3]oxepino[4,5-d]imidazol-2-yl)cyclobutyl)-3-methylbutanamide.

10. A pharmaceutical composition comprising a compound or a combination of compounds according to any one of claims 1-9 or a pharmaceutically

acceptable salt thereof, in combination with a pharmaceutically acceptable carrier or excipient.

11. A pharmaceutical composition comprising a therapeutically effective amount of a compound or combination of compounds of any one of claims 1-9, or a pharmaceutically acceptable salt thereof for use in inhibiting the replication of an RNA containing virus.

12. A pharmaceutical composition comprising a therapeutically effective amount of a compound or combination of compounds of any one of claims 1-9, or a pharmaceutically acceptable salt thereof for use in treating or preventing infection caused by an RNA containing virus.

13. The pharmaceutical composition as claimed in claim 11, wherein the RNA-containing virus is hepatitis C virus.

14. The pharmaceutical composition as claimed in claim 11, further comprising one or more agents selected from the group consisting of a host immune modulator and an antiviral agent, or a combination thereof.

15. The pharmaceutical composition as claimed in claim 14, wherein the host immune modulator is selected from the group consisting of interferon-alpha, pegylated-interferon-alpha, interferon-beta, interferon-gamma, consensus interferon, a cytokine, and a vaccine.

16. The pharmaceutical composition as claimed in claim 14, wherein the antiviral agent inhibits replication of HCV by inhibiting host cellular functions associated with viral replication.

17. The pharmaceutical composition as claimed in claim 14, wherein the antiviral agent inhibits the replication of HCV by targeting proteins of the viral genome.

18. The pharmaceutical composition as claimed in claim 14, wherein said antiviral agent is an inhibitor of a HCV viral protein, a replication process or a combination thereof, wherein said targeting protein or replication process is selected from the group consisting of helicase, protease, polymerase, metalloprotease, NS4A, NS4B, NS5A, assembly, entry, and IRES.

19. The pharmaceutical composition as claimed in claim 11, further comprising an agent or combination of agents that treat or alleviate symptoms of HCV infection selected from cirrhosis and inflammation of the liver.

20. The pharmaceutical composition as claimed in claim 11, further comprising one or more agents that treat patients for disease caused by hepatitis B (HBV) infection.

21. The pharmaceutical composition as claimed in claim 11, further comprising one or more agents that treat patients for disease caused by human immunodeficiency virus (HIV) infection.

22. The pharmaceutical composition of claim 10, further comprising an agent selected from interferon, pegylated interferon, ribavirin, amantadine, an HCV protease inhibitor, an HCV polymerase inhibitor, an HCV helicase inhibitor, or an internal ribosome entry site inhibitor.

23. The composition of claim 10, further comprising a cytochrome P450 monooxygenase inhibitor or a pharmaceutically acceptable salt thereof.

24. A pharmaceutical composition comprising a cytochrome P450 monooxygenase inhibitor or a pharmaceutically acceptable salt thereof, and a compound of any one of claims 1-9 or a pharmaceutically acceptable salt thereof for treating hepatitis C infection.