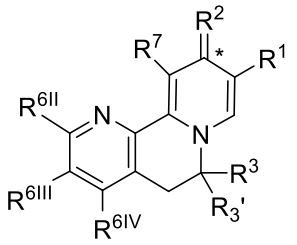
CLAIMS

1. A compound of formula (IIIg), or a salt, solvate, geometric isomer, tautomer, or any mixtures thereof:



(IIIg),

wherein:

R^1 is -C(=O)OR^8;

R^2 is =O;

R^3 is selected from the group consisting of alkyl-substituted oxetanyl, optionally substituted C_1-C_6 alkyl, and optionally substituted C_3-C_8 cycloalkyl;

$R^{3'}$ is H;

wherein the carbon to which R^3 and $R^{3'}$ are bound has (*S*) stereochemistry;

R^{6II} and R^{6III} are independently selected from the group consisting -OR and C_1-C_6 haloalkoxy,

wherein each occurrence of R is independently selected from the group consisting of C_1-C_6 alkyl, C_1-C_6 hydroxyalkyl, optionally substituted (C_1-C_6 alkoxy)-C_1-C_6 alkyl, and optionally substituted C_3-C_8 cycloalkyl,

or R^{6II} and R^{6III} combine to form a divalent group selected from the group consisting of -O(CHF)O-, -O(CF_2)O-, -O(CR^9R^9)O-, -O(CH_2)(CH_2)O- and -O(CH_2)($CR^{11}R^{11}$)(CH_2)O-;

R^{6IV} is H;

R^7 is selected from the group consisting of H, OH, halogen, C_1-C_6 alkoxy, and optionally substituted C_1-C_6 alkyl;

R^8 is selected from the group consisting of H, optionally substituted C_1-C_6 alkyl, and optionally substituted C_3-C_8 cycloalkyl;

each occurrence of R^9 is independently selected from the group consisting of H and C_1-C_6 alkyl; and

each occurrence of R^{11} is independently selected from the group consisting of H, OH, C_1-C_6 alkyl, C_1-C_6 alkoxy, alkoxy-C_1-C_6 alkyl and alkoxy-C_1-C_6 alkoxy, wherein two R^{11} groups bound to the same carbon atom are not simultaneously OH; or two R^{11} groups combine with the carbon atom to which they are bound to form a moiety selected from the group consisting of C=O, $C=CH_2$ and oxetane-3,3-diyl.

2. The compound of claim 1, wherein each occurrence of alkyl or cycloalkyl is independently optionally substituted with at least one substituent selected from the group consisting of C_1-C_6 alkyl, halogen, -OR'', phenyl and -N(R'')(R''), wherein each occurrence of R'' is independently H, C_1-C_6 alkyl or C_3-C_8 cycloalkyl.

3. The compound of claim 1, wherein R^1 is selected from the group consisting of -C(=O)OH, -C(=O)OMe, -C(=O)OEt, -C(=O)O-nPr, -C(=O)O-iPr, -C(=O)O-cyclopentyl, and -C(=O)O-cyclohexyl.

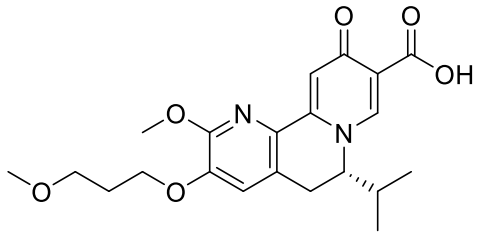
4. The compound of claim 1, wherein R^3 is selected from the group consisting of methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, sec-butyl, t-butyl, hydroxymethyl, 2-hydroxy-ethyl, 2-methoxy-ethyl, methoxymethyl, and 2-methyl-1-methoxy-prop-2-yl.

5. The compound of claim 1, wherein R^{6II} and R^{6III} are independently selected from the group consisting of methoxy, ethoxy, n-propoxy, isopropoxyl, n-butoxy, sec-butoxy, isobutoxy, t-butoxy, 2-methoxy-ethoxy, 2-hydroxy-ethoxy, 3-methoxy-prop-1-oxy, 3-hydroxy-prop-1-oxy, 4-methoxy-but-1-oxy, 4-hydroxy-but-1-oxy, 2-hydroxy-ethoxy, 3-hydroxy-2,2-dimethyl-prop-1-oxy, cyclopropylmethoxy, 2,2,2-trifluoroethoxy, 2-(2-haloethoxy)-ethoxy, 2-(N-morpholino)-ethoxy, 3-(N-morpholino)-prop-1-oxy, 4-(N-morpholino)-but-1-oxy, 2-amino-ethoxy, 2-(NHC(=O)O^{t}Bu)-ethoxy, 3-amino-prop-1-oxy, 3-(NHC(=O)O^{t}Bu)-prop-1-oxy, 4-amino-but-1-oxy, and 4-(NHC(=O)O^{t}Bu)-but-1-oxy.

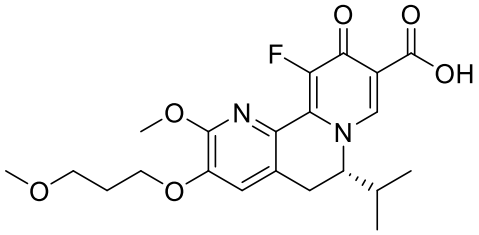
6. The compound of claim 1, wherein R^{6II} is methoxy, R^{6III} is 3-methoxy-propoxy; or R^{6II} is methoxy, R^{6III} is methoxy.

7. The compound of claim 1, wherein R^{7} is selected from the group consisting of H, methyl, ethyl, and fluoro.

8. A compound selected from the group consisting



(*S*)-6-isopropyl-2-methoxy-3-(3-methoxypropoxy)-10-oxo-5,10-dihydro-6H-pyrido[1,2-h][1,7]naphthyridine-9-carboxylic acid;



(*S*)-11-fluoro-6-isopropyl-2-methoxy-3-(3-methoxypropoxy)-10-oxo-5,10-dihydro-6H-pyrido[1,2-h][1,7]naphthyridine-9-carboxylic acid;

or a salt, solvate, tautomer, or any mixtures thereof.

9. A pharmaceutical composition comprising at least one compound of claim 1 and a pharmaceutically acceptable carrier.

10. The pharmaceutical composition of claim 9, further comprising at least one additional agent useful for treating hepatitis virus infection.

11. The pharmaceutical composition of claim 10, wherein the at least one additional agent comprises at least one selected from the group consisting of reverse transcriptase inhibitor; capsid inhibitor; cccDNA formation inhibitor; sAg secretion inhibitor; oligomeric nucleotide targeted to the Hepatitis B genome; and immunostimulator.

12. The pharmaceutical composition of claim 11, wherein the oligomeric nucleotide comprises one or more siRNAs.

13. The pharmaceutical composition of claim 12, wherein the one or more siRNAs are formulated in a lipid nanoparticle.

14. Use of at least one compound of claim 1 in the manufacture of a medicament for the treatment or amelioration of hepatitis B virus (HBV) infection in a subject.

15. The use of claim 14, wherein the subject is to be further administered at least one additional agent useful for treating the hepatitis B virus (HBV) infection.

16. The use of claim 15, wherein the at least one additional agent comprises at least one selected from the group consisting of reverse transcriptase inhibitor; capsid inhibitor; cccDNA formation inhibitor; sAg secretion inhibitor; oligomeric nucleotide targeted to the Hepatitis B genome; and immunostimulator.

17. The use of claim 15, wherein the oligomeric nucleotide comprises one or more siRNAs.

18. The use of claim 15, wherein the one or more siRNAs are formulated in a lipid nanoparticle.

19. The use of claim 15, wherein the subject is to be co-administered the medicament and the at least one additional agent, optionally further
wherein the medicament and the at least one additional agent are co-formulated.

20Use of at least one compound of claim 1 in the manufacture of a medicament for the reduction or minimization of levels of at least one selected from the group consisting of hepatitis B virus surface antigen (HBsAg), hepatitis B e-antigen (HBeAg), hepatitis B core protein, and pregenomic (pg) RNA in a HBV infected subject.

21. The use of claim 20, wherein the subject is to be further administered at least one additional agent useful for treating the viral infection.

22. The use of claim 21, wherein the at least one additional agent comprises at least one selected from the group consisting of reverse transcriptase inhibitor; capsid inhibitor; cccDNA formation inhibitor; sAg secretion inhibitor; oligomeric nucleotide targeted to the Hepatitis B genome; and immunostimulator.

23. The use of claim 22, wherein the oligomeric nucleotide comprises one or more siRNAs.

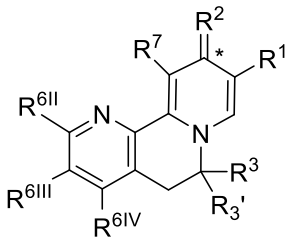
24. The use of claim 23, wherein the one or more siRNAs are formulated in a lipid nanoparticle.

25. The use of claim 21, wherein the subject is to be co-administered the medicament and the at least one additional agent, further optionally wherein the at
least one compound and the at least one additional agent are co-formulated.

26. The use of claim 14, wherein the subject is a mammal.

27. The use of claim 26, wherein the mammal is a human.

28. A compound of formula (IIIg), or a salt, solvate, stereoisomer, geometric isomer, tautomer, or any mixtures thereof:



(IIIg),

wherein:

R^1 is -C(=O)OR^8;

R^2 is =O;

one applies:

(a) R^3 is alkyl-substituted oxetanyl or optionally substituted C_3-C_8 cycloalkyl, and $R^{3'}$ is selected from the group consisting of H, alkyl-substituted oxetanyl, optionally substituted C_1-C_6 alkyl, and optionally substituted C_3-C_8 cycloalkyl;

(b) R^3 is optionally substituted C_1-C_6 alkyl, and $R^{3'}$ is selected from the group consisting of alkyl-substituted oxetanyl, optionally substituted C_1-C_6 alkyl, and optionally substituted C_3-C_8 cycloalkyl;

R^{6II} and R^{6III} are independently selected from the group consisting -OR and C_1-C_6 haloalkoxy,

wherein each occurrence of R is independently selected from the group consisting of C_1-C_6 alkyl, C_1-C_6 hydroxyalkyl, optionally substituted (C_1-C_6 alkoxy)-C_1-C_6 alkyl, and optionally substituted C_3-C_8 cycloalkyl,

or R^{6II} and R^{6III} combine to form a divalent group selected from the group consisting of -O(CHF)O-, -O(CF_2)O-, -O(CR^9R^9)O-, -O(CH_2)(CH_2)O- and -O(CH_2)($CR^{11}R^{11}$)(CH_2)O-;

R^{6IV} is H;

R^7 is selected from the group consisting of H, OH, halogen, C_1-C_6 alkoxy, and optionally substituted C_1-C_6 alkyl;

R^8 is selected from the group consisting of H, optionally substituted C_1-C_6 alkyl, and optionally substituted C_3-C_8 cycloalkyl;

each occurrence of R^9 is independently selected from the group consisting of H and C_1-C_6 alkyl; and

each occurrence of R^{11} is independently selected from the group consisting of H, OH, C_1-C_6 alkyl, C_1-C_6 alkoxy, alkoxy-C_1-C_6 alkyl and alkoxy-C_1-C_6 alkoxy, wherein two R^{11} groups bound to the same carbon atom are not simultaneously OH; or two R^{11} groups combine with the carbon atom to which they are bound to form a moiety selected from the group consisting of C=O, C=CH_2 and oxetane-3,3-diyl.

29. The compound of claim 28, wherein each occurrence of alkyl or cycloalkyl is independently optionally substituted with at least one substituent selected from the group consisting of C_1-C_6 alkyl, halogen, -OR'', phenyl and -N(R'')(R''), wherein each occurrence of R'' is independently H, C_1-C_6 alkyl or C_3-C_8 cycloalkyl.

30. The compound of claim 28, wherein R^1 is selected from the group consisting of -C(=O)OH, -C(=O)OMe, -C(=O)OEt, -C(=O)O-nPr, -C(=O)O-iPr, -C(=O)O-cyclopentyl, and -C(=O)O-cyclohexyl.

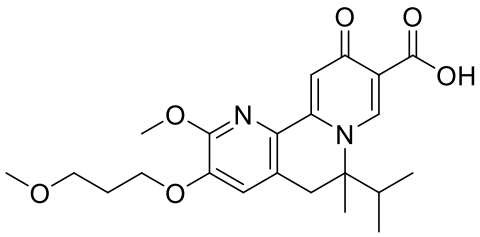
31. The compound of claim 28, wherein R^3 is selected from the group consisting of methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, sec-butyl, t-butyl, hydroxymethyl, 2-hydroxy-ethyl, 2-methoxy-ethyl, methoxymethyl, and 2-methyl-1-methoxy-prop-2-yl.

32. The compound of claim 28, wherein R^{6II} and R^{6III} are independently selected from the group consisting of methoxy, ethoxy, n-propoxy, isopropoxyl, n-butoxy, sec-butoxy, isobutoxy, t-butoxy, 2-methoxy-ethoxy, 2-hydroxy-ethoxy, 3-methoxy-prop-1-oxy, 3-hydroxy-prop-1-oxy, 4-methoxy-but-1-oxy, 4-hydroxy-but-1-oxy, 2-hydroxy-ethoxy, 3-hydroxy-2,2-dimethyl-prop-1-oxy, cyclopropylmethoxy, 2,2,2-trifluoroethoxy, 2-(2-haloethoxy)-ethoxy, 2-(N-morpholino)-ethoxy, 3-(N-morpholino)-prop-1-oxy, 4-(N-morpholino)-but-1-oxy, 2-amino-ethoxy, 2-(NHC(=O)O^{t}Bu)-ethoxy, 3-amino-prop-1-oxy, 3-(NHC(=O)O^{t}Bu)-prop-1-oxy, 4-amino-but-1-oxy, and 4-(NHC(=O)O^{t}Bu)-but-1-oxy.

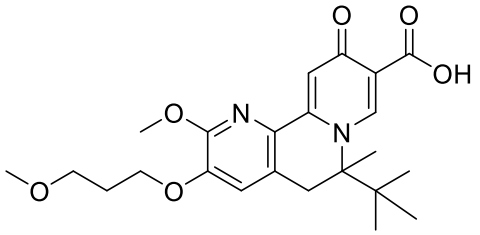
33. The compound of claim 28, wherein R^{6II} is methoxy, R^{6III} is 3-methoxy-propoxy; or R^{6II} is methoxy, R^{6III} is methoxy.

34. The compound of claim 28, wherein R^7 is selected from the group consisting of H, methyl, ethyl, and fluoro.

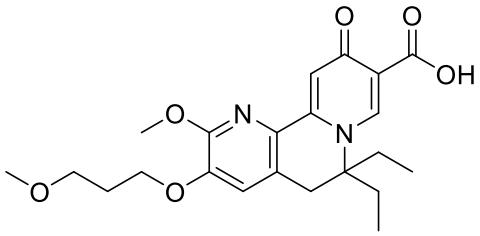
35. A compound selected from the group consisting of:



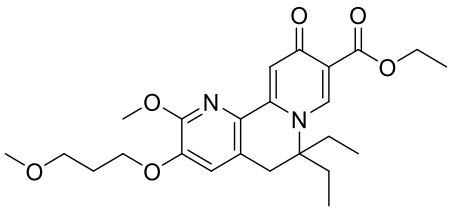
6-isopropyl-2-methoxy-3-(3-methoxypropoxy)-6-methyl-10-oxo-5,10-dihydro-6H-pyrido[1,2-h][1,7]naphthyridine-9-carboxylic acid;



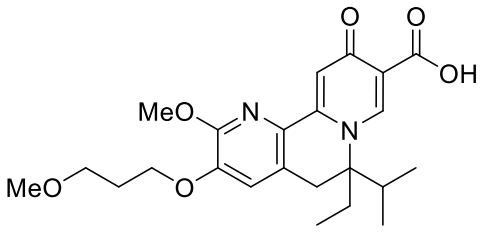
6-(tert-butyl)-2-methoxy-3-(3-methoxypropoxy)-6-methyl-10-oxo-5,10-dihydro-6H-pyrido[1,2-h][1,7]naphthyridine-9-carboxylic acid;



6,6-diethyl-2-methoxy-3-(3-methoxypropoxy)-10-oxo-5,10-dihydro-6H-pyrido[1,2-h][1,7]naphthyridine-9-carboxylic acid;



ethyl 6,6-diethyl-2-methoxy-3-(3-methoxypropoxy)-10-oxo-5,10-dihydro-6H-pyrido[1,2-h][1,7]naphthyridine-9-carboxylate; and



6-ethyl-6-isopropyl-2-methoxy-3-(3-methoxypropoxy)-10-oxo-5,10-dihydro-6H-pyrido[1,2-h][1,7]naphthyridine-9-carboxylic acid;

or a salt, solvate, stereoisomer, tautomer, geometric isomer, or any mixtures thereof.

36. A pharmaceutical composition comprising at least one compound of claim 28 and a pharmaceutically acceptable carrier.

37. The pharmaceutical composition of claim 36, further comprising at least one additional agent useful for treating hepatitis virus infection.

38. The pharmaceutical composition of claim 37, wherein the at least one additional agent comprises at least one selected from the group consisting of reverse transcriptase inhibitor; capsid inhibitor; cccDNA formation inhibitor; sAg secretion inhibitor; oligomeric nucleotide targeted to the Hepatitis B genome; and immunostimulator.

39. The pharmaceutical composition of claim 38, wherein the oligomeric nucleotide comprises one or more siRNAs.

40. The pharmaceutical composition of claim 39, wherein the one or more siRNAs are formulated in a lipid nanoparticle.

41. Use of at least one compound of claim 28 in the manufacture of a medicament for the treatment or amelioration of hepatitis B virus (HBV) infection in a subject.

42. The use of claim 41, wherein the subject is to be further administered at least one additional agent useful for treating the hepatitis B virus (HBV) infection.

43. The use of claim 42, wherein the at least one additional agent comprises at least one selected from the group consisting of reverse transcriptase inhibitor; capsid inhibitor; cccDNA formation inhibitor; sAg secretion inhibitor; oligomeric nucleotide targeted to the Hepatitis B genome; and immunostimulator.

44. The use of claim 43, wherein the oligomeric nucleotide comprises one or more siRNAs.

45. The use of claim 44, wherein the one or more siRNAs are formulated in a lipid nanoparticle.

46. The use of claim 42, wherein the subject is to be co-administered the medicament and the at least one additional agent, optionally further wherein the medicament and the at least one additional agent are co-formulated.

47. Use of at least one compound of claim 28 in the manufacture of a medicament for the reduction or minimization of levels of at least one selected from the group consisting of hepatitis B virus surface antigen (HBsAg), hepatitis B e-antigen (HBeAg), hepatitis B core protein, and pregenomic (pg) RNA in a HBV infected subject.

48. The use of claim 47, wherein the subject is to be further administered at least one additional agent useful for treating the viral infection.

49. The use of claim 48, wherein the at least one additional agent comprises at least one selected from the group consisting of reverse transcriptase inhibitor; capsid inhibitor; cccDNA formation inhibitor; sAg secretion inhibitor; oligomeric nucleotide targeted to the Hepatitis B genome; and immunostimulator.

50. The use of claim 49, wherein the oligomeric nucleotide comprises one or more siRNAs.

51. The use of claim 50, wherein the one or more siRNAs are formulated in a lipid nanoparticle.

52. The use of claim 48, wherein the subject is to be co-administered the medicament and the at least one additional agent, further optionally wherein the medicament and the at least one additional agent are co-formulated.

53. The use of claim 41, wherein the subject is a mammal.

54. The use of claim 53, wherein the mammal is a human.

55. A compound, salt, solvate, geometric isomer, tautomer, or any mixtures thereof of claim 1 or claim 28 for use in the treatment of hepatitis B virus (HBV) infection or for use in the reduction or minimization of levels of at least one selected from the group consisting of hepatitis

B virus surface antigen (HBsAg), hepatitis B e-antigen (HBeAg), hepatitis B core protein, and pregenomic (pg) RNA in a HBV infected subject.