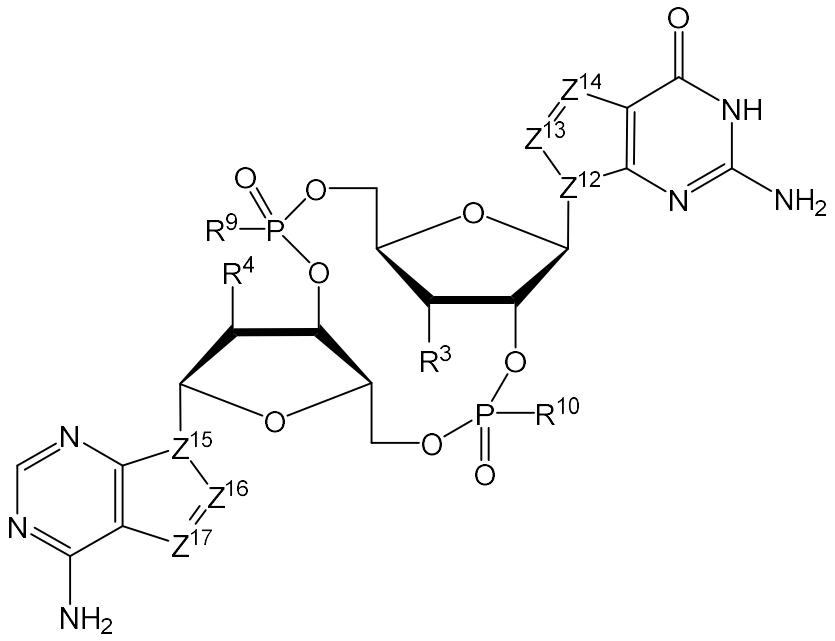
CLAIMS

1. A compound, wherein the compound is of Formula Ic:



Formula Ic

wherein

Z^{12} and Z^{15} are N;

Z^{13}, Z^{14}, Z^{16}, and Z^{17} are independently CH or N;

R^3 is C_2alkyl functionalized with one or more halogen, thiol, hydroxyl, carboxyl, $C_{1\text{-}6}$alkoxy, $C_{1\text{-}6}$hydroxyalkoxy, amino, $C_{1\text{-}6}$alkylamino, di($C_{1\text{-}6}$alkyl)amino, or azido groups;

R^4 is hydroxyl;

R^9 and R^{10} are independently hydroxyl; thiol; $C_{1\text{-}6}$alkyl; $C_{1\text{-}6}$alkyl functionalized with one or more halogen, thiol, hydroxyl, carboxyl, $C_{1\text{-}6}$alkoxy, $C_{1\text{-}6}$hydroxyalkoxy, amino, $C_{1\text{-}6}$alkylamino, di($C_{1\text{-}6}$alkyl)amino, or azido groups; $C_{1\text{-}6}$alkoxy; $C_{1\text{-}6}$alkoxy functionalized with one or more halogen, thiol, hydroxyl, carboxyl, $C_{1\text{-}6}$hydroxyalkoxy, amino, $C_{1\text{-}6}$alkylamino, di($C_{1\text{-}6}$alkyl)amino, or azido groups; $C_{3\text{-}5}$alkenyl-O-; $C_{3\text{-}5}$alkynyl-O-; oligo(ethylene glycol); poly(ethylene glycol); borano ($-BH_3^-$); or $-NR^7R^8$;

R^7 and R^8 are independently hydrogen; $C_{1\text{-}6}$alkyl; $C_{1\text{-}6}$alkyl functionalized with one or more halogen, thiol, hydroxyl, carboxyl, $C_{1\text{-}6}$alkoxy, $C_{1\text{-}6}$hydroxyalkoxy, amino, $C_{1\text{-}6}$alkylamino,

di(C_{1-6}alkyl)amino, or azido groups; cyclic -(C_{1-6}alkyl)-; cyclic -(C_{1-6}alkyl)- functionalized with one or more halogen, thiol, hydroxyl, carboxyl, C_{1-6}alkoxy, C_{1-6}hydroxyalkoxy, amino, C_{1-6}alkylamino, or di(C_{1-6}alkyl)amino groups; cyclic -(C_{1-6}oxaalkyl)-; or cyclic -(C_{1-6}oxaalkyl)- functionalized with one or more halogen, thiol, hydroxyl, carboxyl, C_{1-6}hydroxyalkoxy, amino, C_{1-6}alkylamino, or di(C_{1-6}alkyl)amino groups;
or a pharmaceutically acceptable salt thereof.

2. The compound of claim 1, wherein Z^{13} and Z^{16} are CH.

3. The compound of claim 1, wherein Z^{14} and Z^{17} are N.

4. The compound of claim 1, wherein Z^{13} and Z^{16} are CH, and Z^{14} and Z^{17} are N.

5. The compound of claim 1, wherein R^9 and R^{10} are independently hydroxyl or thiol.

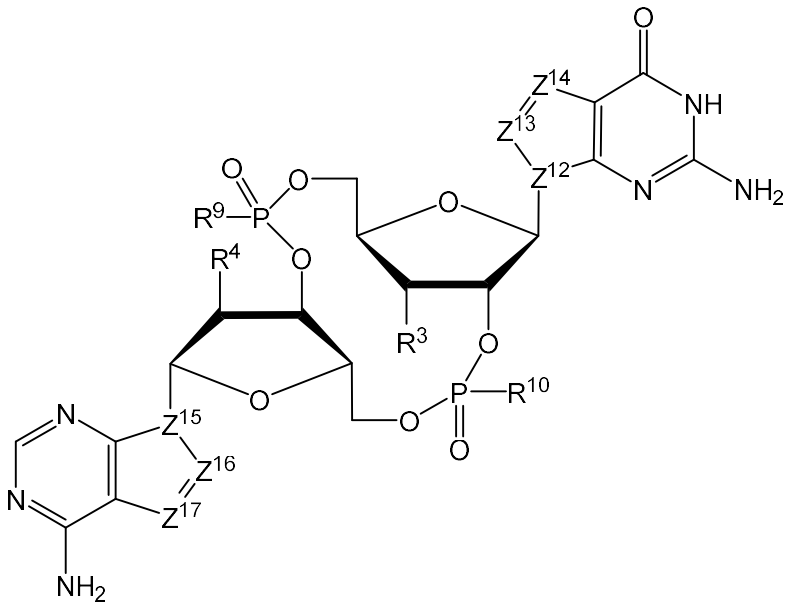
6. The compound of claim 1, wherein R^9 and R^{10} are hydroxyl.

7. The compound of claim 1, wherein R^9 and R^{10} are thiol.

8. The compound of claim 1, wherein R^3 is C_2alkyl functionalized with one or more thiol, hydroxyl, carboxyl, C_{1-6}hydroxyalkoxy, amino, or C_{1-6}alkylamino groups.

9. The compound of claim 1, wherein R^3 is C_2alkyl functionalized with one or more halogen, thiol, or hydroxyl.

10. A compound, wherein the compound is of Formula Ic:



Formula Ic

wherein

Z^{12} and Z^{15} are N;

Z^{13} and Z^{16} are CH;

Z^{14} and Z^{17} are independently CH or N;

R^3 is C_2alkyl functionalized with one or more halogen, thiol, hydroxyl, carboxyl, $C_{1\text{-}6}$alkoxy, $C_{1\text{-}6}$hydroxyalkoxy, amino, $C_{1\text{-}6}$alkylamino, di($C_{1\text{-}6}$alkyl)amino, or azido groups;

R^4 is hydroxyl;

R^9 and R^{10} are independently hydroxyl or thiol;

or a pharmaceutically acceptable salt thereof.

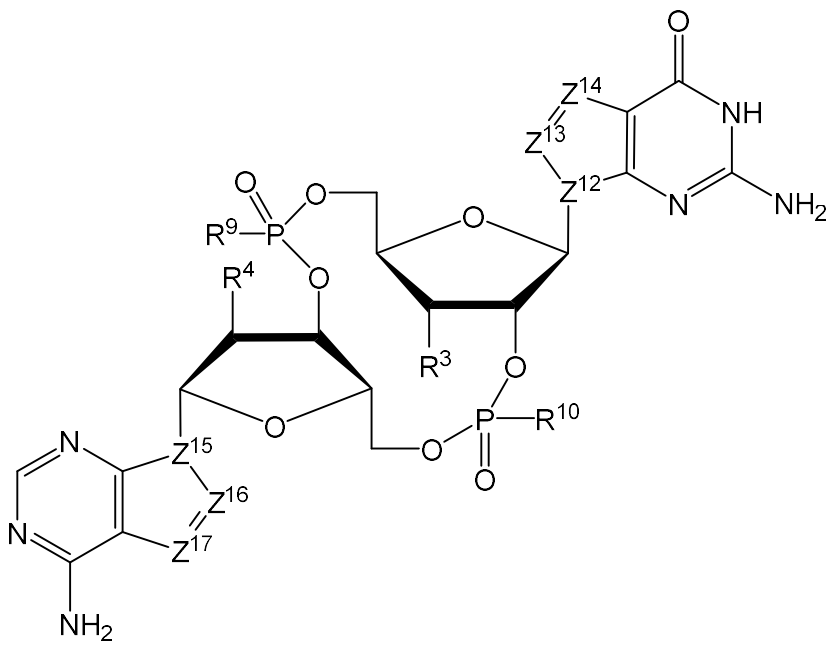
11. The compound of claim 10, wherein R^3 is C_2alkyl functionalized with one or more thiol, hydroxyl, carboxyl, $C_{1\text{-}6}$hydroxyalkoxy, amino, or $C_{1\text{-}6}$alkylamino groups.

12. The compound of claim 10, wherein R^3 is C_2alkyl functionalized with hydroxyl.

13. The compound of claim 10, wherein R^3 is C_2alkyl functionalized with thiol.

14. The compound of claim 10, wherein R^3 is C_2alkyl functionalized with halogen.

15. A compound, wherein the compound is of Formula Ic:



Formula Ic

wherein

Z^{12} and Z^{15} are N;

Z^{13}, Z^{14}, Z^{16}, and Z^{17} are independently CH or N;

R^3 is $C_{1\text{-}6}$alkyl functionalized with one or more halogen, thiol, or hydroxyl;

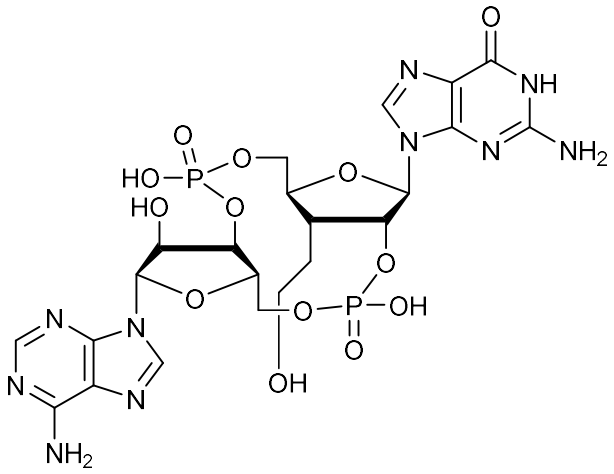
R^4 is hydroxyl;

R^9 and R^{10} are independently hydroxyl; thiol; $C_{1\text{-}6}$alkyl; $C_{1\text{-}6}$alkyl functionalized with one or more halogen, thiol, hydroxyl, carboxyl, $C_{1\text{-}6}$alkoxy, $C_{1\text{-}6}$hydroxyalkoxy, amino, $C_{1\text{-}6}$alkylamino, di($C_{1\text{-}6}$alkyl)amino, or azido groups; $C_{1\text{-}6}$alkoxy; $C_{1\text{-}6}$alkoxy functionalized with one or more halogen, thiol, hydroxyl, carboxyl, $C_{1\text{-}6}$hydroxyalkoxy, amino, $C_{1\text{-}6}$alkylamino, di($C_{1\text{-}6}$alkyl)amino, or azido groups; $C_{3\text{-}5}$alkenyl-O-; $C_{3\text{-}5}$alkynyl-O-; oligo(ethylene glycol); poly(ethylene glycol); borano (-BH_3^-); or -NR^7R^8;

R^7 and R^8 are independently hydrogen; $C_{1\text{-}6}$alkyl; $C_{1\text{-}6}$alkyl functionalized with one or more halogen, thiol, hydroxyl, carboxyl, $C_{1\text{-}6}$alkoxy, $C_{1\text{-}6}$hydroxyalkoxy, amino, $C_{1\text{-}6}$alkylamino, di($C_{1\text{-}6}$alkyl)amino, or azido groups; cyclic -($C_{1\text{-}6}$alkyl)-; cyclic -($C_{1\text{-}6}$alkyl)- functionalized with one or more halogen, thiol, hydroxyl, carboxyl, $C_{1\text{-}6}$alkoxy, $C_{1\text{-}6}$hydroxyalkoxy, amino, $C_{1\text{-}6}$alkylamino, or di($C_{1\text{-}6}$alkyl)amino groups; cyclic -($C_{1\text{-}6}$oxaalkyl)-; or cyclic -($C_{1\text{-}6}$oxaalkyl)-

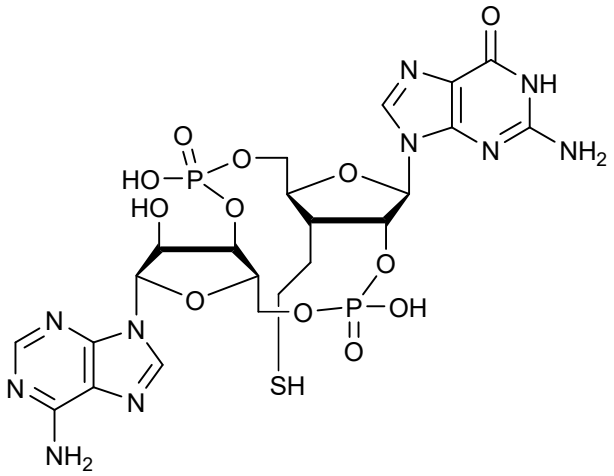
functionalized with one or more halogen, thiol, hydroxyl, carboxyl, C_{1-6}hydroxyalkoxy, amino, C_{1-6}alkylamino, or di(C_{1-6}alkyl)amino groups;
or a pharmaceutically acceptable salt thereof.

16. The compound of claim 15 having the structure:



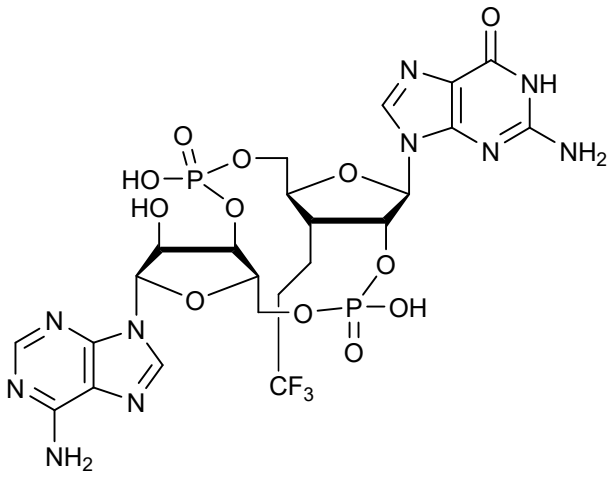
or a pharmaceutically acceptable salt thereof.

17. The compound of claim 15 having the structure:



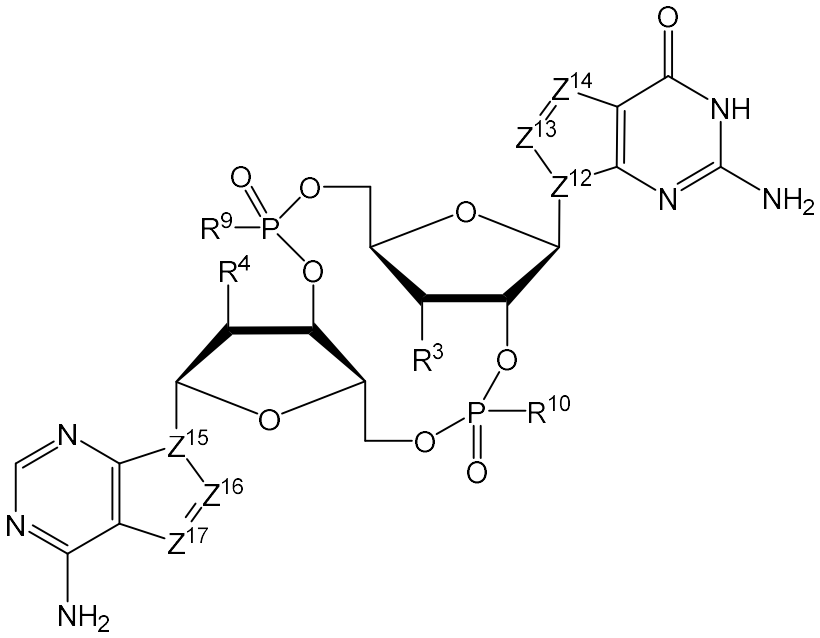
or a pharmaceutically acceptable salt thereof.

18. The compound of claim 15 having the structure:



or a pharmaceutically acceptable salt thereof.

19. A compound, wherein the compound is of Formula Ic:



Formula Ic

wherein

Z^{12} and Z^{15} are N;

Z^{13} and Z^{16} are CH;

Z^{14} and Z^{17} are independently CH or N;

R^3 is C_{1-6}alkyl functionalized with one or more halogen, thiol, or hydroxyl;

R^4 is hydroxyl;

R^9 and R^{10} are independently hydroxyl or thiol;

or a pharmaceutically acceptable salt thereof.

20. The compound of claim 19, wherein R^3 is C_{1-6}alkyl functionalized with hydroxyl.

21. The compound of claim 19, wherein R^3 is C_{1-6}alkyl functionalized with thiol.

22. The compound of claim 19, wherein R^3 is C_{1-6}alkyl functionalized with halogen.

23. A pharmaceutical composition that provides a therapeutically effective amount of a compound of claim 1 and one or more pharmaceutically acceptable excipients.

24. A pharmaceutical composition that provides a therapeutically effective amount of a compound of claim 1 in combination with at least one further therapeutic agent and one or more pharmaceutically acceptable excipients.

25. An immunogenic composition comprising an antigen or antigen composition and a compound of claim 1.

26. A pharmaceutical composition that provides a therapeutically effective amount of a compound of claim 8 and one or more pharmaceutically acceptable excipients.

27. A pharmaceutical composition that provides a therapeutically effective amount of a compound of claim 10 and one or more pharmaceutically acceptable excipients.

28. A pharmaceutical composition that provides a therapeutically effective amount of a compound of claim 11 and one or more pharmaceutically acceptable excipients.

29. A pharmaceutical composition that provides a therapeutically effective amount of a compound of claim 15 and one or more pharmaceutically acceptable excipients.

30. A pharmaceutical composition that provides a therapeutically effective amount of a compound of claim 16 and one or more pharmaceutically acceptable excipients.

31. A pharmaceutical composition that provides a therapeutically effective amount of a compound of claim 17 and one or more pharmaceutically acceptable excipients.

32. A pharmaceutical composition that provides a therapeutically effective amount of a compound of claim 18 and one or more pharmaceutically acceptable excipients.