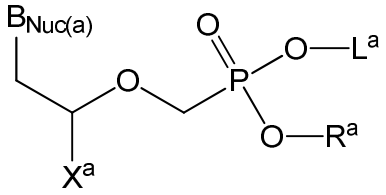
CLAIMS

1. Use of a compound of Formula (Ia), or a pharmaceutically acceptable salt, hydrate, solvate or crystalline form thereof:



(Ia)

wherein:

$B_{Nuc(a)}$ is a naturally occurring purine, a naturally occurring pyrimidine, a non-naturally occurring purine or a non-naturally occurring pyrimidine;

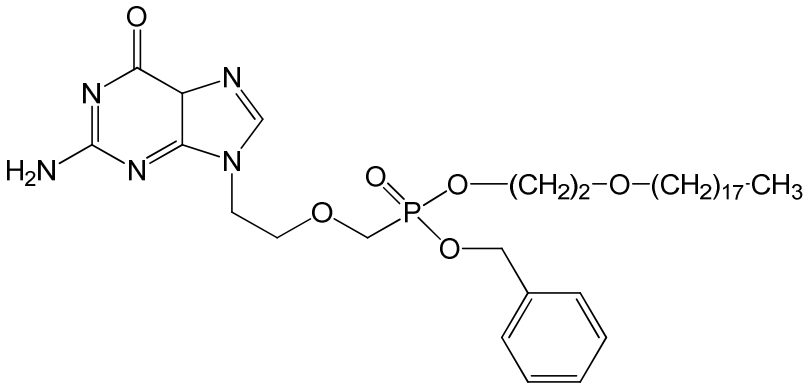
L^a is an unsubstituted C_{12-24} alkyl, an unsubstituted C_{13-29} heteroalkyl or a substituted glyceryl moiety, wherein the glyceryl moiety is substituted with one or more groups selected from an unsubstituted C_{13-29} alkyl, an unsubstituted C_{13-29} heteroalkyl, a substituted or unsubstituted aryl(C_{1-6} alkyl), a substituted or unsubstituted heteroaryl(C_{1-6} alkyl) and a substituted or unsubstituted heterocycloalkyl(C_{1-6} alkyl);

R^a is selected from the group consisting of an unsubstituted C_{1-6} alkyl, a substituted or unsubstituted aryl, a substituted or unsubstituted heteroaryl, a substituted or unsubstituted heterocycloalkyl, a substituted or unsubstituted aryl(C_{1-6} alkyl), a substituted or unsubstituted heteroaryl(C_{1-6} alkyl) and a substituted or unsubstituted heterocycloalkyl(C_{1-6} alkyl); and

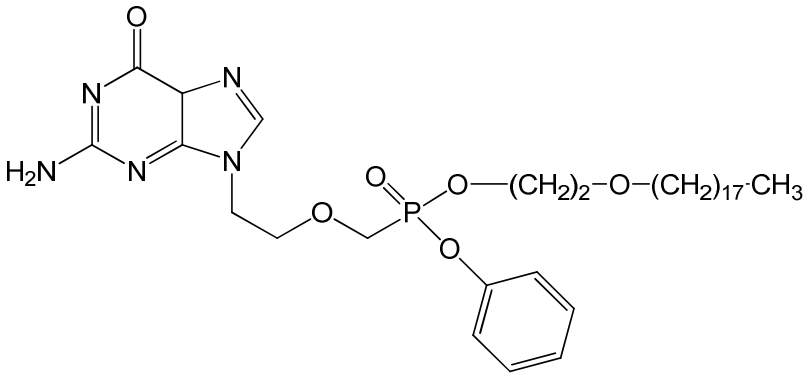
X^a is hydrogen, an unsubstituted C_{1-6} alkyl, a halogen substituted C_{1-6} alkyl, a hydroxy substituted C_{1-6} alkyl or an unsubstituted C_{1-6} alkoxy,

wherein the substituent is selected from -OH, $-NH_2$, -SH, -CN, $-CF_3$, $-NO_2$, oxo, halogen, unsubstituted alkyl, unsubstituted heteroalkyl, unsubstituted cycloalkyl, unsubstituted heterocycloalkyl, unsubstituted aryl, and unsubstituted heteroaryl

except for following two compounds or their pharmaceutically acceptable salts, hydrates, solvates or crystalline forms thereof:



and



in the manufacture of a medicament for treating head and neck cancer, testicular cancer, cervical intraepithelial neoplasia, anal intraepithelial neoplasia or vulvar intraepithelial neoplasia in a subject.

2. The use of claim 1, wherein X^a is hydrogen.

3. The use of claim 1, wherein X^a is methyl.

4. The use of claim 1, wherein X^a is methoxy.

5. The use of claim 1, wherein X^a is a fluoro substituted C_{1-6} alkyl.

6. The use of claim 5, wherein X^a is a CH_2F.

7. The use of claim 1, wherein X^a is a CH_2OH.

8. The use of any one of claims 1-7, wherein L^a is an unsubstituted C_{13-29} heteroalkyl.

9. The use of claim 8, wherein L^a has the structure $–(CH_2)_{1-6}$-O-$(CH_2)_{11-21}$-CH_3.

10. The use of claim 9, wherein L^a has the structure $–(CH_2)_2$-O-$(CH_2)_{17}$-CH_3.

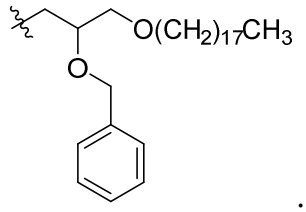
11. The use of claim 9, wherein L^a has the structure $–(CH_2)_3$-O-$(CH_2)_{15}$-CH_3.

12. The use of claim 8, wherein L^a has the structure $–(CH_2)_{1-6}$-O-$(CH_2)_{10-20}$-$(CHCH_3)$-CH_3.

13. The use of any one of claims 1-7, wherein L^a is a substituted glyceryl moiety.

14. The use of claim 13, wherein L^a has the structure $–(CH_2)$-$CH(OR^{a1})$-(CH_2)-O-$(CH_2)_{11-21}$-CH_3, wherein R^{a1} is a substituted or unsubstituted aryl(C_{1-6}alkyl), a substituted or unsubstituted heteroaryl(C_{1-6} alkyl) and a substituted or unsubstituted heterocycloalkyl(C_{1-6} alkyl).

15. The use of claim 14, wherein L^a has the structure:



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16. The use of claim 1, wherein R^a is a substituted or unsubstituted aryl.

17. The use of claim 16, wherein the substituted or unsubstituted aryl is a substituted or unsubstituted phenyl.

18. The use of claim 16, wherein the substituted or unsubstituted aryl is a substituted or unsubstituted naphthyl.

19. The use of claim 1, wherein R^a is a substituted or unsubstituted aryl(C_{1-6} alkyl).

20. The use of claim 19, wherein the substituted or unsubstituted aryl(C_{1-6} alkyl) is a substituted or unsubstituted benzyl.

21. The use of claim 1, wherein R^a is a substituted or unsubstituted heterocycloalkyl(C_{1-6} alkyl).

22. The use of claim 21, wherein the substituted or unsubstituted heterocycloalkyl(C_{1-6} alkyl) is a substituted or unsubstituted galactosyl.

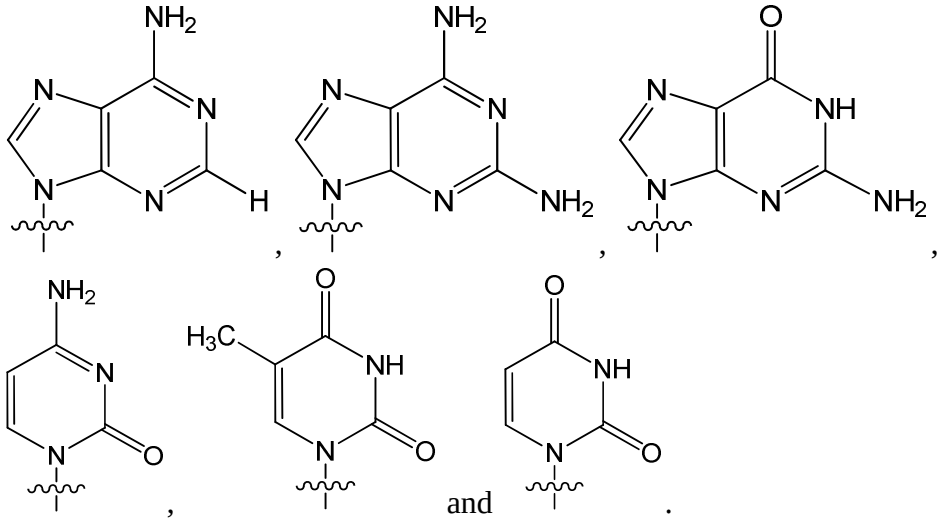
23. The use of claim 1, wherein $B_{Nuc(a)}$ is a naturally occurring purine.

24. The use of claim 1, wherein $B_{Nuc(a)}$ is a naturally occurring pyrimidine.

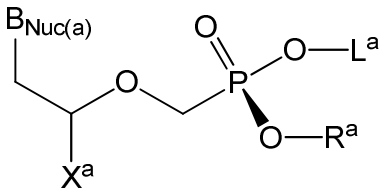
25. The use of claim 1, wherein $B_{Nuc(a)}$ is a non-naturally occurring purine.

26. The use of claim 1, wherein $B_{Nuc(a)}$ is a non-naturally occurring pyrimidine.

27. The use of claim 1, wherein $B_{Nuc(a)}$ is selected from the group consisting of:

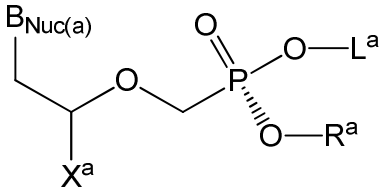


28. The use of claim 1, wherein the compound has the structure:



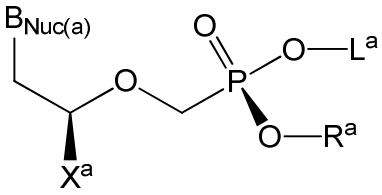
wherein X^a is an unsubstituted C_{1-6} alkyl, a halogen substituted C_{1-6} alkyl, a hydroxy substituted C_{1-6} alkyl or an unsubstituted C_{1-6} alkoxy.

29. The use of claim 1, wherein the compound has the structure:



wherein X^a is an unsubstituted C_{1-6} alkyl, a halogen substituted C_{1-6} alkyl, a hydroxy substituted C_{1-6} alkyl or an unsubstituted C_{1-6} alkoxy.

30. The use of claim 1, wherein the compound has the structure: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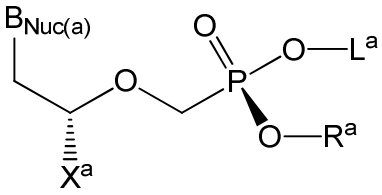
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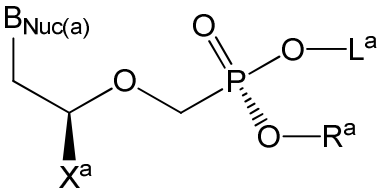
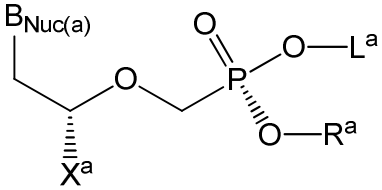
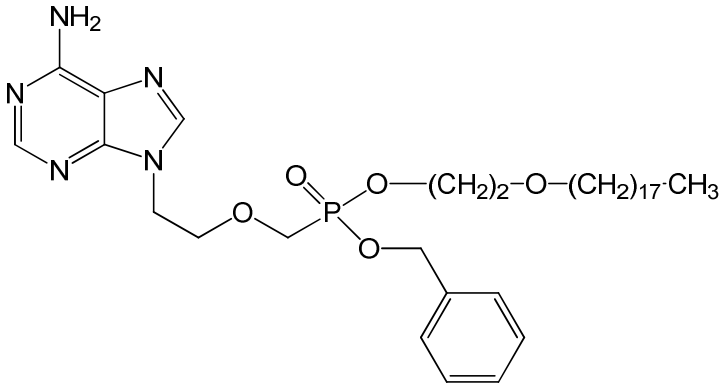

or


wherein X^a is an unsubstituted C_{1-6} alkyl, a halogen substituted C_{1-6} alkyl, a hydroxy substituted C_{1-6} alkyl or an unsubstituted C_{1-6} alkoxy.

31. The use of claim 1, wherein the compound is selected from the group consisting of:


NH2
N
N
N
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O
O
P
O
O
O—(CH2)2–O–(CH2)17·CH3

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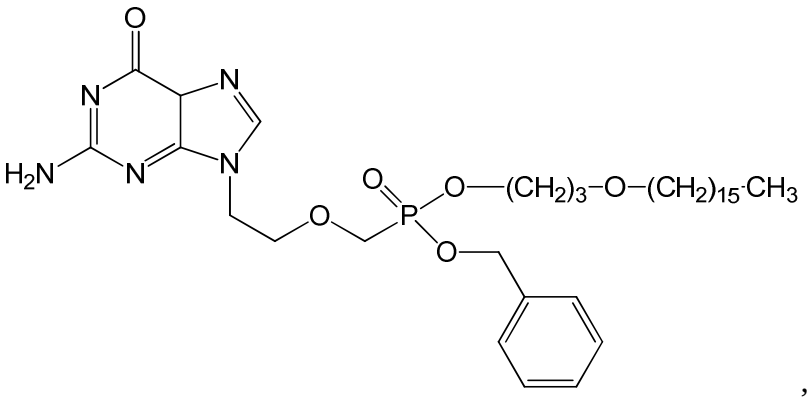
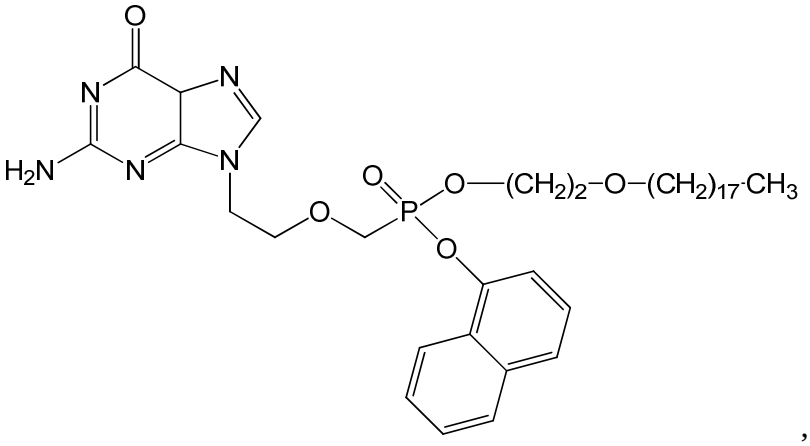

O
N
N
H2N
N
N
O
O
P
O
O
O—(CH2)3–O–(CH2)15·CH3

,


O
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H2N
N
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P
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O
O—(CH2)2–O–(CH2)17·CH3

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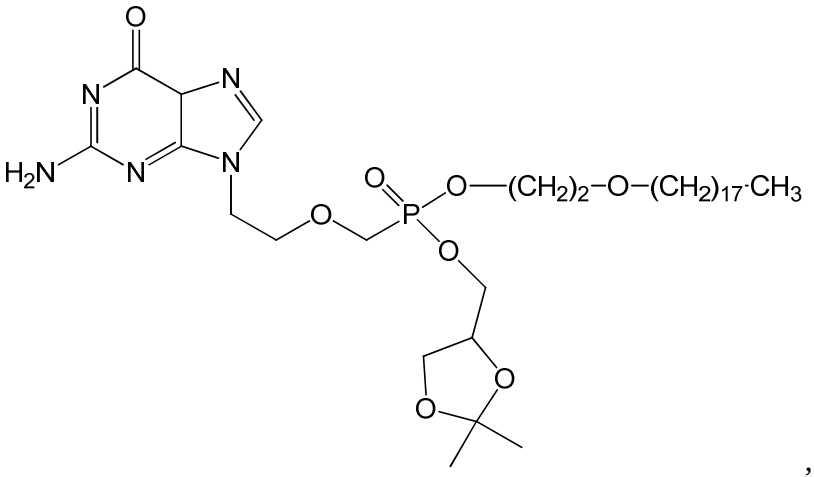
O
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H2N
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O—(CH2)2–O–(CH2)17·CH3
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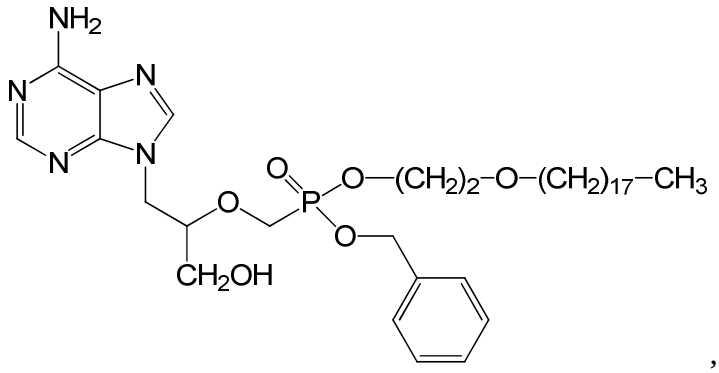
NH2
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O—(CH2)2–O–(CH2)17–CH3
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CH2OH
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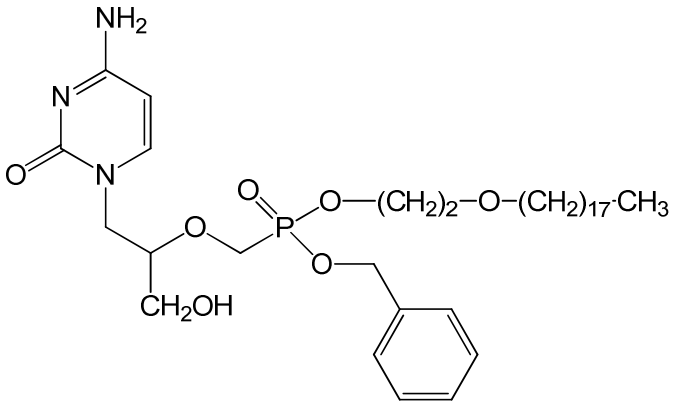
NH2
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P
O—(CH2)2–O–(CH2)17·CH3
O
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CH2OH
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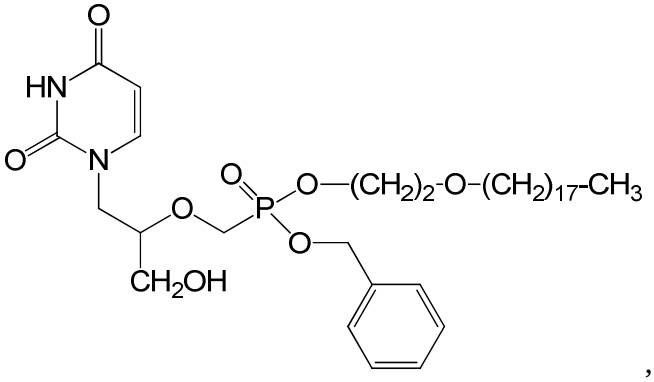
O
HN
O
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P
O—(CH2)2-O-(CH2)17-CH3
O
O
CH2OH
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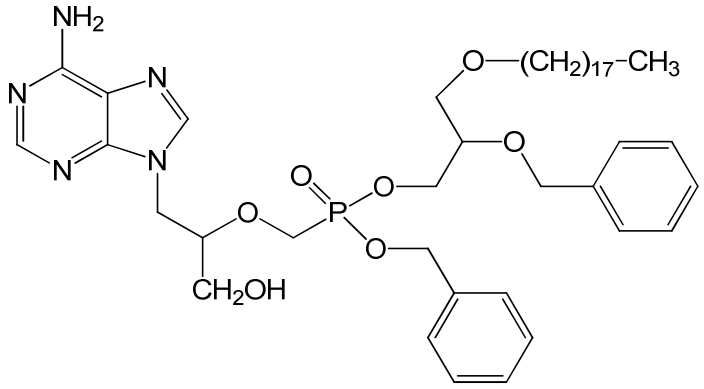
NH2
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O—(CH2)17–CH3
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CH2OH
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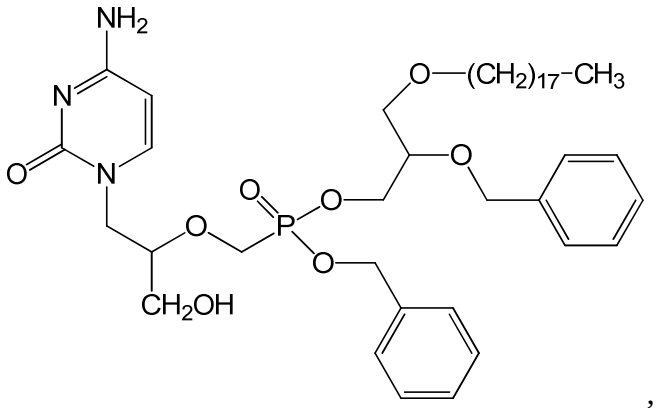
NH2
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O—(CH2)17–CH3
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P
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O
CH2OH
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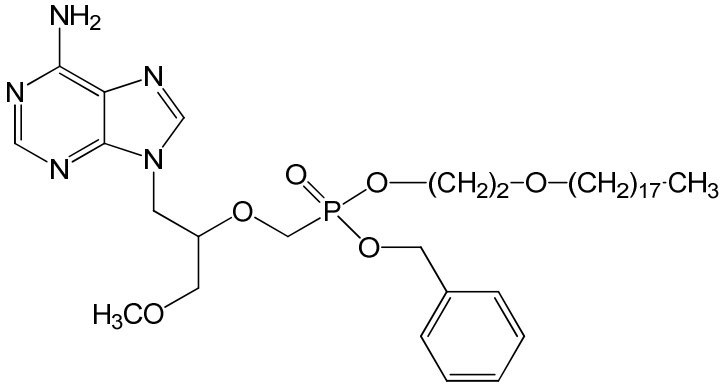
NH2
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N
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P
O—(CH2)2–O–(CH2)17·CH3
O
O
H3CO
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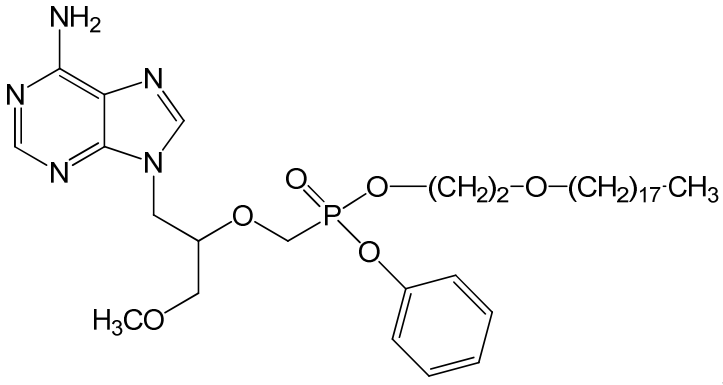
NH2
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N
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N
O
P
O—(CH2)2–O–(CH2)17·CH3
O
O
H3CO
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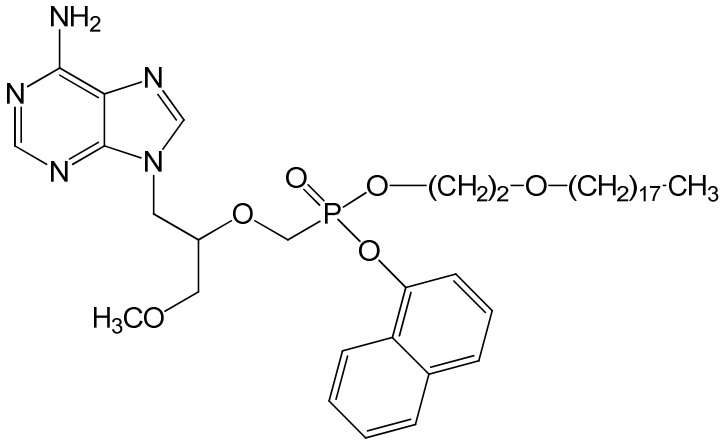

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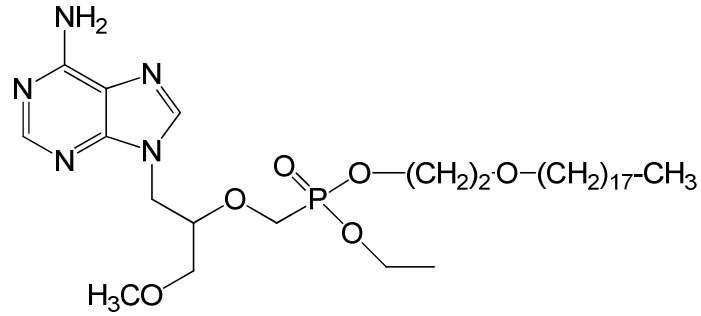

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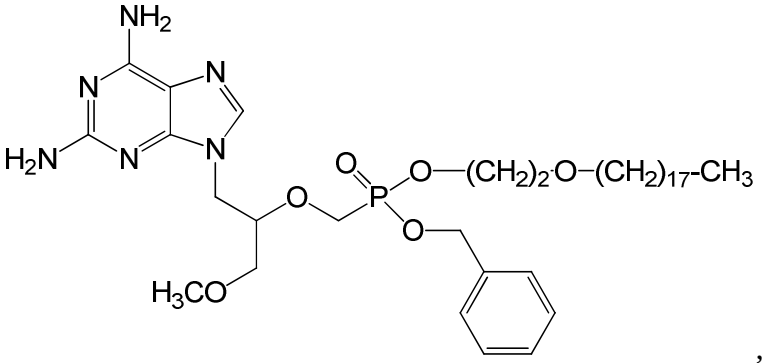

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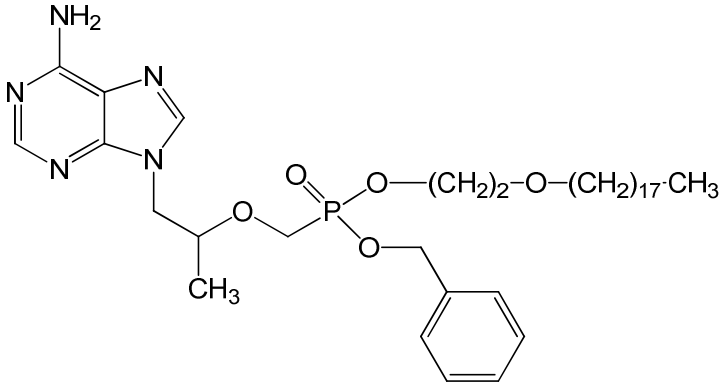

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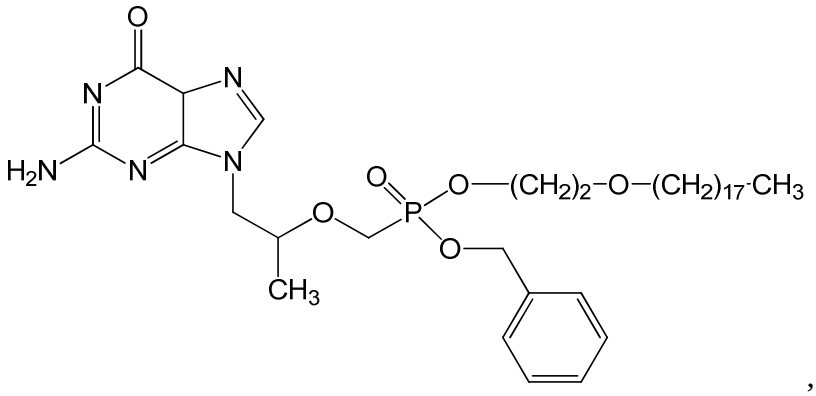

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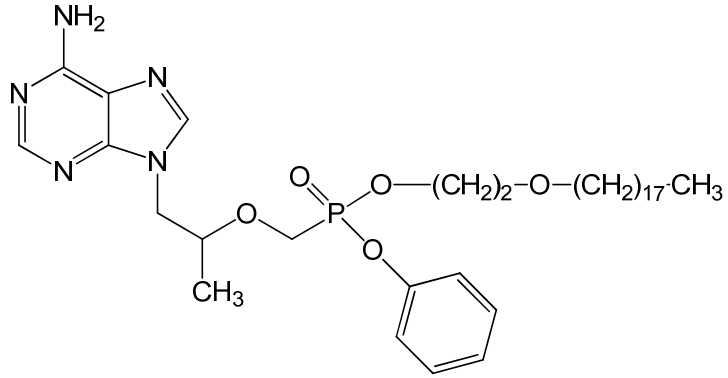

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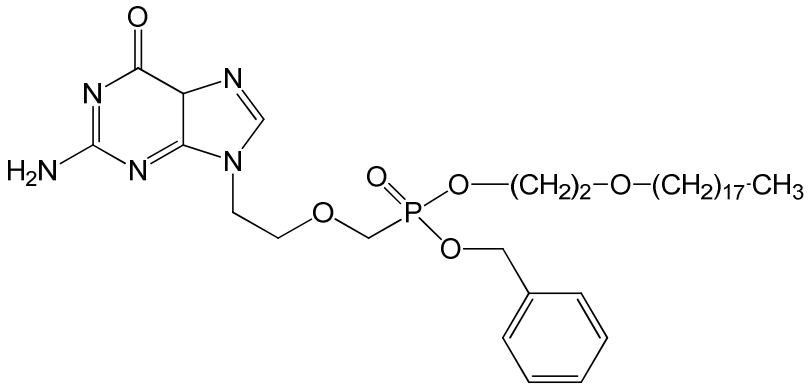
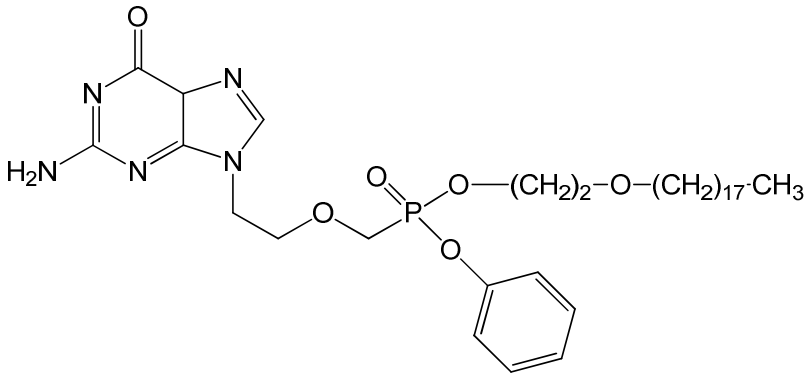
or a pharmaceutically acceptable salt, hydrate, solvate or crystalline form of any of the foregoing.

32. Use of a compound with the structure



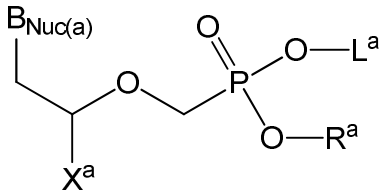
or a pharmaceutically acceptable salt thereof, in the manufacture of a medicament for treating head and neck cancer or testicular cancer in a subject.

33. Use of a compound with the structure



or a pharmaceutically acceptable salt thereof, in the manufacture of a medicament for treating head and neck cancer or testicular cancer in the subject.

34. Use of a compound of Formula (Ia), or a pharmaceutically acceptable salt, hydrate, solvate or crystalline form thereof:



(Ia)

wherein:

$B_{Nuc(a)}$ is a naturally occurring purine, a naturally occurring pyrimidine, a non-naturally occurring purine or a non-naturally occurring pyrimidine;

L^a is an unsubstituted C_{12-24} alkyl, an unsubstituted C_{13-29} heteroalkyl or a substituted glyceryl moiety, wherein the glyceryl moiety is substituted with one or more groups selected from an unsubstituted C_{13-29} alkyl, an unsubstituted C_{13-29} heteroalkyl, a substituted or unsubstituted aryl(C_{1-6} alkyl), a substituted or unsubstituted heteroaryl(C_{1-6} alkyl) and a substituted or unsubstituted heterocycloalkyl(C_{1-6} alkyl);

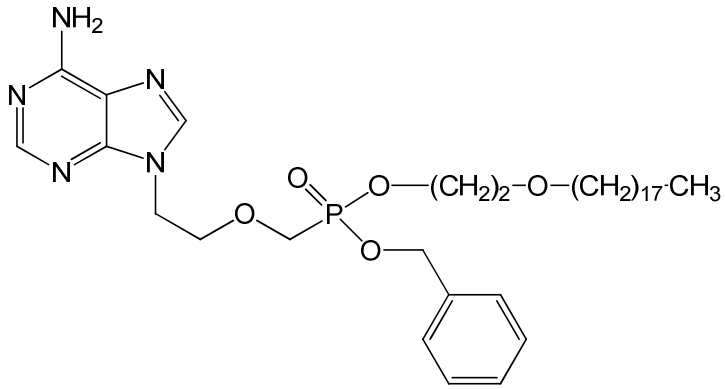
R^a is selected from the group consisting of an unsubstituted C_{1-6} alkyl, a substituted or unsubstituted aryl, a substituted or unsubstituted heteroaryl, a substituted or unsubstituted heterocycloalkyl, a substituted or unsubstituted aryl(C_{1-6} alkyl), a substituted or unsubstituted heteroaryl(C_{1-6} alkyl) and a substituted or unsubstituted heterocycloalkyl(C_{1-6} alkyl); and

X^a is hydrogen, an unsubstituted C_{1-6} alkyl, a halogen substituted C_{1-6} alkyl, a hydroxy substituted C_{1-6} alkyl or an unsubstituted C_{1-6} alkoxy;

wherein the substituent is selected from -OH, -NH_2, -SH, -CN, -CF_3, -NO_2, oxo, halogen, unsubstituted alkyl, unsubstituted heteroalkyl, unsubstituted cycloalkyl, unsubstituted heterocycloalkyl, unsubstituted aryl, and unsubstituted heteroaryl;

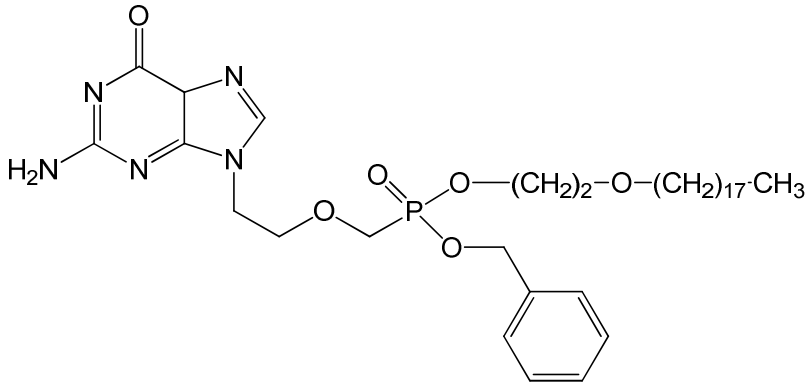
in the manufacture of a medicament for treating acute myelogenous leukemia or chronic myelogenous leukemia in a subject.

35. The use of claim 34, wherein the compound has the structure



or a pharmaceutically acceptable salt thereof.

36. The use of claim 34, wherein the compound has the structure



or a pharmaceutically acceptable salt thereof.

37. The use of any one of claims 1-36, wherein the subject is a human.