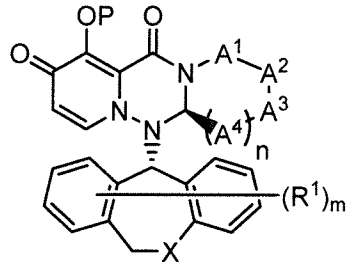
Claims

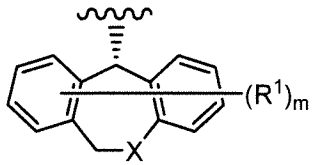
Claim 1

A compound represented by formula (I):

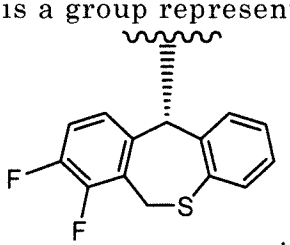


(I)

, or its pharmaceutically acceptable salt:
wherein
P is hydrogen or a group $P^R$ to form a prodrug;
$A^1$ is $CR^{1A}R^{1B}$, S or O;
$A^2$ is $CR^{2A}R^{2B}$, S or O;
$A^3$ is $CR^{3A}R^{3B}$, S or O;
$A^4$ is each independently $CR^{4A}R^{4B}$, S or O;
the number of hetero atoms among atoms constituting the ring which consists of $A^1$, $A^2$, $A^3$, $A^4$, nitrogen atom adjacent to $A^1$ and carbon atom adjacent to $A^4$, is 1 or 2;
$R^{1A}$ and $R^{1B}$ are each independently hydrogen, halogen, alkyl, haloalkyl, alkyloxy or phenyl;
$R^{2A}$ and $R^{2B}$ are each independently hydrogen, halogen, alkyl, haloalkyl, alkyloxy or phenyl;
$R^{3A}$ and $R^{3B}$ are each independently hydrogen, halogen, alkyl, haloalkyl, alkyloxy or phenyl;
$R^{4A}$ and $R^{4B}$ are each independently hydrogen, halogen, alkyl, haloalkyl, alkyloxy or phenyl;
$R^{3A}$ and $R^{3B}$ may be taken together with an adjacent carbon atom to form non-aromatic carbocycle or non-aromatic heterocycle;
n is any integer of 1 to 2, and
the group represented by formula:

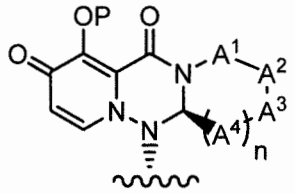


is a group represented by formula:

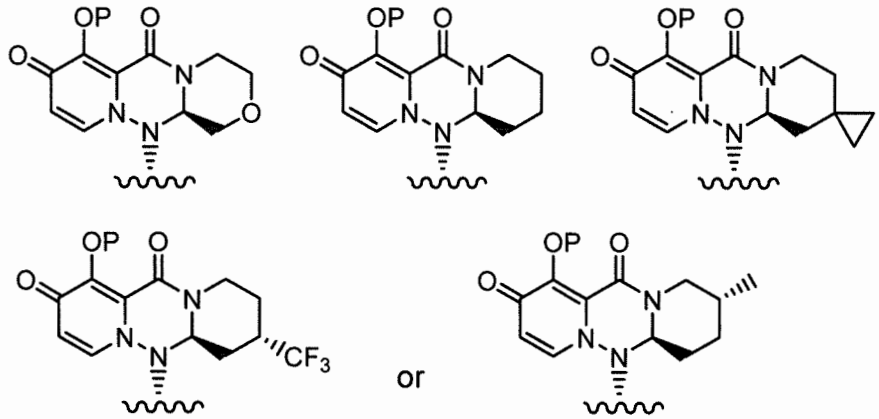


Claim 2

The compound according to Claim 1, wherein the group represented by formula:



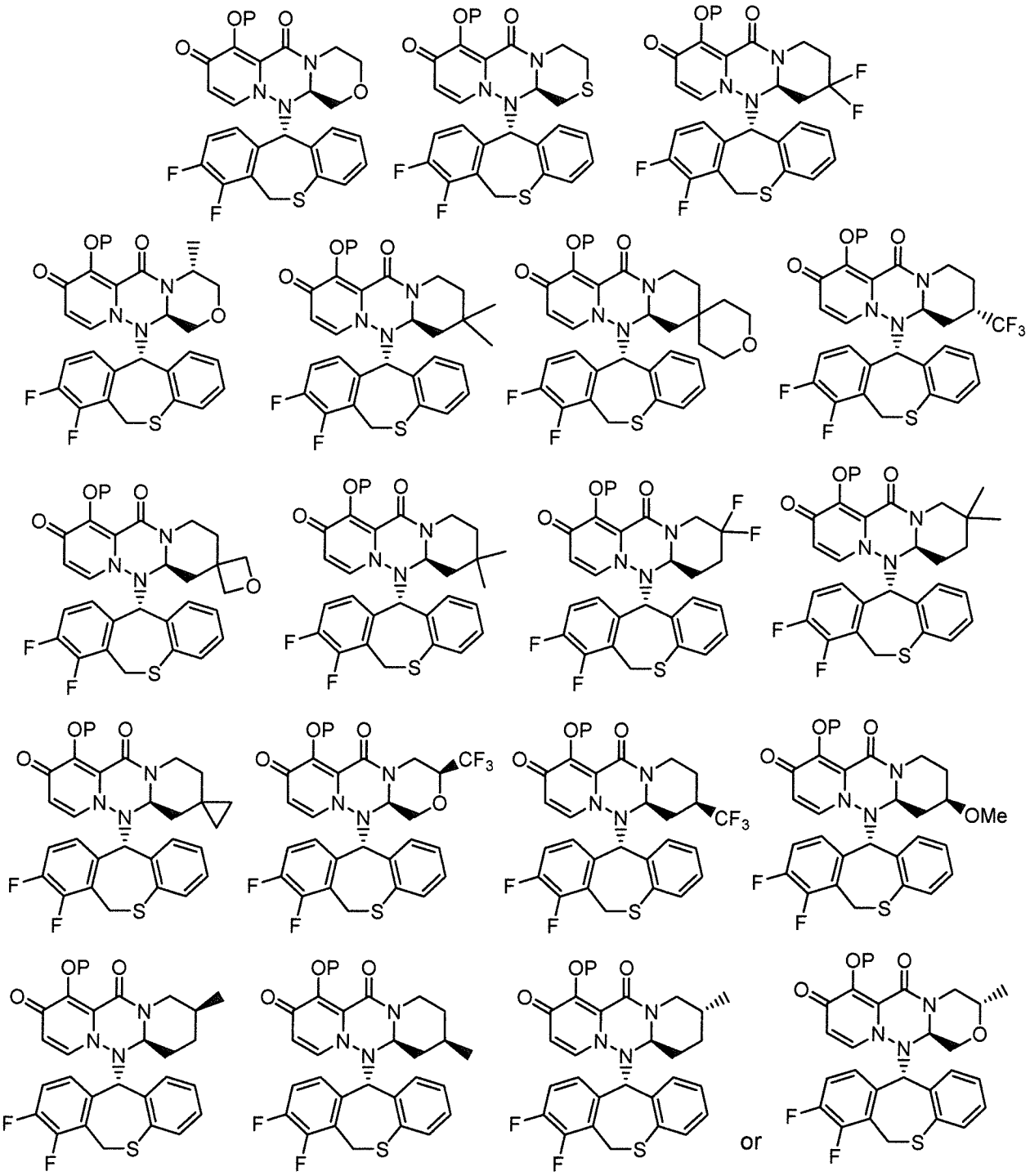
is represented by formula:



wherein each definition has the same meaning as described in Claim 1, or its pharmaceutically acceptable salt.

Claim 3

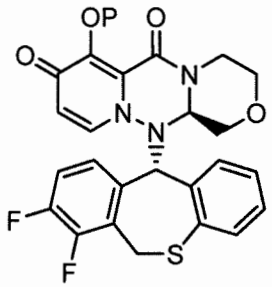
The compound according to Claim 1, represented by the following formula:



wherein each definition has the same meaning as described in Claim 1, or its pharmaceutically acceptable salt.

Claim 4

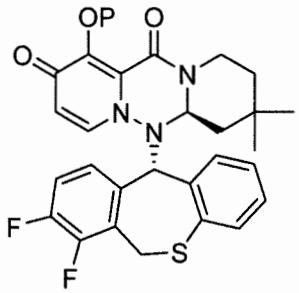
The compound according to Claim 1, represented by the following formula:



wherein each definition has the same meaning as described in Claim 1, or its pharmaceutically acceptable salt.

Claim 5

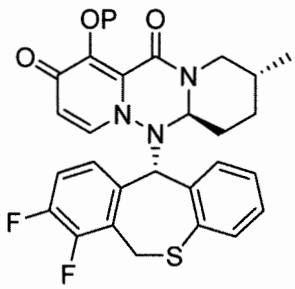
The compound according to Claim 1, represented by the following formula:



wherein each definition has the same meaning as described in Claim 1, or its pharmaceutically acceptable salt.

Claim 6

The compound according to Claim 1, represented by the following formula:



wherein each definition has the same meaning as described in claim 1, or its pharmaceutically acceptable salt.

Claim 7

The compound according to any one of Claims 1 to 6, or its pharmaceutically acceptable salt,

wherein $P^R$ is a group selected from the following formula a) to ac):

a) -C(=O)-$P^{R0}$,

b) -C(=O)-$P^{R1}$,

c) -C(=O)-L-$P^{R1}$,

d) -C(=O)-L-O-$P^{R1}$,

e) -C(=O)-L-O-L-O-$P^{R1}$,
f) -C(=O)-L-O-C(=O)-$P^{R1}$,
g) -C(=O)-O-$P^{R2}$,
h) -C(=O)-N(-K)($P^{R2}$),
i) -C(=O)-O-L-O-$P^{R2}$,
j) -C($P^{R3}$)$_2$-O-$P^{R4}$,
k) -C($P^{R3}$)$_2$-O-L-O-$P^{R4}$,
l) -C($P^{R3}$)$_2$-O-C(=O)-$P^{R4}$,
m) -C($P^{R3}$)$_2$-O-C(=O)-O-$P^{R4}$,
n) -C($P^{R3}$)$_2$-O-C(=O)-N(-K)-$P^{R4}$,
o) -C($P^{R3}$)$_2$-O-C(=O)-O-L-O-$P^{R4}$,
p) -C($P^{R3}$)$_2$-O-C(=O)-O-L-N($P^{R4}$)$_2$,
q) -C($P^{R3}$)$_2$-O-C(=O)-N(-K)-L-O-$P^{R4}$,
r) -C($P^{R3}$)$_2$-O-C(=O)-N(-K)-L-N($P^{R4}$)$_2$,
s) -C($P^{R3}$)$_2$-O-C(=O)-O-L-O-L-O-$P^{R4}$,
t) -C($P^{R3}$)$_2$-O-C(=O)-O-L-N(-K)-C(=O)-$P^{R4}$,
u) -C($P^{R3}$)$_2$-O-P(=O)(-$P^{R5}$)$_2$,
v) -C($P^{R3}$)$_2$-$P^{R6}$, (except for a benzyl group)
w) -C(=$N^+$($P^{R7}$)$_2$)(-N($P^{R7}$)$_2$),
x) -C($P^{R3}$)$_2$-C($P^{R3}$)$_2$-C(=O)-O-$P^{R2}$,
y) -C($P^{R3}$)$_2$-N(-K)-C(=O)-O-$P^{R2}$,
z) -P(=O)(-$P^{R8}$)(-$P^{R9}$),
aa) -S(=O)$_2$-$P^{R10}$,
ab) -$P^{R11}$, and
ac) -C($P^{R3}$)$_2$-C($P^{R3}$)$_2$-O-$P^{R2}$,
wherein L is straight or branched alkylene, or straight or branched alkenylene;
K is hydrogen, or alkyl optionally substituted by substituent group A;
$P^{R0}$ is alkyl optionally substituted by substituent group A, or alkenyl optionally substituted by substituent group A;
$P^{R1}$ is carbocyclyl group optionally substituted by substituent group A, heterocyclyl group optionally substituted by substituent group A, alkylamino optionally substituted by substituent group A, or alkylsulfanyl optionally substituted by substituent group A;
$P^{R2}$ is alkyl optionally substituted by substituent group A, carbocyclyl group optionally substituted by substituent group A, heterocyclyl group optionally substituted by substituent group A, carbocyclylalkyl optionally substituted by substituent group A, heterocyclylalkyl optionally substituted by substituent group A or trialkylsilyl;
$P^{R3}$ is each independently hydrogen or alkyl;
$P^{R4}$ is each independently alkyl optionally substituted by substituent group A, carbocyclyl group optionally substituted by substituent group A, heterocyclyl group optionally substituted by substituent group A, alkylamino optionally substituted by substituent group A, carbocyclylalkyl optionally substituted by substituent group A, heterocyclylalkyl optionally substituted by substituent group A, or trialkylsilyl;

$P^{R5}$ is each independently hydroxy or OBn;
$P^{R6}$ is carbocyclyl group optionally substituted by substituent group A, or heterocyclyl group optionally substituted by substituent group A;
$P^{R7}$ is each independently alkyl optionally substituted by substituent group A;
$P^{R8}$ is alkyloxy optionally substituted by substituent group A;
$P^{R9}$ is alkyloxy optionally substituted by substituent group A, alkylamino optionally substituted by substituent group A, carbocyclyloxy optionally substituted by substituent group A, heterocyclyloxy optionally substituted by substituent group A, carbocyclylamino optionally substituted by substituent group A or heterocyclylamino optionally substituted by substituent group A;
$P^{R8}$ and $P^{R9}$ may be taken together with an adjacent phosphorus atom to form heterocycle optionally substituted by substituent group A;
$P^{R10}$ is alkyl optionally substituted by substituent group A, carbocyclyl group optionally substituted by substituent group A, heterocyclyl group optionally substituted by substituent group A, carbocyclylalkyl optionally substituted by substituent group A or heterocyclylalkyl optionally substituted by substituent group A;
$P^{R11}$ is alkyl optionally substituted by substituent group A, alkenyl optionally substituted by substituent group A, carbocyclyl group optionally substituted by substituent group A, or heterocyclyl group optionally substituted by substituent group A;
Substituent group A; oxo, alkyl, hydroxyalkyl, amino, alkylamino, carbocyclyl group, heterocyclyl group, carbocyclylalkyl, alkylcarbonyl, halogen, hydroxy, carboxy, alkylcarbonylamino, alkylcarbonylaminoalkyl, alkylcarbonyloxy, alkyloxycarbonyl, alkyloxycarbonylalkyl, alkyloxycarbonyloxy, alkylaminocarbonyloxy, alkylaminoalkyl, alkyloxy, cyano, nitro, azido, alkylsulfonyl, trialkylsilyl and phospho.

Claim 8

The compound according to Claim 7, or its pharmaceutically acceptable salt,
wherein $P^{R}$ is a group selected from the following formula:
a) $-C(=O)-P^{R0}$,
b) $-C(=O)-P^{R1}$,
g) $-C(=O)-O-P^{R2}$,
h) $-C(=O)-N(-K)(P^{R2})$,
i) $-C(=O)-O-L-O-P^{R2}$,
l) $-C(P^{R3})_2-O-C(=O)-P^{R4}$,
m) $-C(P^{R3})_2-O-C(=O)-O-P^{R4}$,
o) $-C(P^{R3})_2-O-C(=O)-O-L-O-P^{R4}$,
v) $-C(P^{R3})_2-P^{R6}$, (except for a benzyl group)
x) $-C(P^{R3})_2-C(P^{R3})_2-C(=O)-O-P^{R2}$,
y) $-C(P^{R3})_2-N(-K)-C(=O)-O-P^{R2}$, and
z) $-P(=O)(-P^{R8})(-P^{R9})$,
wherein L is straight or branched lower alkylene;

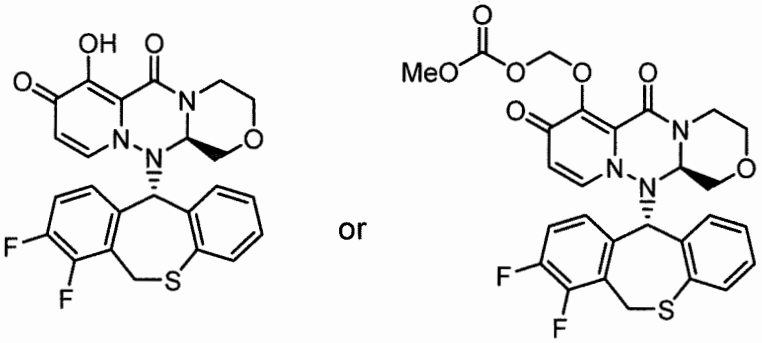
K is hydrogen or alkyl optionally substituted by substituent group A;
$P^{R0}$ is alkyl optionally substituted by substituent group A;
$P^{R1}$ is carbocyclyl group optionally substituted by substituent group A, or heterocyclyl group optionally substituted by substituent group A;
$P^{R2}$ is alkyl optionally substituted by substituent group A, carbocyclyl group optionally substituted by substituent group A, heterocyclyl group optionally substituted by substituent group A, carbocyclylalkyl optionally substituted by substituent group A, or heterocyclylalkyl optionally substituted by substituent group A;
$P^{R3}$ is each independently hydrogen or alkyl;
$P^{R4}$ is alkyl optionally substituted by substituent group A, carbocyclyl group optionally substituted by substituent group A, or heterocyclyl group optionally substituted by substituent group A;
$P^{R6}$ is carbocyclyl group optionally substituted by substituent group A, or heterocyclyl group optionally substituted by substituent group A;
$P^{R8}$ is alkyloxy optionally substituted by substituent group A;
$P^{R9}$ is alkyloxy optionally substituted by substituent group A, alkylamino optionally substituted by substituent group A, carbocyclyloxy optionally substituted by substituent group A, heterocyclyloxy optionally substituted by substituent group A, carbocyclylamino optionally substituted by substituent group A or heterocyclylamino optionally substituted by substituent group A; and
$P^{R8}$ and $P^{R9}$ may be taken together with an adjacent phosphorus atom to form heterocycle optionally substituted by substituent group A,
Substituent group A; oxo, alkyl, alkylamino, carbocyclyl group, heterocyclyl group, alkylcarbonyl, halogen, hydroxy, alkylcarbonylamino, alkylcarbonyloxy, alkyloxycarbonyl, alkyloxycarbonylalkyl, alkylaminocarbonyloxy, alkyloxy, nitro, azido, alkylsulfonyl and trialkylsilyl.

Claim 9

The compound according to Claim 7, or its pharmaceutically acceptable salt,
wherein $P^{R}$ is a group selected from the following formula:
m) $-C(P^{R3})_2-O-C(=O)-O-P^{R4}$
wherein
$P^{R3}$ is each independently hydrogen or alkyl; and
$P^{R4}$ is alkyl optionally substituted by substituent group A, carbocyclyl group optionally substituted by substituent group A, or heterocyclyl group optionally substituted by substituent group A;
Substituent group A; oxo, alkyl, alkylamino, carbocyclyl group, heterocyclyl group, alkylcarbonyl, halogen, hydroxy, alkylcarbonylamino, alkylcarbonyloxy, alkyloxycarbonyl, alkyloxycarbonylalkyl, alkylaminocarbonyloxy, alkyloxy, nitro, azido, alkylsulfonyl and trialkylsilyl.

Claim 10

A compound represented by the following formula:



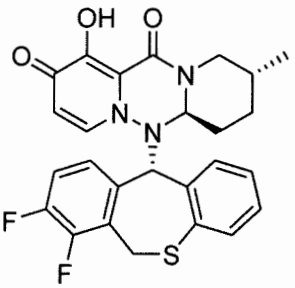
or



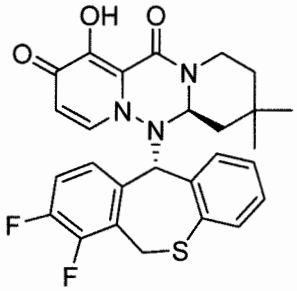
, or its pharmaceutically acceptable salt.

Claim 11

A compound represented by the following formula:



or



, or its pharmaceutically acceptable salt.