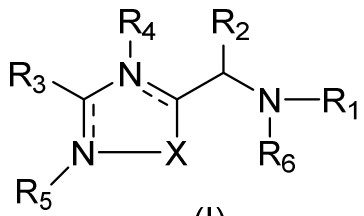
## CLAIMS

1. A compound of formula (I):




(I)

or a pharmaceutically acceptable salt thereof or a stereoisomer thereof;

wherein,

X is O or S;

each dotted line [----] independently represents an optional bond;

$R_1$ is hydrogen or -CO-Aaa;

Aaa represents an amino acid residue;

$R_2$ is a side chain of an amino acid, hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, heterocyclyl, heterocyclylalkyl heteroaralkyl, aralkyl, heteroaryl or aryl, each optionally substituted by one or more substituents selected from carboxylate, carboxylic acid, carboxylic acid ester, thiocarboxylate, thio acid, amido, amino, heterocyclyl, hydroxyl, cycloalkyl, aryl, aryl-COOH, heteroaryl, guanidino, amidino, -NH, -N(alkyl), -SH and -S(alkyl), optionally wherein two or three carbon atoms of the alkyl, alkenyl or alkynyl form part of a 3-7-membered carbocyclic or heterocyclic ring which is optionally substituted with 1 to 4 substituents, each independently selected from alkyl, alkoxy, carboxylic acid, carboxylate and hydroxyl;

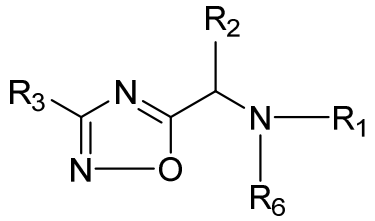
$R_3$ is aryl, heteroaryl, heterocyclyl, or cycloalkyl, each optionally substituted by 1 to 4 occurrences of $R_a$;

$R_a$, independently for each occurrence, is alkyl, alkoxy, halo, hydroxyl, amino, -C(O)OH, aralkyl, aryl, alkoxy, heteroaralkyl, heteroaryl, cycloalkyl, (cycloalkyl)alkyl, hydroxyalkyl, alkoxyalkyl or acyl; or any two $R_a$ groups attached to the same carbon atom together represent an oxo (=O) or thioxo (=S);

each of $R_4$ and $R_5$ independently is hydrogen or absent; and

$R_6$ is hydrogen or alkyl.

2. The compound of claim 1, wherein the compound is represented by formula (IA):



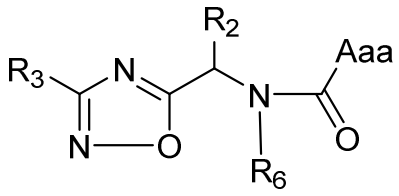

(IA)

or a pharmaceutically acceptable salt thereof or a stereoisomer thereof;

wherein,

$R_2$ is ($C_1$-$C_6$)alkyl, cycloalkyl, ($C_2$-$C_6$)alkynyl or heteroarylalkyl; wherein ($C_1$-$C_6$)alkyl or heteroarylalkyl is substituted with one or more substituents selected from carboxylic acid, carboxylate, thiocarboxylate, thioacid, amido, amino, hydroxyl, cycloalkyl, aryl, aryl-COOH, heterocyclyl, heteroaryl, guanidino, amidino, -SH and -S(alkyl); optionally wherein two or three carbon atoms of the alkyl, alkenyl or alkynyl form part of a 3-7-membered carbocyclic or heterocyclic ring, optionally substituted with 1 to 4 substituents, each independently selected from alkyl, alkoxy, carboxylic acid, carboxylate, and hydroxyl.

3. The compound of claim 1 or 2, wherein the compound is represented by formula (IB):




(IB)

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4. The compound of claim 3, wherein Aaa is a natural amino acid residue.

5. The compound of claim 3 or 4, wherein Aaa is Ser, Met, Thr, Gly, Lys, Phe, or Ala.

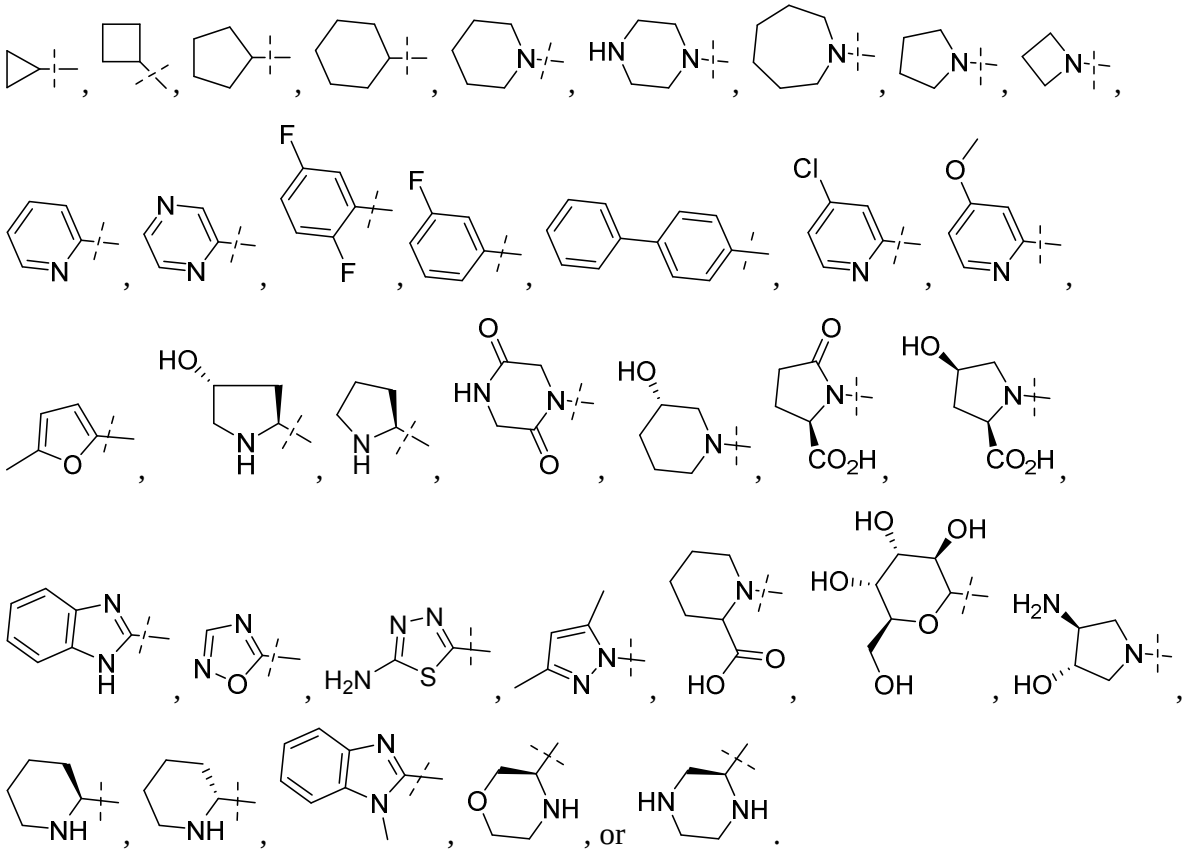
6. The compound of any one of claims 3 to 5, wherein Aaa is Ser or Thr.

7. The compound of any one of claims 1 to 6, wherein $R_3$ is aryl, cycloalkyl, heterocyclyl, or heteroaryl, optionally substituted by 1 to 4 occurrences of $R_a$.

8. The compound of any one of claims 1 to 7, wherein $R_a$ is hydrogen, alkyl, halo, hydroxyl, amino, -C(O)OH, aralkyl, aryl, alkoxy, heteroaralkyl, heteroaryl, cycloalkyl, (cycloalkyl)alkyl, hydroxyalkyl, alkoxyalkyl, or acyl.

9. The compound of any one of claims1 to 7, wherein any two $R_a$ groups attached to the same carbon atom together represent an oxo (=O) or thioxo (=S).

10. The compound of any one of claims 1 to 9, wherein $R_3$ is



11. The compound of any one of claims 1 to 10, wherein $R_2$ is $(C_1\text{-}C_6)$alkyl, $(C_2\text{-}C_6)$alkenyl or $(C_2\text{-}C_6)$alkynyl, substituted by one or more substituents selected from carboxylic acid, carboxylate, thiocarboxylate, thioacid, amido, amino, and amidino.

12. The compound of any one of claims 1 to 11, wherein $R_2$ is $(C_1\text{-}C_6)$alkyl substituted by carboxylic acid, amido or amidino.

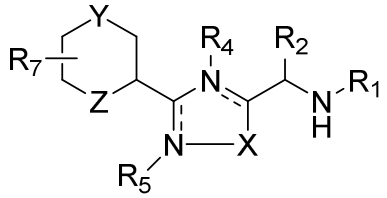
13. The compound of any one of claims 1 to 12, wherein $R_2$ is $(C_1\text{-}C_6)$alkyl, substituted by -C(O)OH, $-C(O)NH_2$, or $-C(=NH)NH_2$.

14. The compound of any one of claims 1 to 13, wherein $R_2$ is $-(CH_2)COOH$, $-(CH_2)_2COOH$, $-(CH_2)CONH_2$, $-(CH_2)_2CONH_2$, or $-(CH_2)C(=NH)NH_2$.

15. The compound of any one of claims 1 to 14, wherein $R_2$ is $-(CH_2)COOH$ or $-(CH_2)CONH_2$.

16. The compound of any one of claims 1 to 15, wherein $R_6$ is hydrogen.

17. A compound of formula (II),




(II)

or a pharmaceutically acceptable salt thereof or a stereoisomer thereof;

wherein,

Y and Z are each independently $-CR_aR_b-$, $-NR_c-$, O or S;

X is O or S;

each dotted line [----] independently represents an optional bond;

$R_a$ and $R_b$ are each independently hydrogen or a substituent such as alkyl, acyl, hydroxyl, amino, halo, aralkyl, aryl, heteroaralkyl, heteroaryl, cycloalkyl, aminoalkyl, alkoxy

hydroxyalkyl, alkoxyalkyl, or (cycloalkyl)alkyl; preferably hydroxyl, amino, lower alkyl, lower acyl or lower aralkyl;

$R_c$ is hydrogen, or a substituent, such as alkyl, acyl, aralkyl, aryl, heteroaralkyl, heteroaryl, cycloalkyl, or (cycloalkyl)alkyl; preferably lower alkyl, lower acyl or lower aralkyl;

$R_1$ is hydrogen or -CO-Aaa;

Aaa represents an amino acid residue;

$R_2$ is a side chain of an amino acid, hydrogen, alkyl, alkenyl, alkynyl, cycloalkyl, heterocyclyl, heterocyclylalkyl, heteroaralkyl, aralkyl, heteroaryl or aryl, each optionally substituted by one or more substituents selected from carboxylate, carboxylic acid, carboxylic acid ester, thiocarboxylate, thio acid, amido, amino, heterocyclyl, hydroxyl, cycloalkyl, aryl, aryl-COOH, heteroaryl, guanidino, amidino, -SH and -S(alkyl), optionally wherein two or three carbon atoms of the alkyl, alkenyl or alkynyl form part of a 3-7-membered carbocyclic or heterocyclic ring, (such as a cyclobutyl or oxirane ring) which is optionally substituted with 1 to 4 substituents, each independently selected from alkyl, alkoxy, carboxylic acid, carboxylate, and hydroxyl;

each of $R_4$ and $R_5$ independently is hydrogen or absent; and

$R_7$ represents 0-4 substituents on the ring to which it is attached, wherein each substituent is independently selected from alkyl, aralkyl, aryl, alkoxy, heteroaralkyl, heteroaryl, halo, cycloalkyl, (cycloalkyl)alkyl, amino, -C(O)OH, hydroxyl, hydroxyalkyl, alkoxyalkyl and acyl; preferably lower alkyl, lower acyl or lower aralkyl; or two $R_7$ groups attached to the same carbon atom together represent an oxo (=O), or thioxo (=S);

18. The compound of claim 17, wherein X is O and each dotted line [----] represents a bond.

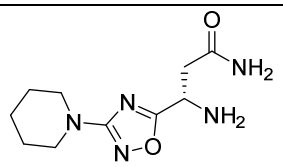
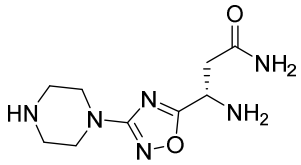
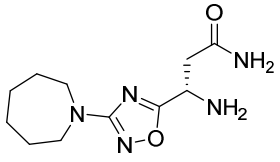
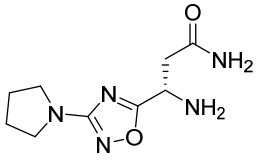
19. The compound of claim 17 or 18, wherein $R_1$ is -CO-Aaa.

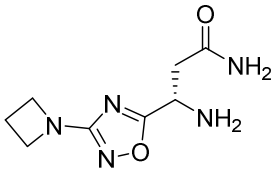
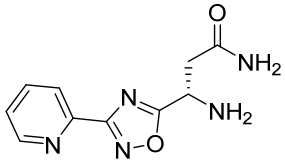
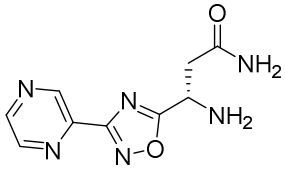
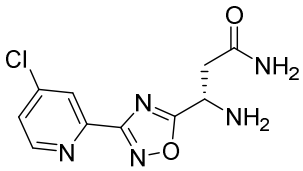
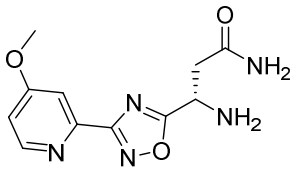
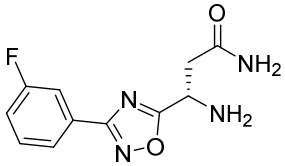
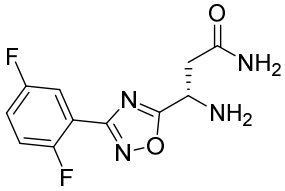
20. The compound of any one of claims 17 to 19, wherein Aaa represents an amino acid residue, wherein the amino acid residue comprises a side chain that includes an -OH, -O-acyl, -SH, $-NH_2$, -NH(alkyl), or -S(alkyl) moiety.

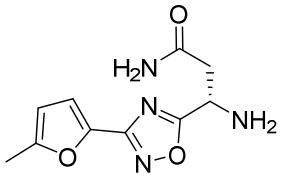
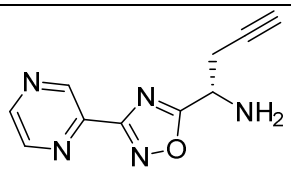
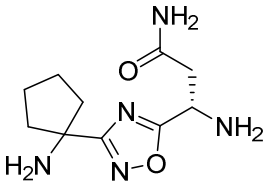
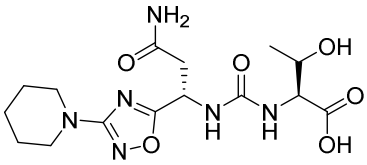
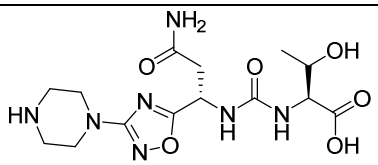
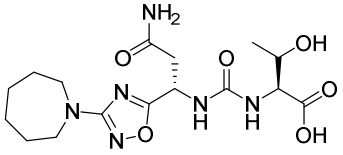
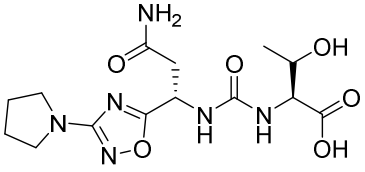
21. The compound of any one of claims 17 to 20, wherein $R_2$ represents ($C_1$-$C_6$)alkyl, ($C_2$-$C_6$)alkenyl or ($C_2$-$C_6$)alkynyl, substituted by one or more substituents selected from carboxylate, carboxylic acid, carboxylic acid ester, thiocarboxylate, thio acid, amido, amino and heterocyclyl, preferably from lower alkyl, lower acyl or lower aralkyl, optionally wherein two or three carbon atoms of the ($C_1$-$C_6$)alkyl, ($C_2$-$C_6$)alkenyl or ($C_2$-$C_6$)alkynyl form part of a 3-7-membered carbocyclic or heterocyclic ring (such as a cyclobutyl or oxirane ring).

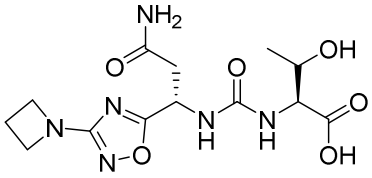
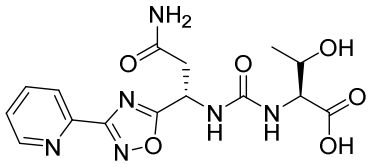
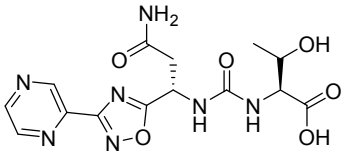
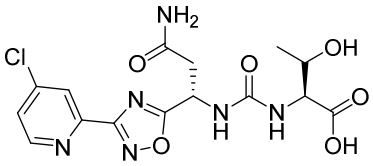
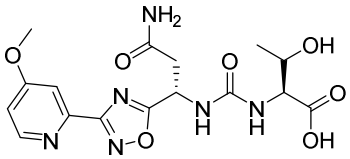
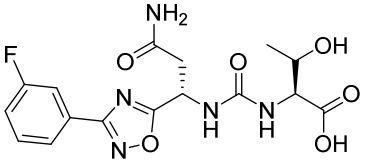
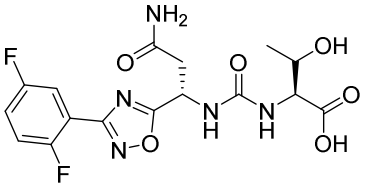
22. The compound of any one of claims 17 to 21, wherein $R_7$ represents 0-4 substituents on the ring to which it is attached, wherein each substituent is independently selected from alkyl, aralkyl, aryl, alkoxy, heteroaralkyl, heteroaryl, halo, cycloalkyl, (cycloalkyl)alkyl, amino, hydroxyl, hydroxyalkyl, alkoxyalkyl, and acyl preferably lower alkyl, lower acyl or lower aralkyl.

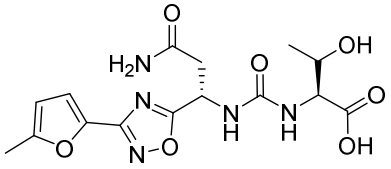
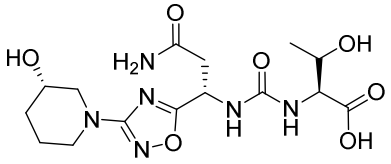
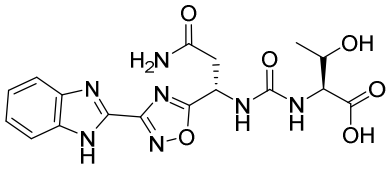
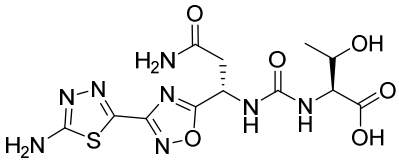
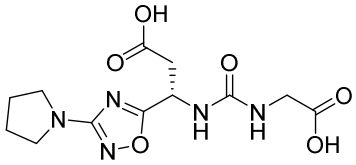
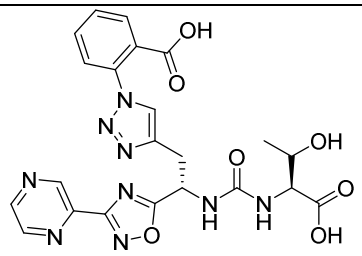
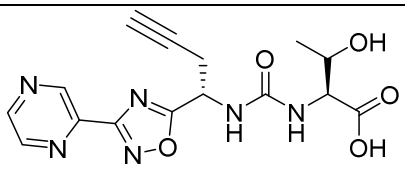
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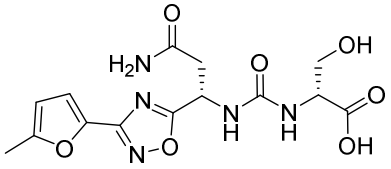
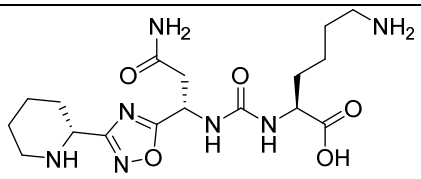
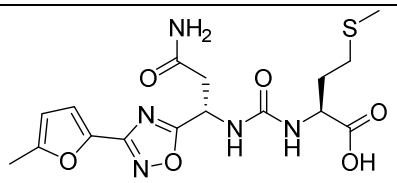
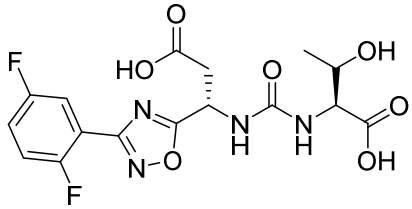
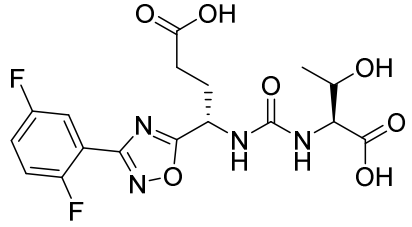
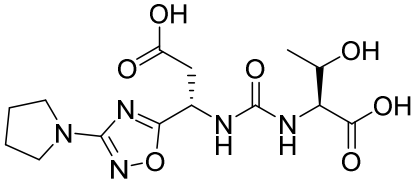
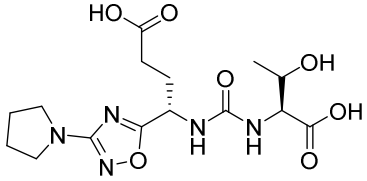
| **Compound No.** | **Structure** |
|---|---|
| 1 |  |
| 2 |  |
| 3 |  |
| 4 |  |

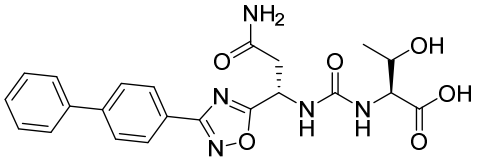
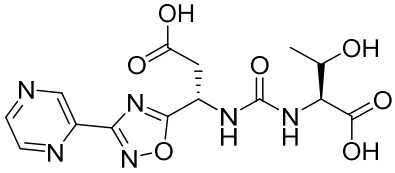
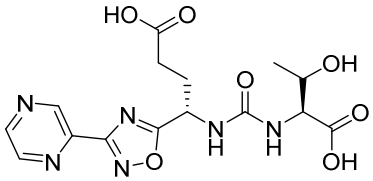
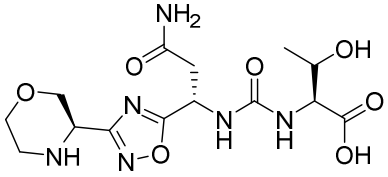
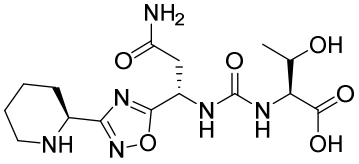
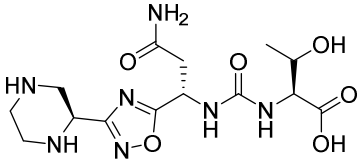
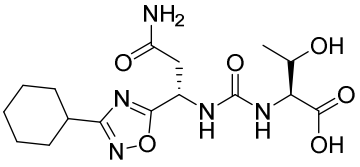
| Compound No. | Structure |
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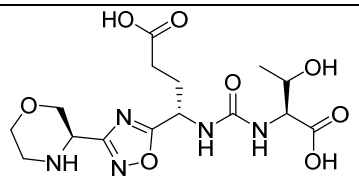
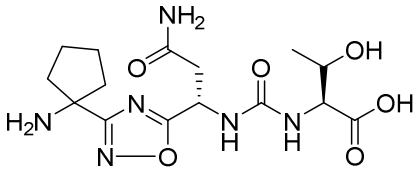
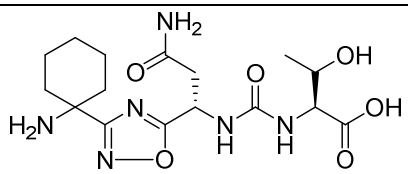
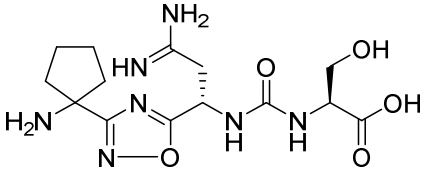
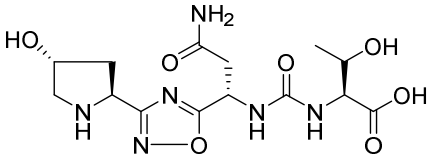
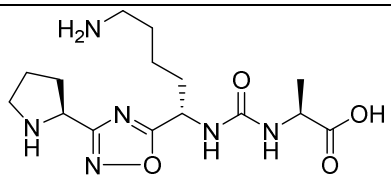
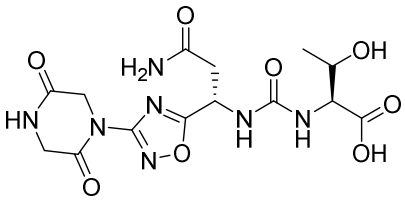
| Compound No. | Structure |
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| 18 |  |

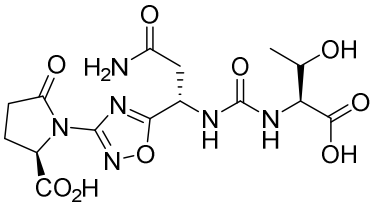
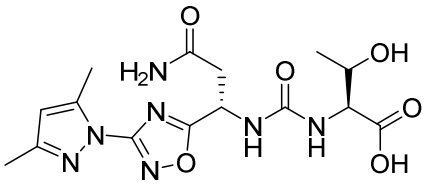
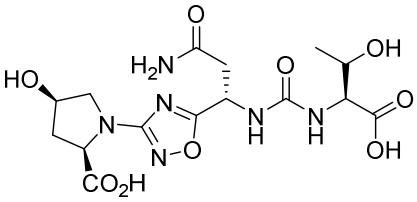
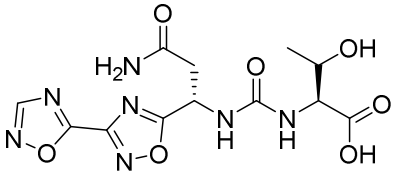
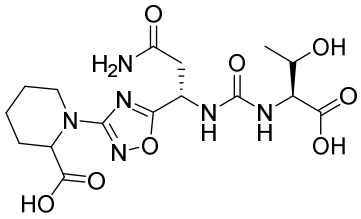
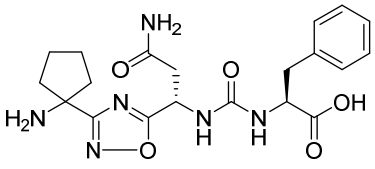
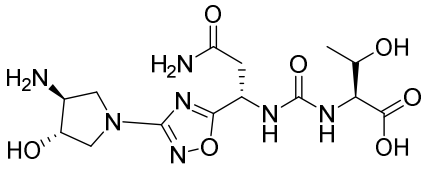
| Compound No. | Structure |
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| 25 |  |

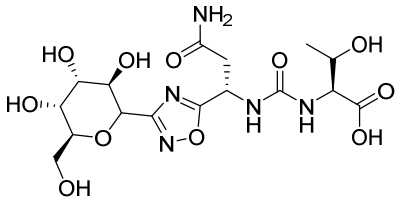
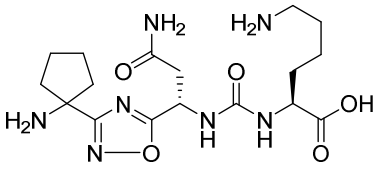
| Compound No. | Structure |
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| Compound No. | Structure |
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| Compound No. | Structure |
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| 40 |  |
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| Compound No. | Structure |
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| 47 |  |
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| Compound No. | Structure |
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| Compound No. | Structure |
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| 61 |  and |
| 62 |  |

or a pharmaceutically acceptable salt thereof or a stereoisomer thereof.

24. A pharmaceutical composition comprising a compound of any one of claims 1 to 23 and a pharmaceutically acceptable carrier.

25. Use of a compound of any one of claims 1 to 23 in the manufacture of a medicament for the treatment of cancer.

26. The use of claim 25, wherein the cancer is selected from lung cancer, breast cancer, colon cancer, renal cancer, bladder cancer, thyroid cancer, prostate cancer, osteosarcoma, and Hodgkin's lymphoma.

27. Use of a compound of any one of claims 1 to 23 in the manufacture of a medicament for the treatment of a bacterial infection, a viral infection, a fungal infection, or an immunological condition.