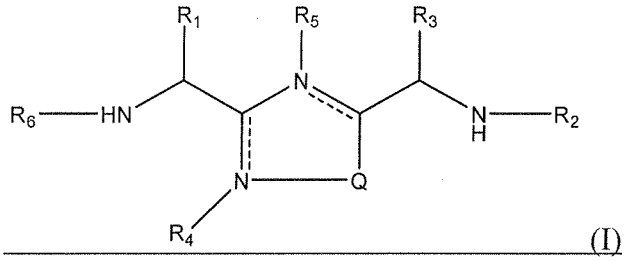
CLAIMS

1. A compound of formula (I)



(I)

wherein,

Q is S or O;

R_1 represents a side chain of an amino acid residue Ser or Thr, optionally substituted with alkyl or acyl;

R_2 is hydrogen or –CO-Aaa;

Aaa is an amino acid residue Thr or Ser; wherein the C-terminus thereof is a free terminus, is amidated, or is esterified;

R_3 represents a side chain of an amino acid residue selected from Asn, Asp, Gln, or Glu;

----- is an optional bond;

R_4 and R_5 independently are hydrogen or absent;

R_6 is hydrogen, alkyl, or acyl;

or a pharmaceutically acceptable salt thereof.

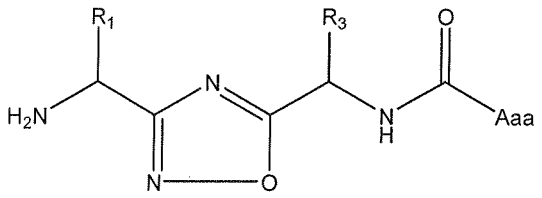
2. The compound according to claim 1, wherein Q is O.

3. The compound according to claim 1 or 2, wherein R_6 is H.

4. The compound according to claim 1 or 2, wherein R_6 is $-C(O)CH_3$, $-C(O)CH_2CH_3$, $-C(O)(CH_2)_2CH_3$, $-C(O)(CH_2)_3CH_3$, $-C(O)(CH_2)_4CH_3$ or $-C(O)(CH_2)_5CH_3$.

5. The compound according to any one of claims 1 to 4, wherein R_2 is –CO-Aaa.

6. The compound according to claim 1, wherein the compound of formula (I) is a compound of formula (IA):



(IA)

or a pharmaceutically acceptable salt thereof; wherein,

R_1 represents a side chain of the amino acid residue Ser or Thr, optionally substituted with alkyl or acyl;

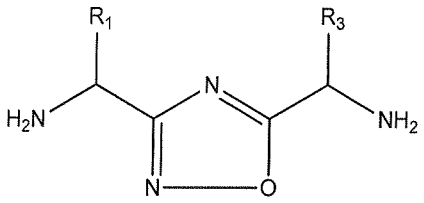
R_3 represents a side chain of the amino acid residue selected from Asn, Asp, Gln, or Glu; and

Aaa is an amino acid residue Thr or Ser; wherein the C-terminus thereof is a free terminus, is amidated, or is esterified.

7. The compound according to any one of claims 1 to 6, wherein

Aaa is the amino acid residue Thr or Ser; wherein the C-terminus is a free terminus.

8. The compound according to claim 1, wherein the compound of formula (I) is a compound of formula (IB):



(IB)

or a pharmaceutically acceptable salt thereof; wherein,

R_1 represents a side chain of an amino acid residue Ser or Thr, optionally substituted with alkyl or acyl; and

R_3 represents the side chain of the amino acid residue selected from Asn, Asp, Gln, or Glu.

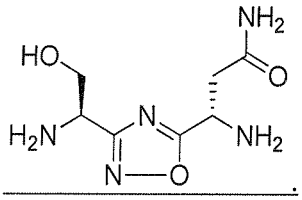
9. The compound according to any one of claims 1 to 8, wherein:

R_1 represents the side chain of the amino acid residue Ser or Thr.

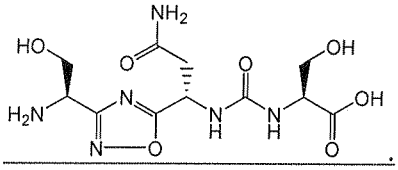
10. The compound according to any one of claims 1 to 8, wherein R_1 is substituted with $C_{1\text{-}5}$ alkyl.

11. The compound according to any one of claims 1 to 11, wherein R_3 represents the side chain of the amino acid residue Asn or Gln.

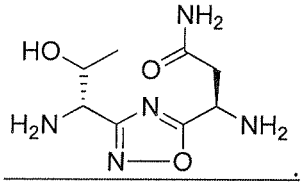
12. The compound according to claim 1, having the following structure:



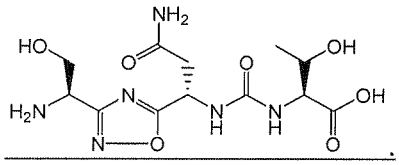
13. The compound according to claim 1, having the following structure:



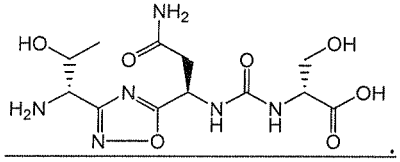
14. The compound according to claim 1, having the following structure:



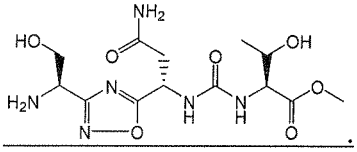
15. The compound according to claim 1, having the following structure:



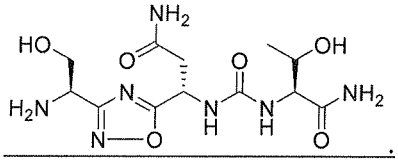
16. The compound according to claim 1, having the following structure:



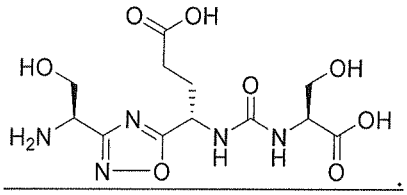
17. The compound according to claim 1, having the following structure:



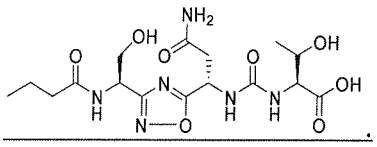
18. The compound according to claim 1, having the following structure:



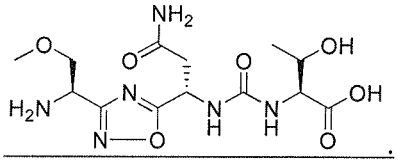
19. The compound according to claim 1, having the following structure:



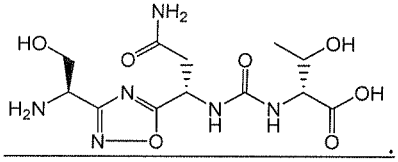
20. The compound according to claim 1, having the following structure:



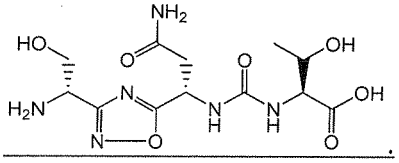
21. The compound according to claim 1, having the following structure:



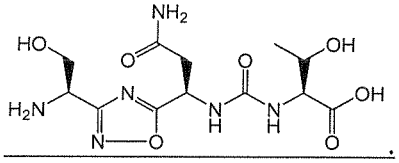
22. The compound according to claim 1, having the following structure:



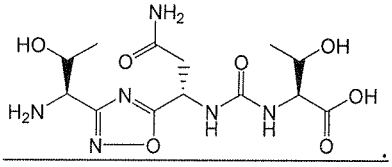
23. The compound according to claim 1, having the following structure:



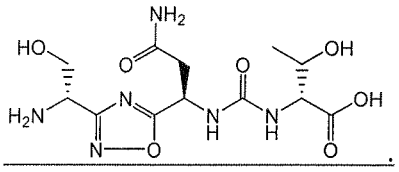
24. The compound according to claim 1, having the following structure:



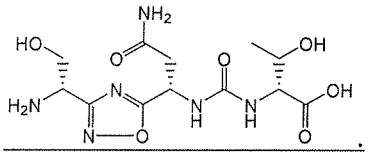
25. The compound according to claim 1, having the following structure:



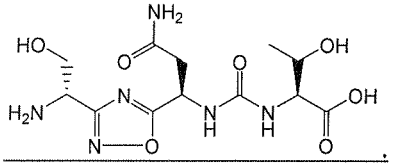
26. The compound according to claim 1, having the following structure:



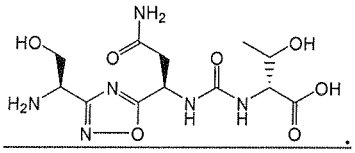
27. The compound according to claim 1, having the following structure:



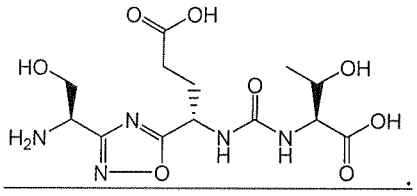
28. The compound according to claim 1, having the following structure:



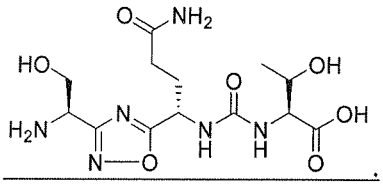
29. The compound according to claim 1, having the following structure:



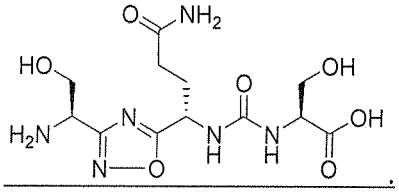
30. The compound according to claim 1, having the following structure:



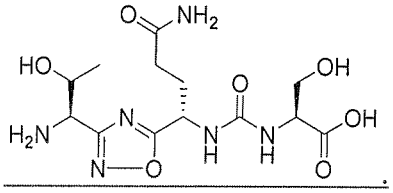
31. The compound according to claim 1, having the following structure:



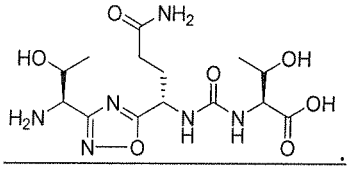
32. The compound according to claim 1, having the following structure:



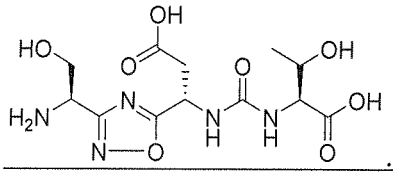
33. The compound according to claim 1, having the following structure:



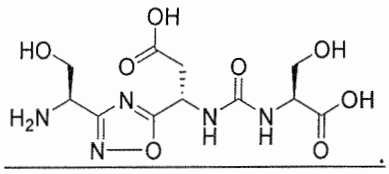
34. The compound according to claim 1, having the following structure:



35. The compound according to claim 1, having the following structure:



36. The compound according to claim 1, having the following structure:



37. A pharmaceutical composition comprising a pharmaceutically acceptable carrier or excipient and at least one compound according to any one of claims 1 to 36 or a pharmaceutically acceptable salt thereof.

38. The pharmaceutical composition according to claim 37, further comprising at least one agent selected from an anticancer agent, a chemotherapy agent, and an antiproliferative compound.

39. Use of a compound according to any one of claims 1 to 36 or a pharmaceutically acceptable salt thereof, for the manufacture of a medicament for modulating an immune response mediated by PD-1 signaling pathway.

40. Use of a compound according to any one of claims 1 to 36 or a pharmaceutically acceptable salt thereof, for the manufacture of a medicament for the treatment of cancer.

41. Use according to claim 40, wherein the cancer is selected from breast cancer, colon cancer, lung cancer, melanoma, prostate cancer, and renal cancer.

42. Use according to claim 40, wherein the cancer is selected from bone cancer, cancer of the head or neck, pancreatic cancer, skin cancer, cutaneous or intraocular malignant melanoma, carcinoma of the endometrium, carcinoma of the cervix, carcinoma of the vagina, carcinoma of the vulva, Hodgkin's Disease, non-Hodgkin's lymphoma, cancer of the esophagus, cancer of the small intestine, cancer of the endocrine system, cancer of the thyroid gland, cancer of the parathyroid gland, cancer of the adrenal gland, sarcoma of soft tissue, cancer of the urethra, cancer of the penis,

chronic or acute leukemias including acute myeloid leukemia, chronic myeloid leukemia, acute lymphoblastic leukemia, chronic lymphocytic leukemia, solid tumors of childhood, lymphocytic lymphoma, cancer of the bladder, cancer of the kidney or ureter, carcinoma of the renal pelvis, neoplasm of the central nervous system (CNS), primary CNS lymphoma, tumor angiogenesis, spinal axis tumor, brain stem glioma, pituitary adenoma, Kaposi's sarcoma, epidermoid cancer, squamous cell cancer, T-cell lymphoma, environmentally induced cancers including those induced by asbestos, and combinations of said cancers.

43. Use of a compound according to any one of claims 1 to 36 or a pharmaceutically acceptable salt thereof, for the manufacture of a medicament for the treatment of infectious disease.

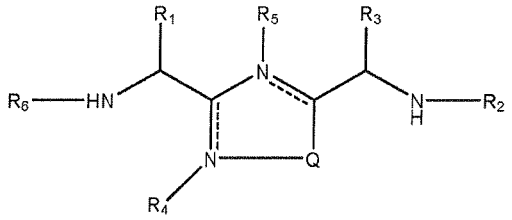
44. Use of a compound according to any one of claims 1 to 36 or a pharmaceutically acceptable salt thereof, for the manufacture of a medicament for the treatment of a bacterial infectious disease, a viral infectious disease or a fungal infectious disease.

45. Use according to claim 43, wherein the infectious disease is selected from HIV, Influenza, Herpes, *Giardia*, Malaria, *Leishmania*, the pathogenic infection by the virus Hepatitis (A, B, & C), herpes virus (e.g., VZV, HSV-I, HAV-6, HSV-II, and CMV, Epstein Barr virus), adenovirus, influenza virus, flaviviruses, echovirus, rhinovirus, coxsackie virus, cornovirus, respiratory syncytial virus, mumps virus, rotavirus, measles virus, rubella virus, parvovirus, vaccinia virus, HTLV virus, dengue virus, papillomavirus, molluscum virus, poliovirus, rabies virus, JC virus and arboviral encephalitis virus, pathogenic infection by the bacteria *chlamydia*, rickettsial bacteria, mycobacteria, staphylococci, streptococci, pneumonococci, meningococci and conococci, *klebsiella, proteus, serratia, pseudomonas, E. coli, legionella*, diphtheria, *salmonella*, bacilli, cholera, tetanus, botulism, anthrax, plague, leptospirosis, and Lyme's disease bacteria, pathogenic infection by the fungi *Candida* (*albicans, krusei, glabrata, tropicalis*, etc.), *Cryptococcus neoformans, Aspergillus* (*fumigatus, niger,*

etc.), Genus *Mucorales (mucor, absidia, rhizophus), Sporothrix schenkii, Blastomyces dermatitidis, Paracoccidioides brasiliensis, Coccidioides immitis* and *Histoplasma capsulatum*, and pathogenic infection by the parasites *Entamoeba histolytica, Balantidium coli, Naegleria fowleri, Acanthamoeba* sp., *Giardia lambia, Cryptosporidium* sp., *Pneumocystis carinii, Plasmodium vivax, Babesia microti, Trypanosoma brucei, Trypanosoma cruzi, Leishmania donovani, Toxoplasma gondi*, or *Nippostrongylus brasiliensis*.

We claim:

1. A compound of formula (I)



wherein,

Q is S or O;

R_1 is side chain of an amino acid Ser or Thr, optionally substituted with alkyl or acyl;

R_2 is hydrogen or –CO-Aaa;

Aaa is an amino acid residue Thr or Ser; wherein a C-terminus thereof is a free terminus, is amidated or is esterified;

R_3 is side chain of an amino acid selected from Asn, Asp, Gln or Glu;

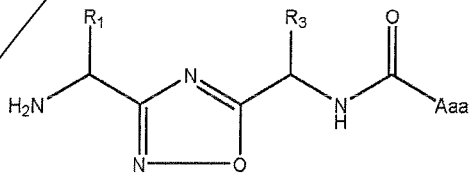
----- is an optional bond;

R_4 and R_5 independently are hydrogen or absent;

R_6 is selected from hydrogen, alkyl or acyl;

or a pharmaceutically acceptable salt or a stereoisomer thereof.

2. The compound according to claim 1, wherein the compound of formula (I) is a compound of formula (IA):



(IA)

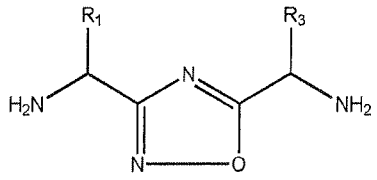
or a pharmaceutically acceptable salt or a stereoisomer thereof; wherein,

R_1 is side chain of an amino acid Ser or Thr, optionally substituted with alkyl or acyl;

R_3 is side chain of an amino acid selected from Asn, Asp, Gln or Glu;

Aaa is an amino acid residue Thr or Ser; wherein a C-terminus thereof is a free terminus, is amidated or is esterified.

3. The compound according to claim 1, wherein the compound of formula (I) is a compound of formula (IB):



(IB)

or a pharmaceutically acceptable salt or a stereoisomer thereof; wherein,

R_1 is side chain of an amino acid Ser or Thr, optionally substituted with alkyl or acyl;

R_3 is side chain of an amino acid selected from Asn, Asp, Gln or Glu.

4. The compound according to claim 1, wherein

R_1 is side chain of Ser or Thr;

R_2 is –CO-Aaa;

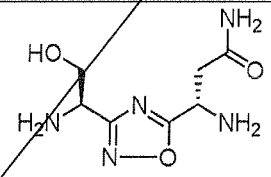
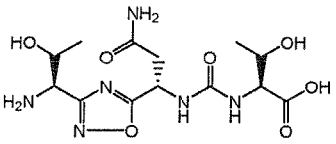
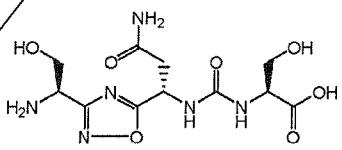
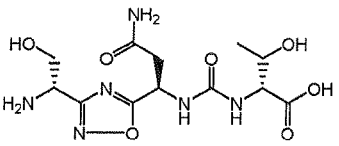
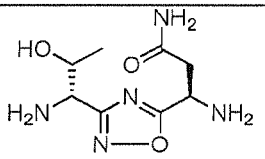
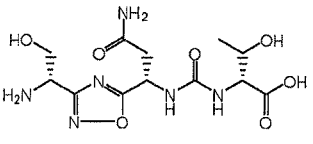
Aaa is an amino acid residue Thr or Ser; wherein the C-terminus is free;

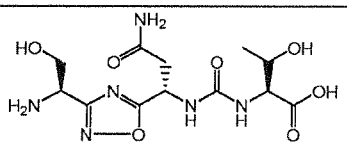
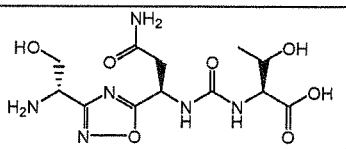
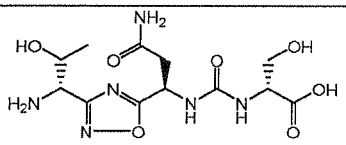
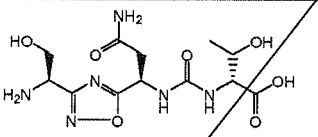
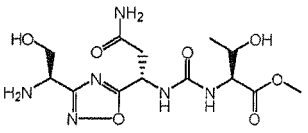
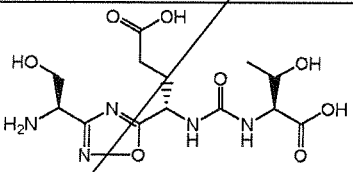
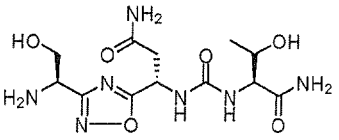
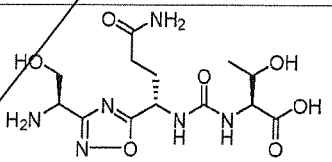
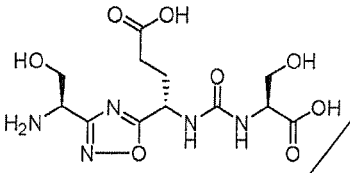
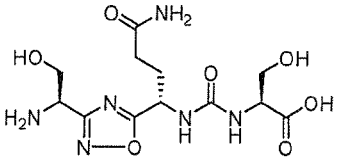
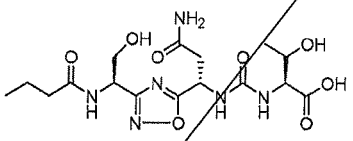
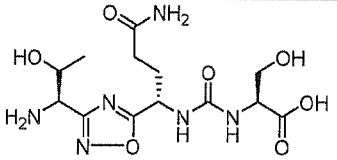
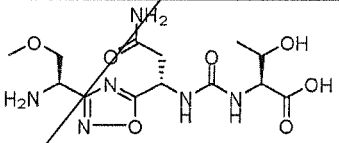
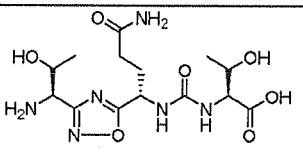
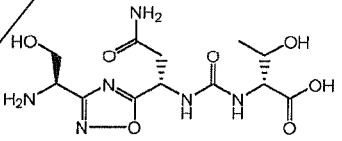
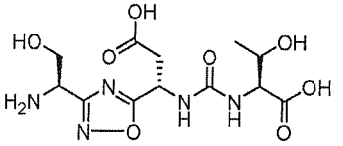
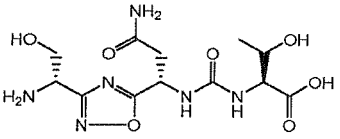
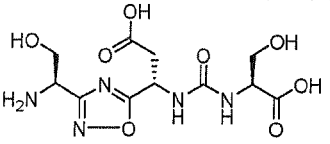
R_3 is side chain of Asn or Glu.

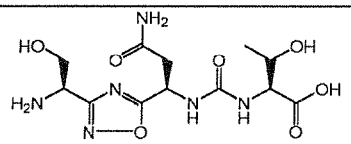
5. The compound according to claim 1, wherein Q is O.

6. The compound according to claim 1, wherein R_6 is $-C(O)CH_3$, $-C(O)CH_2CH_3$, $-C(O)(CH_2)_2CH_3$, $-C(O)(CH_2)_3CH_3$, $-C(O)(CH_2)_4CH_3$ or $-C(O)(CH_2)_5CH_3$.

7. A compound according to claim 1 is selected from the group consisting of

Compound No.	Structure	Compound No.	Structure
1.		14.	
2.		15.	
3.		16.	

4.		17.	
5.		18.	
6.		19.	
7.		20.	
8.		21.	
9.		22.	
10.		23.	
11.		24.	 and
12.		25.	

13.			

or a pharmaceutically acceptable salt or a stereoisomer thereof.

8. A pharmaceutical composition comprising at least one compound according to any one of claims 1 to 7 or a pharmaceutically acceptable salt or a stereoisomer thereof, and a pharmaceutically acceptable carrier or excipient.

9. The pharmaceutical composition according to claim 8 further comprising at least one of an anticancer agent, chemotherapy agent, or antiproliferative compound.

10. A compound according to any one of claims 1 to 7, or a pharmaceutically acceptable salt or a stereoisomer thereof, for use as a medicament.

11. A compound according to any one of claims 1 to 7, or a pharmaceutically acceptable salt or a stereoisomer thereof, for use as a medicament for the treatment of cancer or infectious disease.

12. The compound for use according to claim 11, wherein the cancer is selected from the group consisting of breast cancer, colon cancer, lung cancer, melanoma, prostate cancer and renal cancer, bone cancer, cancer of the head or neck, pancreatic cancer, skin cancer, cutaneous or intraocular malignant melanoma, uterine cancer, ovarian cancer, rectal cancer, cancer of the anal region, stomach cancer, testicular cancer, uterine cancer, carcinoma of the fallopian tubes, carcinoma of the endometrium, carcinoma of the cervix, carcinoma of the vagina, carcinoma of the vulva, Hodgkin's Disease, non-Hodgkin's lymphoma, cancer of the esophagus, cancer of the small intestine, cancer of the endocrine system, cancer of the thyroid gland, cancer of the parathyroid gland, cancer of the adrenal gland, sarcoma of soft tissue, cancer of the urethra, cancer of the penis, chronic or acute leukemias including acute myeloid leukemia, chronic myeloid leukemia, acute lymphoblastic leukemia, chronic lymphocytic leukemia, solid tumours of childhood, lymphocytic lymphoma, cancer of the bladder, cancer of the kidney or ureter, carcinoma of the renal pelvis, neoplasm of the central nervous system (CNS), primary CNS lymphoma, tumour angiogenesis, spinal axis tumour, brain stem glioma, pituitary adenoma, Kaposi's sarcoma, epidermoid cancer, squamous cell cancer, T-cell lymphoma, environmentally induced cancers including those induced by asbestos, and combinations of said cancers.

13. The compound for use according to claim 11, wherein the cancer is breast cancer, colon cancer, lung cancer, melanoma, prostate cancer and renal cancer.

14. The compound for use according to claim 11, wherein the infectious disease is a bacterial infectious disease, a viral infectious disease or a fungal infectious disease.