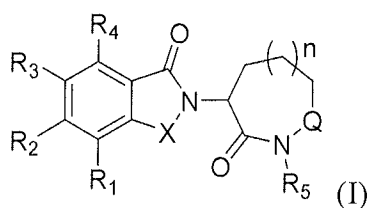


Claims

1. A compound of Formula (I):



or a pharmaceutically acceptable salt thereof, wherein:

R₁ is halogen, nitro, optionally substituted amino, optionally substituted C₁ to C₆ alkoxy, optionally substituted C₁ to C₆ alkyl, or optionally substituted C₃ to C₈ carbocyclyl;

R₂, R₃, and R₄, are each independently H, halogen, nitro, optionally substituted amino, optionally substituted C₁ to C₆ alkoxy, optionally substituted C₁ to C₆ alkyl, or optionally substituted C₃ to C₈ carbocyclyl;

R₅ is H or C₁ to C₆ alkyl;

X is CH₂, or C=O;

Q is CH₂, or C=O; and

n is 1;

wherein an optionally substituted substituent may be substituted with one or more groups selected from alkyl, alkenyl, alkynyl, cycloalkyl, cycloalkenyl, cycloalkynyl, aryl, heteroaryl, heteroalicyclyl, aralkyl, heteroaralkyl, (heteroalicyclyl)alkyl, hydroxy, protected hydroxyl, alkoxy, aryloxy, acyl, mercapto, alkylthio, arylthio, cyano, halogen, thiocarbonyl, O-carbamyl, N-carbamyl, O-thiocarbamyl, N-thiocarbamyl, C-amido, N-amido, S-sulfonamido, N-sulfonamido, C-carboxy, protected C-carboxy, O-carboxy, isocyanato, thiocyanato, isothiocyanato, nitro, silyl, sulfenyl, sulfinyl, sulfonyl, haloalkyl, haloalkoxy, trihalomethanesulfonyl, trihalomethanesulfonamido, amino, mono-substituted amino and di-substituted amino.

2. The compound or the pharmaceutically acceptable salt of Claim 1, wherein Q is CH₂.

3. The compound or the pharmaceutically acceptable salt of Claim 1, wherein Q is C=O.

4. The compound or the pharmaceutically acceptable salt of any one of Claims 1-3, wherein R₅ is H.

5. The compound or the pharmaceutically acceptable salt of any one of Claims 1-4, wherein X is CH₂.

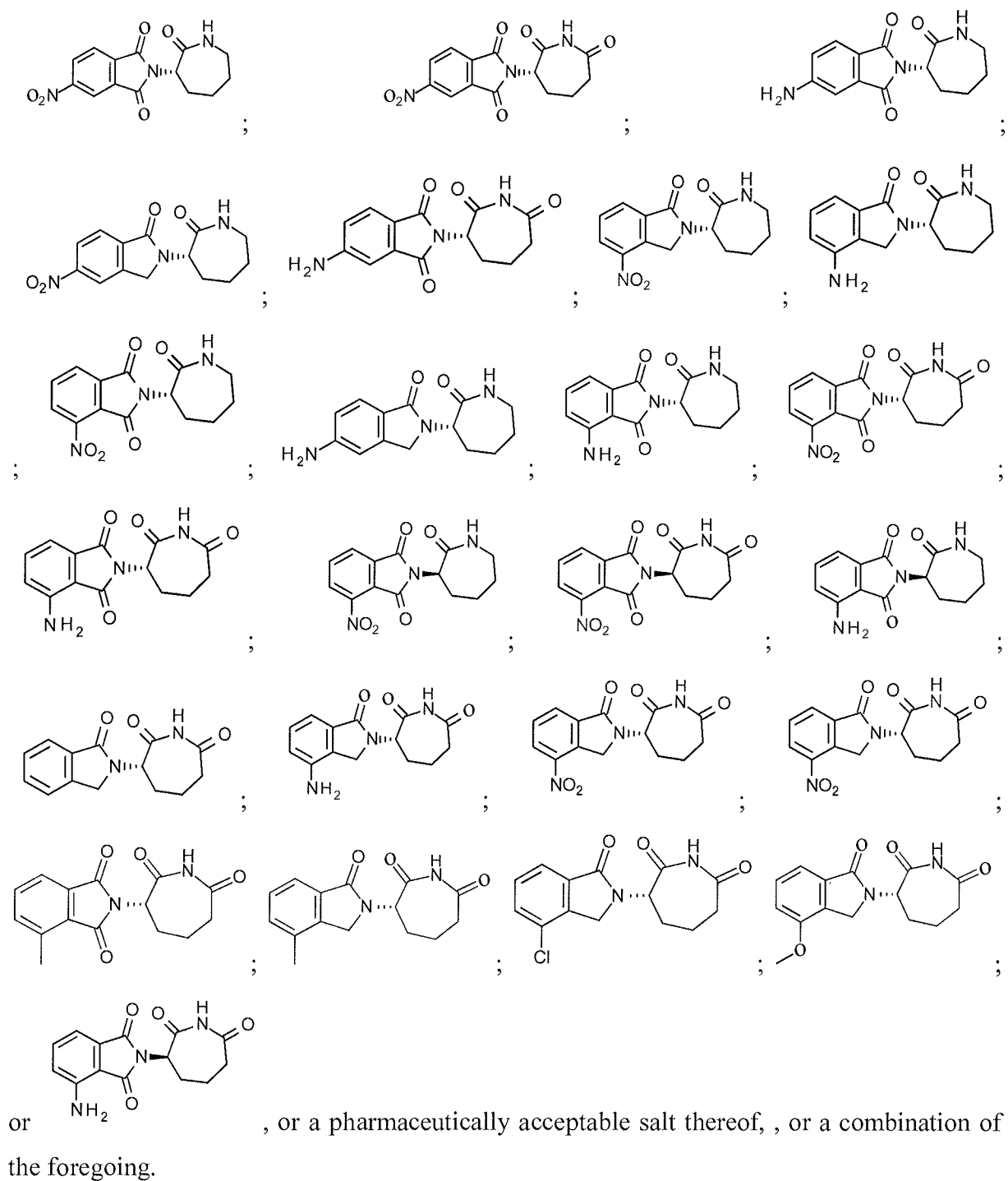
6. The compound or the pharmaceutically acceptable salt of any one of Claims 1-4, wherein X is C=O.

7. The compound or the pharmaceutically acceptable salt of any one of Claims 1-6, wherein R₁ is NH₂.
8. The compound or the pharmaceutically acceptable salt of any one of Claims 1-6, wherein R₁ is NO₂.
9. The compound or the pharmaceutically acceptable salt of any one of Claims 1-6, wherein R₁ is C₁ to C₆ alkyl.
10. The compound or the pharmaceutically acceptable salt of Claim 9, wherein R₁ is CH₃.
11. The compound or the pharmaceutically acceptable salt of any one of Claims 1-6, wherein R₁ is halogen.
12. The compound or the pharmaceutically acceptable salt of Claim 11, wherein R₁ is chloro.
13. The compound or the pharmaceutically acceptable salt of any one of Claims 1-6, wherein R₁ is C₁ to C₆ alkoxy.
14. The compound or the pharmaceutically acceptable salt of Claim 13, wherein R₁ is methoxy.
15. The compound or the pharmaceutically acceptable salt of any one of Claims 1-14, wherein R₂ is NH₂.
16. The compound or the pharmaceutically acceptable salt of any one of Claims 1-14, wherein R₂ is NO₂.
17. The compound or the pharmaceutically acceptable salt of any one of Claims 1-14, wherein R₂ is H.
18. The compound or the pharmaceutically acceptable salt of any one of Claims 1-17, wherein R₃ is H.
19. The compound or the pharmaceutically acceptable salt of any one of Claims 1-17, wherein R₃ is halogen.
20. The compound or the pharmaceutically acceptable salt of any one of Claims 1-19, wherein R₄ is H.
21. The compound or the pharmaceutically acceptable salt of any one of Claims 1-19, wherein R₄ is C₁ to C₆ alkyl.
22. The compound or the pharmaceutically acceptable salt of any one of Claims 1-21, wherein the compound of Formula (I) is present in a form of a racemic mixture.

23. The compound or the pharmaceutically acceptable salt of any one of Claims 1-21, wherein the compound of Formula (I) has an S-configuration.

24. The compound or the pharmaceutically acceptable salt of any one of Claims 1-21, wherein the compound of Formula (I) has an R-configuration.

25. A compound that is:



26. A pharmaceutical composition comprising the compound defined in any one of Claims 1-25, or a pharmaceutically acceptable salt thereof, and at least one pharmaceutically acceptable carrier.

27. The pharmaceutical composition of Claim 26, wherein the composition is formulated for oral, parenteral, topical, ophthalmic, inhalation, nasal, or intravenous administration.

28. The pharmaceutical composition of Claim 26 or 27, wherein the pharmaceutical composition further comprises a second therapeutic agent.

29. The pharmaceutical composition of Claim 28, wherein the second therapeutic agent is an anti-inflammatory agent, anti-cancer agent, immunostimulatory agent, or immunosuppressive agent.

30. The pharmaceutical composition of Claim 29, wherein the second therapeutic agent is an anti-cancer agent.

31. Use of the compound defined in any one of Claims 1-25, or a pharmaceutically acceptable salt thereof, or the pharmaceutical composition defined in any one of Claims 26-30, in the preparation of a medicament for treating, ameliorating, or preventing a cancer associated with one or more cytokines, the one or more cytokines being (i) IL-1- β , (ii) IL-6, (iii) TNF- α , (iv) IL-2, or (v) a combination of at least two of (i) to (iv).

32. Use of a compound defined in any one of Claims 1-25, or a pharmaceutically acceptable salt thereof, or the pharmaceutical composition defined in any one of Claims 26-30, for treating, ameliorating, or preventing a cancer associated with one or more cytokines, the one or more cytokines being (i) IL-1- β , (ii) IL-6, (iii) TNF- α , (iv) IL-2, or (v) a combination of at least two of (i) to (iv).

33. Use of the compound defined in any one of Claims 1-25, or a pharmaceutically acceptable salt thereof, or the pharmaceutical composition defined in any one of Claims 26-30, in the preparation of a medicament for inhibiting one or more cytokine activities, wherein the one or more cytokine is (i) IL-1- β , (ii) IL-6, (iii) TNF- α , or (iv) a combination of at least two of (i) to (iii).

34. Use of the compound defined in any one of Claims 1-25, or a pharmaceutically acceptable salt thereof, or the pharmaceutical composition defined in any one of Claims 26-30, for inhibiting one or more cytokine activities, wherein the one or more cytokine is (i) IL-1- β , (ii) IL-6, (iii) TNF- α , or (iv) a combination of at least two of (i) to (iii).

35. Use of the compound defined in any one of Claims 1 to 25, or a pharmaceutically acceptable salt thereof, or the pharmaceutical composition defined in any one

of Claims 26-30, in the preparation of a medicament for inducing cytokine activity, wherein the cytokine is IL-2.

36. Use of the compound defined in any one of Claims 1 to 25, or a pharmaceutically acceptable salt thereof, or the pharmaceutical composition defined in any one of Claims 26-30, for inducing cytokine activity, wherein the cytokine is IL-2.

37. Use of the compound defined in any one of Claims 1 to 25, or a pharmaceutically acceptable salt thereof, or the pharmaceutical composition defined in any one of Claims 26-30, in the preparation of a medicament for treating, ameliorating, or preventing a cancer associated with protein malfunction, wherein the protein is casein kinase 1.

38. Use of the compound defined in any one of Claims 1 to 25, or a pharmaceutically acceptable salt thereof, or the pharmaceutical composition defined in any one of Claims 26-30, for treating, ameliorating, or preventing a cancer associated with protein malfunction, wherein the protein is casein kinase 1.

39. The use of any one of Claims 31, 32, 37 and 38, wherein the cancer is leukemia; lymphoma, bladder cancer, bone cancer, stomach cancer, colorectal cancer, brain cancer, breast cancer, cervical cancer, sarcoma, ocular cancer, oral cancer, renal cancer, liver cancer, lung cancer, non-small cell lung cancer, metastatic cancer, melanoma, mesothelioma, ovarian cancer, pancreatic cancer, prostate cancer, skin cancer, testicular cancer, throat cancer, thyroid cancer, or uterine cancer.

40. The use of Claim 39, wherein the cancer is known to possess wild-type p53.

41. The use of Claim 39 or 40, wherein the cancer is known to possess aberrant casein kinase 1.