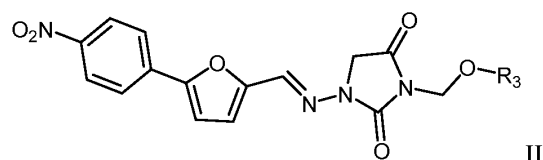
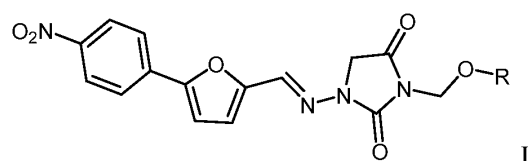


What is claimed:

1. A method of treating a subject that has been or will be exposed to radiation comprising administering to the subject a pharmaceutical composition comprising a therapeutically effective amount of dantrolene, a compound of formula I, a compound of formula II, or a pharmaceutically acceptable salt thereof, or a combination thereof



wherein R is -P(O)(OH)₂ or -P(O)(OR₁)(OR₂);

R₁ is H, -C₁₋₂₆alkyl, aryl, C₁₋₆alkC(O)O-C₁₋₂₆alkyl, -C₁alkOC(O)C₁₋₂₆alkyl, or C₁alkOC(O)OC₁₋₂₆alkyl; and

R₂ is -C₁₋₂₆alkyl, aryl, C₁₋₆alkC(O)O-C₁₋₂₆alkyl, -C₁alkOC(O)C₁₋₂₆alkyl, or C₁alkOC(O)OC₁₋₂₆alkyl;

R₃ is H, -C(O)-Z-N(R₄)(R₅), -C(O)Z-C(O)-OH, or -C(O)-NH-Y-CH₂-OC(O)-Z-C(O)-OH; Z is C₁₋₆alk; Y is arylene; C₁₋₆alkyl; R₅ is H or C₁₋₆alkyl; or R₄ and R₅, together with the nitrogen to which they are attached, form a heterocycloalkyl;

or a pharmaceutically acceptable salt thereof.

2. The method of claim 1, wherein R is -P(O)(OH)₂.
3. The method of claim 1, wherein R is P(O)(OR₁)(OR₂).
4. The method of claim 3, wherein R₁ is H.
5. The method of claim 3, wherein R₁ is -C₁₋₂₆alkyl.
6. The method of claim 3, wherein R₁ is aryl.

7. The method of claim 3, wherein R₁ is C₁₋₆alkC(O)O-C₁₋₂₆alkyl.
8. The method of claim 3, wherein R₁ is -C₁alkOC(O)C₁₋₂₆alkyl.
9. The method of claim 3, wherein R₁ is C₁alkOC(O)OC₁₋₂₆alkyl.
10. The method of any one of claims 4 to 9, wherein R₂ is -C₁₋₂₆alkyl, aryl.
11. The method of any one of claims 4 to 9, wherein R₂ is C₁₋₆alkC(O)O-C₁₋₂₆alkyl.
12. The method of any one of claims 4 to 9, wherein R₂ is -C₁alkOC(O)C₁₋₂₆alkyl.
13. The method of any one of claims 4 to 9, wherein R₂ is C₁alkOC(O)OC₁₋₂₆alkyl.
14. The method of any one of the preceding claims, wherein the dantrolene, the compound of formula I, and/or formula II is in the form of a pharmaceutically acceptable salt.
15. The method of any one of the preceding claims, wherein the subject is administered a pharmaceutical composition comprising dantrolene or a pharmaceutically acceptable salt thereof.
16. The method of any one of the preceding claims, wherein the subject is administered a pharmaceutical composition comprising a compound of formula I or a pharmaceutically acceptable salt thereof.
17. The method of any one of the preceding claims, wherein the subject is administered a pharmaceutical composition comprising a compound of formula II or a pharmaceutically acceptable salt thereof.
18. The method of any one of the preceding claims, wherein the subject has been or will be exposed to a radiation dose of between 0.3 Gy and 50 Gy.
19. The method of any one of the preceding claims, wherein the subject has been or will be exposed to a radiation dose of at least 0.7 Gy.
20. The method of any one of the preceding claims, wherein the subject has been or will be exposed to a radiation dose of at least 6 Gy, at least 10 Gy, or at least 50 Gy.

21. The method of any one of the preceding claims, wherein the radiation is X-ray radiation, gamma ray radiation, neutron radiation, or a combination thereof.
22. The method of any one of the preceding claims, wherein the radiation exposure is chemoradiation exposure.
23. The method of any one of claims 1 to 21, wherein the radiation exposure is nuclear power plant leakage exposure.
24. The method of any one of claims 1 to 21, wherein the radiation exposure is nuclear weapon exposure.
25. The method of any one of the preceding claims, wherein the pharmaceutical composition is administered to the subject 24 hours or less after the subject has been exposed to the radiation.
26. The method of any one of the preceding claims, wherein the subject is a mammal.
27. The method of any one of the preceding claims, wherein the subject is a human.
28. The method of any one of the preceding claims, wherein the therapeutically effective amount is 1 mg/kg to about 30 mg/kg of dantrolene.
29. The method of any one of the preceding claims, wherein the pharmaceutical composition is administered to the subject prior to the subject being exposed to the radiation.
30. The method of any one of the preceding claims, wherein the pharmaceutical composition is administered intravenously, subcutaneously, intramuscularly, intraosseously, or transdermally.
31. The method of any one of the preceding claims, wherein the pharmaceutical composition comprises dantrolene or a pharmaceutically acceptable salt thereof, mannitol, a polysorbate, a povidone, an optional pH adjustor, and water.

32. The method of any one of the preceding claims, wherein the treatment lowers the mortality of the subject as a result of the radiation exposure, as compared to a control subject that did not receive the treatment.
33. The method of any one of the preceding claims, wherein the treatment improves at least one hematological parameter of the subject, as compared to a control subject that did not receive the treatment.
34. The method of any one of the preceding claims, wherein the treatment is effective for treating hematopoietic syndrome occurring in the subject as a result of the radiation exposure.
35. The method of any one of the preceding claims, wherein the treatment is effective for treating gastrointestinal syndrome occurring in the subject as a result of the radiation exposure.
36. The method of any one of the preceding claims, wherein the treatment is effective for treating cardiovascular syndrome occurring in the subject as a result of the radiation exposure.
37. The method of any one of the preceding claims, wherein the treatment is effective for treating central nervous system syndrome occurring in the subject as a result of the radiation exposure.
38. The method of any one of the preceding claims, wherein the treatment is effective for treating anorexia, nausea, vomiting, cramps, or diarrhea occurring in the subject as a result of the radiation exposure.
39. The method of any one of the preceding claims, wherein the treatment is effective for treating cognitive changes or behavior changes occurring in the subject as a result of the radiation exposure.