CLAIMS

1. A pharmaceutical composition comprising miRNA146a-conjugated cerium oxide nanoparticles (CNPs), wherein the miRNA146a-conjugated cerium oxide nanoparticles (CNPs) are configured to synergistically reduce oxidative stress and inflammation.

2. The pharmaceutical composition of claim 1 for use in treating or preventing inflammation in a subject.

3. The pharmaceutical composition of claim 1 for use in treating or preventing oxidative stress in a subject.

4. Use of a pharmaceutical composition comprising microRNA-conjugated cerium oxide nanoparticles (CNPs) in the manufacture of a medicament for treating or preventing inflammation in a subject.

5. The pharmaceutical composition for use according to claim 2 or the use according to claim 4, wherein the inflammation is associated with a wound.

6. The pharmaceutical composition for use or the use according to claim 5, wherein the treating or preventing inflammation results in an increased rate of wound closure in the subject compared to the rate of wound closure in an untreated subject.

7. The pharmaceutical composition for use or the use according to claim 6, wherein the pharmaceutical composition is administered once.

8. Use of a pharmaceutical composition comprising microRNA-conjugated cerium oxide nanoparticles (CNPs) in the manufacture of a medicament for treating or preventing oxidative stress in a subject.

9. The pharmaceutical composition for use according to claim 3 or the use according to claim 8, wherein the oxidative stress is associated with a wound.

10. The pharmaceutical composition for use or the use according to claim 9, wherein the treating or preventing oxidative stress results in an increased rate of wound closure in the subject compared to the rate of wound closure in an untreated subject.

11. The pharmaceutical composition for use according to any one of claims 2, 3, 6 and 10 or the use according to any one of claims 4, 6, 8 and 10, wherein the subject is a diabetic subject.

12. The pharmaceutical composition for use or the use according to claim 6 or 10, wherein the pharmaceutical composition is topically administered to the wound.

13. The pharmaceutical composition for use or the use according to claim 6 or 10, wherein the pharmaceutical composition is administered a plurality of times.

14. The pharmaceutical composition for use or the use according to claim 6 or 10, wherein the pharmaceutical composition is administered daily to the wound.

15. The pharmaceutical composition for use according to claim 2 or 3 or the use according to claim 4 or 8, wherein the subject is diagnosed as having a myocardial infarction.

16. The pharmaceutical composition for use according to claim 2 or 3 or the use according to claim 4 or 8, wherein the inflammation or oxidative stress is associated with myocardial infarction.

17. The pharmaceutical composition for use or the use according to claim 16, wherein the treatment or prevention comprises reducing left ventricular end diastolic volume (LVEDV) in the subject relative to an untreated control.

18. The pharmaceutical composition for use or the use according to claim 16, wherein the pharmaceutical composition is administered by injection to the site of the infarction.

19. The pharmaceutical composition for use or the use according to claim 16, wherein the pharmaceutical composition is administered to the subject about 1 hour, about 2 hours, about 3 hours, about 4 hours, about 6 hours, about 8 hours, about 12 hours, about 18 hours, about 24 hours, or about 48 hours following cardiac infarction.

20. The pharmaceutical composition for use or the use according to claim 16, wherein the pharmaceutical composition is administered to the subject a plurality of times within the first week following cardiac infarction.

21. The pharmaceutical composition for use according to any one of claims 2, 5-7 and 11-20 or the use according to any one of claims 4 to 7 and 11-20, wherein the treatment or prevention comprises reducing the expression level of one or more of IL-6, IL-8, TRAF6, IRAK1, and NFκB in the subject relative to an untreated control.

22. The pharmaceutical composition for use according to any one of claims 2, 5-7 and 11-20 or the use according to any one of claims 4 to 7 and 11-20, wherein the treatment or prevention comprises reducing the expression level of one or more of TNF-a, IL-6, CD64, IDO, SOCS1, and CXCL10 in macrophages in a subject in need thereof relative to an untreated control.

23. The pharmaceutical composition for use according to any one of claims 2, 5-7 and 11-20 or the use according to any one of claims 4 to 7 and 11-20, wherein the

treatment or prevention comprises increasing the expression level of one or more of MMP-8, MRC1, TGM2, CD23, and CCL22 in macrophages in a subject in need thereof relative to an untreated control.

24. The pharmaceutical composition for use according to any one of claims 2, 5-7 and 11-20 or the use according to any one of claims 4 to 7 and 11-20, wherein the treatment or prevention comprises increasing the percentage of M2 macrophages relative to M1 macrophages in the subject's macrophage pool.

25. The pharmaceutical composition for use according to any one of claims 2, 5-7 and 11-20 or the use according to any one of claims 4 to 7 and 11-20, wherein administration of the microRNA-conjugated cerium oxide nanoparticles (CNPs) treats or prevents oxidative stress in the subject.

26. The pharmaceutical composition for use according to any one of claims 3 and 9-20 or the use according to any one of claims 8-20, wherein the treatment or prevention comprises reducing the expression level of NOX2 in the subject relative to an untreated control.

27. The pharmaceutical composition for use according to claim 2 or 25 or the use according to claim 4 or 25, wherein the microRNA comprises miRNA-146a.

28. The pharmaceutical composition for use according to claim 2 or 25 or the use according to claim 4 or 25, wherein the administering is performed topically, intradermally, or intramuscularly.

29. The pharmaceutical composition of claim 1, the pharmaceutical composition for use according to claim 2 or 3 or the use according to claim 4 or 8, wherein the surface of the CNPs is coated with one or more biocompatible molecules selected from hyaluronic acid, collagen, and fibrinogen.

30. The pharmaceutical composition of claim 1, the pharmaceutical composition for use according to claim 2 or 3 or the use according to claim 4 or 8, wherein the CNPs have a size range of about 3-5 nm.

31. The pharmaceutical composition of claim 1, the pharmaceutical composition for use according to claim 2 or 3 or the use according to claim 4 or 8, wherein the CNPs are doped with a lanthanide selected from one or more of Europium (Eu), Lanthanum (La), Praseodymium (Pr), Neodymium (Nd), Promethium (Pm), Samarium (Sm), Gadolinium (Gd), Terbium (Tb), Dysprosium (Dy), Homium (Ho), Erbium (Er), Thulium (Tm), Ytterbium (Yb), and Lutetium (Lu).