CLAIMS

What is claimed is:

1. A topical composition, comprising:

a combination of a therapeutically effective amount of superoxide dismutase (SOD) with a stabilizing carrier that is suitable for topical administration.

2. The topical composition of claim 1, wherein the stabilizing carrier comprises deoxygenated water.

3. The topical composition of claim 2, wherein the deoxygenated water has less than one or more of: about 10 ppm of oxygen, about 5 ppm of oxygen, about 3 ppm of oxygen, about 1 ppm of oxygen, or combinations thereof.

4. The topical composition of claim 1, wherein the topical composition further comprises a support agent selected from the group consisting of: a stabilizing agent, a preservative, an emollient, an adjuvant, and combinations thereof.

5. The topical composition of claim 4, wherein the support agent is a stabilizing agent.

6. The topical composition of claim 5, wherein the stabilizing agent includes an oxygen scavenger, a lipid, a synthetic polymer, a natural polymer, a polyelectrolyte, a protein, an amino acid, a co-polymer, an emulsion, a gel, an inert gas, or a combination thereof.

7. The topical composition of claim 5, wherein the stabilizing agent is an encapsulating agent that forms a nanoemulsion, a liposome, a nanogel, or a combination thereof.

8. The topical composition of claim 7, wherein the encapsulating agent is selected from the group consisting essentially of: chitosan, cyclodextrin, dextran, starch, silicon, tragacanth, and combinations thereof.

9. The topical composition of claim 5, wherein the stabilizing agent forms a stabilizing complex with the SOD.

10. The topical composition of claim 5, wherein the stabilizing agent is a lipid selected from the group consisting essentially of: phospholipids, glycolipids, cholesterol, triglycerides, fatty acids, fatty acid glycerides, surfactants, or a combination thereof.

11. The topical composition of claim 10, wherein the lipid forms a liposome, an inverted micelle, or a combination thereof.

12. The topical composition of claim 1, wherein the topical composition further comprises an additional active agent.

13. The topical composition of claim 12, wherein the additional active agent is a member selected from the group consisting of: a catalase, an antioxidant, an anti-infective agent, an antibiotic, an anti-tumor agent, an anti-inflammatory agent, an anesthetic, an analgesic, an anti-rheumatic agent, a growth factor, a cytokine, an amino acid, a protein, a vaccine, a hormone, a vitamin, and combinations thereof.

14. The topical composition of claim 12, wherein the additional active agent is an anesthetic.

15. The topical composition of claim 14, wherein the anesthetic is a member selected from the group consisting of: articaine, bupivacaine, cinchocaine, etidocaine, levobupivacaine, lidocaine, mepivacaine, prilocaine, ropivacaine, trimecaine, and combinations thereof.

16. The topical composition of claim 14, wherein the anesthetic is lidocaine.

17. The topical composition of claim 12, wherein the additional active agent is in the same or a different composition as the SOD.

18. The topical composition of claim 12, wherein the additional active agent is present at a concentration of from about 0.0001 wt% to about 10 wt%.

19. The topical composition of claim 1, wherein the topical composition has a pH of from about 6.8 to about 7.4.

20. The topical composition of claim 1, wherein the topical composition has a viscosity of from about 1 cP to about 1000 cP.

21. The topical composition of claim 1, wherein the topical composition is formulated as one of: a solution, a suspension, an emulsion, a gel, a hydrogel, a thermo-responsive gel, a cream, an ointment, a paste, an adhesive, a liquid reservoir, a patch, or a combination thereof.

22. The topical composition of claim 1, wherein the SOD is present in the topical composition at a concentration of from about 0.0001 wt% to about 10 wt%.

23. The topical composition of claim 1, wherein when the SOD is present in the topical composition at a concentration of 0.02 wt%:

more than about 80% of the SOD remains in a reactive form after a period of about 2 weeks when stored at room temperature and 75% relative humidity; or

more than about 80% of the SOD remains in a reactive form after a period of about 2 weeks when stored at 40°C and 75% relative humidity; or

more than about 80% of the SOD remains in a reactive form after a period of about 4 weeks when stored at room temperature and 75% relative humidity; or

more than about 80% of the SOD remains in a reactive form after a period of about 4 weeks when stored at 40°C and 75% relative humidity.

24. The topical composition of claim 1, wherein the topical composition consists essentially of SOD and deoxygenated water.

25. The topical composition of claim 1, wherein the topical composition is substantially free of: ethanol, capsaicin, menthol, carbomer, and combinations thereof.

26. The topical composition of claim 1, wherein the SOD comprises human recombinant SOD (rhSOD), SOD-1, SOD-2, SOD-3, or a combination thereof.

27. Use of a topical composition as recited in any one of claims 1-26 in the manufacture of a medicament for the treatment of a condition in a subject that is responsive to treatment with superoxide dismutase.

28. The use of claim 27, wherein the condition is pain.

29. The use of claim 28, wherein the pain is one or more of chronic pain, back pain, leg pain, ankle pain, joint pain, arthritic pain, wound pain, or combinations thereof

30. The use of claim 27, wherein the condition is edema.

31. The use of claim 27, wherein the condition is inflammation.

32. The use of claim 27, wherein the condition is erectile dysfunction.

33. The use of claim 27, wherein the condition is interstitial cystitis.