CLAIMS

1. An antibody or antigen-binding fragment thereof that binds to a fragment of a human sclerostin polypeptide of SEQ ID NO: 1, wherein the fragment consists of the amino acid sequences set forth in SEQ ID NOs: 70-73, wherein SEQ ID NO: 70 and SEQ ID NO: 71 are joined by a disulfide bond, and SEQ ID NO: 72 and SEQ ID NO: 73 are joined by a disulfide bond.

2. An antibody or antigen-binding fragment thereof that binds to a fragment of a human sclerostin polypeptide of SEQ ID NO: 1, and consisting of the amino acid sequences set forth in SEQ ID NOs: 2-5, wherein SEQ ID NO: 2 and 4 are joined by a disulfide bond at amino acid positions 57 and 111 with reference to SEQ ID NO: 1, and SEQ ID NO: 3 and 5 are joined by at least one of (a) a disulfide bond at amino acid positions 82 and 142 with reference to SEQ ID NO: 1, and (b) a disulfide bond at amino acid positions 86 and 144 with reference to SEQ ID NO: 1.

3. The antibody or antigen-binding fragment thereof of claim 1 or claim 2, wherein the fragment of said human sclerostin polypeptide retains the tertiary structure of the corresponding polypeptide region of human sclerostin of SEQ ID NO:1.

4. The antibody or antigen-binding fragment thereof of any one of claims 1-3, which binds to the fragment of human sclerostin polypeptide with a binding affinity (Kd) of $1 \times 10^{-7}$ M to $1 \times 10^{-12}$ M.

5. The antibody or antigen-binding fragment thereof of any one of claims 1-4, wherein the antibody is a monoclonal antibody.

6. The antibody or antigen-binding fragment thereof of any one of claims 1-5, wherein the antibody is a humanized antibody or a chimeric antibody.

7. The antibody or antigen-binding fragment thereof of any one of claims 1-4, wherein the antibody is a human antibody.

8. The antibody or antigen-binding fragment thereof of any one of claims 1-7 which is recombinant.

9. The antibody or antigen-binding fragment thereof of any one of claims 1-8 comprising a non-native constant region.

10. The antibody or antigen-binding fragment thereof of any one of claims 1-9, which is an immunoglobulin comprising heavy chains and light chains.

11. The antibody or antigen-binding fragment thereof of any one of claims 1-10, which is an IgG.

12. The antibody or antigen-binding fragment thereof of any one of claims 1-4, which comprises an $F(ab')_2$, Fab, Fab', Fv, Fc, or Fd fragment.

13. The antibody or antigen-binding fragment thereof of any one of claims 2-4, which comprises light chains comprising the amino acid sequence set forth in SEQ ID NO: 205 and heavy chains comprising the amino acid sequence set forth in SEQ ID NO: 209.

14. The antibody or antigen-binding fragment thereof of any one of claims 2-4, which comprises (a) light chains comprising the amino acid sequence set forth in SEQ ID NO: 15 and heavy chains comprising the amino acid sequence set forth in SEQ ID NO: 19 or (b) light chains comprising the amino acid sequence set forth in SEQ ID NO: 7 and heavy chains comprising the amino acid sequence set forth in SEQ ID NO: 11.

15. A sterile composition comprising the antibody or antigen-binding fragment thereof of any one of claims 1-14 and a physiologically acceptable carrier, excipient or diluent.

16. An antibody or antigen-binding fragment thereof that (i) cross-blocks the binding of the antibody or antigen-binding fragment thereof of claim 5 to sclerostin of SEQ ID NO: 1 or (ii) is cross-blocked from binding to sclerostin of SEQ ID NO: 1 by the antibody or antigen-binding fragment thereof of claim 5.

17. The antibody or antigen-binding fragment thereof of claim 16, which comprises a light chain variable domain comprising the amino acid sequence set forth in SEQ ID NO: 380 and a heavy chain variable domain comprising the amino acid sequence set forth in SEQ ID NO: 382.

18. An antibody or antigen-binding fragment thereof that (i) cross-blocks the binding of the antibody or antigen-binding fragment thereof of claim 13 to sclerostin of SEQ ID NO: 1 or (ii) is cross-blocked from binding to sclerostin of SEQ ID NO: 1 by the antibody or antigen-binding fragment thereof of claim 13.

19. The antibody or antigen-binding fragment thereof of any one of claims 16-18, wherein the antibody is a monoclonal antibody.

20. The antibody or antigen-binding fragment thereof of any one of claims 16-19, wherein the antibody is a humanized antibody or a chimeric antibody.

21. The antibody or antigen-binding fragment thereof of any one of claims 16-19, wherein the antibody is a human antibody.

22. The antibody or antigen-binding fragment thereof of any one of claims 16-21, which is recombinant.

23. The antibody or antigen-binding fragment thereof of any one of claims 16-22 comprising a non-native constant region.

24. The antibody or antigen-binding fragment thereof of any one of claims 16-23, which binds to human sclerostin with a binding affinity (Kd) of 1 x $10^{-7}$M to 1 x $10^{-12}$M.

25. The antibody or antigen-binding fragment thereof of any one of claims 16-24, wherein the cross-blocking is determined in a surface plasmon resonance assay.

26. The antibody or antigen-binding fragment thereof of claim 16, wherein (a) the antibody or antigen-binding fragment thereof of claim 16 in solution or (b) the antibody or antigen-binding fragment thereof of claim 3 in solution in an ELISA assay causes a reduction of between 60% and 100% in the amount of sclerostin bound by immobilized (a) the antibody or antigen-binding fragment thereof of claim 3 or (b) the antibody or antigen-binding fragment thereof of claim 16, respectively, compared to the amount of sclerostin bound in the absence of the antibody or antigen-binding fragment thereof in solution.

27. The antibody or antigen-binding fragment thereof of claim 26, wherein the reduction in the amount of sclerostin bound by the immobilized antibody or antigen-binding fragment thereof is between 70% and 100%.

28. The antibody or antigen-binding fragment thereof of claim 27, wherein the reduction in the amount of sclerostin bound by the immobilized antibody or antigen-binding fragment thereof is between 80% and 100%.

29. An antibody that (i) cross-blocks the binding of the antibody of claim 17 to sclerostin of SEQ ID NO: 1 or (ii) is cross-blocked from binding to sclerostin of SEQ ID NO: 1 by the antibody of claim 17.

30. The antibody of claim 29, wherein the antibody is a monoclonal antibody.

31. The antibody of claim 30, wherein the antibody is a humanized antibody.

32. The antibody or antigen-binding fragment thereof of any one of claims 1-31, which neutralizes sclerostin in a cell-based mineralization assay.

33. An antibody or antigen-binding fragment thereof that (i) cross-blocks the binding of (a) Ab-C comprising light chains comprising the amino acid sequence set forth in SEQ ID NO: 15 and heavy chains comprising the amino acid sequence set forth in SEQ ID NO: 19 or (b) Ab-D comprising light chains comprising the amino acid sequence set forth in SEQ ID NO: 7 and heavy chains comprising the amino acid sequence set forth in SEQ ID NO: 11 to sclerostin of SEQ ID NO: 1 or (ii) is cross-blocked from binding to sclerostin of SEQ ID NO: 1 by Ab-C or Ab-D.

34. The antibody or antigen-binding fragment thereof of claim 33, wherein the antibody is a monoclonal antibody.

35. The antibody or antigen-binding fragment thereof of claim 33 or claim 34, wherein the antibody is a humanized antibody.

36. The antibody or antigen-binding fragment thereof of any one of claims 33-35, which neutralizes sclerostin in a cell-based mineralization assay.

37. The antibody or antigen-binding fragment thereof of any one of claims 33-36, wherein (a) the antibody or antigen-binding fragment thereof in solution or (b) Ab-C or Ab-D in solution in an ELISA assay causes a reduction of between 60% and 100% in the amount of sclerostin bound by immobilized (a) Ab-C or Ab-D or (b) the antibody or antigen-binding fragment thereof, respectively, compared to the amount of sclerostin bound in the absence of the antibody or antigen-binding fragment thereof, Ab-C, or Ab-D in solution.

38. The antibody or antigen-binding fragment thereof of claim 37, wherein the reduction in the amount of sclerostin bound by the immobilized Ab-C, Ab-D, or antibody or antigen-binding fragment thereof is between 70% and 100%.

39. The antibody or antigen-binding fragment thereof of claim 38, wherein the reduction in the amount of sclerostin bound by the immobilized Ab-C, Ab-D, or antibody or antigen-binding fragment thereof is between 80% and 100%.

40. Use of the antibody or antigen-binding fragment thereof of any one of claims 1-14 and 16-39 in preparation of a medicament for improving bone repair or improving an outcome in an orthopedic procedure, dental procedure, implant surgery, joint replacement, bone grafting, bone cosmetic surgery, or facial reconstruction.

41. The use of claim 40, wherein the bone repair is associated with fracture healing, nonunion healing, or delayed union healing.

42. A sterile composition comprising the antibody or antigen-binding fragment thereof of any one of claims 16-39 and a physiologically acceptable carrier, excipient or diluent.

43. The composition of claim 15 or claim 42 for use in the treatment of a bone-related disorder, wherein the antibody or antigen-binding fragment increases at least one of bone formation, bone mineral density, bone mineral content, bone mass, bone quality or bone strength.

44. The composition of claim 43, wherein the bone-related disorder is osteoporosis or osteopenia.

45. The composition of claim 15 or claim 42 for use in improving bone repair or improving an outcome in an orthopedic procedure, dental procedure, implant surgery, joint replacement, bone grafting, bone cosmetic surgery, or facial reconstruction.