CLAIMS

What is claimed is:

What is claimed is:

1. A method of producing a cartilage product comprising:
    a. providing a cartilage sample; and
    b. porating the cartilage sample.
2. The method of Claim 1, wherein the cartilage sample comprises type II collagen, optionally wherein the sample comprises hyaline cartilage.
3. The method of Claim 2, wherein the cartilage sample has a thickness of about 0.3 mm to about 2.0 mm, optionally wherein said thickness is about 1.0 mm to about 1.5 mm.
4. The method of Claim 2, wherein the hyaline cartilage is selected from: articular cartilage, condoyle cartilage, femur condoyle cartilage, and tibial plateau cartilage.
5. The method of Claim 3, wherein the cartilage sample is devoid of subchondral bone, optionally wherein the cartilage product is devoid of a calcified cartilage layer.
6. The method of Claim 4, wherein providing the cartilage sample comprises isolating the cartilage sample from subchondral bone.
7. The method of Claim 5, wherein providing the cartilage sample comprises:
    a. isolating a sample comprising articular cartilage and subchondral bone; and
    b. removing the subchondral bone from the articular cartilage; and
    c. optionally, removing calcified cartilage from the articular cartilage.
8. The method of Claim 1, wherein the cartilage sample comprises a radial layer, a transitional layer, and a tangential layer.
9. The method of Claim 8, wherein the poration provides pores extending through:
    a. the radial layer;
    b. the transitional layer;
    c. the tangential layer;
    d. a and b; or
    e. a, b, and c.

10. The method of Claim 8, wherein the poration provides pores that are substantially perpendicular to said layers.
11. The method of Claim 1, wherein the cartilage sample comprises a layer of cartilage selected from: a radial layer, a transitional layer, and a tangential layer.
12. The method of Claim 11, wherein the poration provides pores that are substantially perpendicular to said layer.
13. The method of any of the preceding Claims, wherein the cartilage sample has a thickness of less than about 3 mm.
14. The method of Claim 13, wherein the wherein the cartilage sample has a thickness of about 0.5mm to about 2 mm or about 1 mm to about 1.5 mm.
15. The method of Claim 1 wherein porating the cartilage sample at about 10 to about 100 or about 20 to about 60 pores per cm^2.
16. The method of Claim 1 or Claim 15, wherein porating the cartilage sample comprises providing a plurality of pores having a diameter selected from: about 0.3 mm to about 2 mm, about 0.5 mm to about 1.5 mm, about 0.8 mm to about 1.2 mm, or about 1 mm.
17. The method of Claim 16, wherein the pores pass through the majority of the thickness of the cartilage sample thickness.
18. The method of Claim 17, wherein the pores pass through the entire thickness of the cartilage sample.
19. The method of any of Claims 15-18, wherein porating comprise mechanically removing cartilage from the cartilage sample.
20. The method of any of the preceding Claims, further comprising a step of partially digesting the cartilage sample wherein the step of partially digesting the cartilage sample optionally comprises digesting the cartilage to an extent that retains viable native cells, optionally, wherein the viable native cells are chondrocytes.
21. The method of Claim 20, wherein said extent is an amount of digestion that results in retaining of a substantial amount of viable chondrocytes per cm^2, optionally wherein the substantial amount is a majority of the viable chondrocytes per cm^2 relative to an undigested cartilage sample.
22. The method of Claim 1, Claim 20, or Claim 21, wherein the step of partially digesting the cartilage comprise enzymatic digestion

23. The method of Claim 22, wherein the enzyme is a proteinase.
24. The method of Claim 23, wherein the proteinase is a collagenase, optionally wherein the collagenase is a collagenase II.
25. The method of any of the preceding claims, further comprising treating the cartilage sample with an antibiotic.
26. The method of any of the preceding claims, further comprising cryopreserving the cartilage sample, optionally wherein said cryopreserving is performed after said porating and partial digestion.
27. The method of Claim 26, further comprising thawing the cryopreserved cartilage sample.
28. The method of any of the preceding claims, further comprising periodically chilling the cartilage sample during said step of porating, partial digesting, or a combination thereof.
29. A cartilage product produced by the method of any of the preceding claims.
30. A method of treatment comprising administering to a subject in need thereof, a cartilage product of Claim 29.
31. The method of Claim 30, wherein the cartilage product is administered arthroscopically.
32. The method of Claim 30, wherein administering comprises folding or rolling the cartilage product.
33. The method of Claim 30, wherein the step of administering is performed in conjunction with a microfracture procedure.
34. The method of any of claims 1-15, further comprising cryopreserving the cartilage sample, optionally wherein said cryopreserving is performed after said porating and partial digestion.
35. The method of Claim 34, wherein cryopreservation comprises incubating for a period of time the cartilage sample at one or more temperatures intermediate of room temperature and -80°C.
36. The method of Claim 35, wherein said one or more temperatures intermediate of room temperature and -80°C comprises at least two independent temperatures.
37. The method of Claim 35 or Claim 36, wherein said period of time is at least about 10 min, at least about 20 min, or at least about 30 min, optionally wherein said period of time less than about 24 hours.

38. The method of Claim 35, wherein the cryopreservation comprises:
    a. incubating the cartilage product for a first period of time at about 0°C to about 10°C;
    b. incubating the cartilage product for a second period of time at about 0°C to about 10°C; or
    c. both a) and b).
39. The method of Claim 38 wherein said first period of time is greater than about 10 minutes, optionally wherein the first period of time is less than about 24 hours or less than about 1.5 hours.
40. The method of Claim 38 or Claim 39 wherein said second period of time is greater than about 10 minutes, optionally wherein the first period of time is less than about 12 hours or less than about 1 hour.
41. The method of any of claims 1-15, wherein the cartilage sample has a surface area of about 0.8 cm^2 to about 13 cm^2.
42. The method of any of claims 1-15, wherein the cartilage sample is a primate cartilage sample or a human cartilage sample.
43. The method of Claim 42, wherein the cartilage sample has a surface area of about 0.8 cm^2 to about 13 cm^2.
44. The method of any of the preceding Claims wherein the cartilage product further comprises an additive.

CLAIMS

1. A method of producing a cartilage product comprising:

a. providing a cartilage sample; and

b. porating the cartilage sample

wherein the cartilage product comprises viable cells native to the cartilage sample.

2. The method of Claim 1, wherein the cartilage sample comprises type II collagen, preferably wherein the sample comprises hyaline cartilage, more preferably wherein the hyaline cartilage is selected from: articular cartilage, condoyle cartilage, femur condoyle cartilage, and tibial plateau cartilage.

3. The method of Claim 2, wherein the cartilage sample has a thickness of about 0.3 mm to about 2.0 mm, preferably wherein said thickness is about 1 .0 mm to about 1 .5 mm.

4. The method of Claim 3, wherein the cartilage sample is devoid of subchondral bone or calcified cartilage.

5. The method of claim 1, wherein providing the cartilage sample comprises isolating the cartilage sample from subchondral bone.

6. The method of Claim 4, wherein providing the cartilage sample comprises:

a. isolating a sample comprising articular cartilage and subchondral bone; and

b. removing the subchondral bone or calcified cartilage from the articular cartilage.

7. The method of Claim 1, wherein the cartilage sample comprises at least one of the layers selected from: a radial layer, a transitional layer, and a tangential layer.

8. The method of Claim 7, wherein the porating provides pores extending through at least one layer.

9. The method of Claim 7, wherein the porating provides pores that are substantially perpendicular to said layers.

10. The method of any of the preceding Claims, wherein the cartilage sample has a thickness of less than about 3 mm, preferably wherein the cartilage sample has a thickness of about 0.5mm to about 2 mm or about 1 mm to about 1.5 mm.

11. The method of Claim 1 wherein porating the cartilage sample at about 10 to about 100 or about 20 to about 60 pores per cm^2.

12. The method of Claim 1 or Claim 11, wherein porating the cartilage sample comprises providing a plurality of pores having a diameter selected from: about 0.3 mm to about 2 mm, about 0.5 mm to about 1 .5 mm, about 0.8 mm to about 1.2 mm, or about 1 mm.

13. The method of Claim 12, wherein the pores pass through the majority of the thickness of the cartilage sample thickness.

14. The method of Claim 13, wherein the pores pass through the entire thickness of the cartilage sample.

15. The method of any of the preceding Claims, further comprising a step of partially digesting the cartilage sample wherein the step of partially digesting the cartilage sample optionally comprises digesting the cartilage to an extent that retains viable native cells, optionally, wherein the viable native cells are chondrocytes.

16. The method of Claim 15, wherein the step of partially digesting the cartilage comprise enzymatic digestion, preferably wherein the enzyme is a proteinase, more preferably wherein the proteinase is a collagenase, most preferably wherein the collagenase is a collagenase II.

17. The method of any of the preceding claims, further comprising cryopreserving the cartilage sample, preferably wherein said cryopreserving is performed after said porating and partial digestion, more preferably wherein said cryopreserving is performed after said porating and partial digestion.

18. The method of claim 1, wherein the cartilage product further comprises a layer of bone or calcified cartilage, wherein the layer of bone or calcified cartilage is native to the cartilage sample.

19. The method of claim 1, wherein the cartilage sample comprises hyaline cartilage.

20. The method of claim 1, further comprising the step of cryopreserving the cartilage product.

21. The method of claim 20, wherein the step of cryopreserving the cartilage product occurs after porating the cartilage sample.

22. The method of claim 20, wherein the step of cryopreserving comprises a gradual and step-wise manner of lowering the temperature.

23. The method of claim 20, wherein the cartilage product comprises at least 70% viable cells native to the cartilage sample.

24. The method of claim 20, wherein the step of cryopreserving comprises selectively depleting the cartilage sample of a substantial portion of one of more types of functional immunogenic cells.

25. The method of claim 1, wherein the cartilage product further comprises a structural matrix and growth factors.