For these reasons, there is a need in the rapidly expanding aesthetic market for instrumentation and procedures for aesthetic surgical skin tightening. There is also a need for systems, instruments or devices, and procedures that enable the repeated harvesting of skin grafts from the same donor site while eliminating donor site deformity.

INCORPORATION BY REFERENCE

Each patent, patent application, and/or publication mentioned in this specification is herein incorporated by reference in its entirety to the same extent as if each individual patent, patent application, and/or publication was specifically and individually indicated to be incorporated by reference.

SUMMARY OF INVENTION

An aspect of the present invention provides a system comprising:

a carrier;

a scalpet assembly configured to couple to the carrier, and comprising a scalpet array, wherein the scalpet array includes at least one scalpet configured for at least one of fractional resection and fractional lipectomy of tissue at a target site of a subject, wherein the carrier is configured to control application of a rotational force to the at least one scalpet during the fractional resection and fractional lipectomy; and

a vacuum component coupled to the scalpet assembly and configured to evacuate the tissue from the target site using vacuum force.

Another aspect of the present invention provides a device comprising:

a scalpet assembly configured to couple to a carrier, wherein the scalpet assembly includes a scalpet array configured for at least one of fractional resection and fractional lipectomy of tissue at a target site of a subject, wherein the carrier is configured to control application of rotational force to scalpets of the scalpet array during the fractional resection and fractional lipectomy; and

a manifold configured to removeably couple to the scalpet assembly, wherein the manifold includes a depth control device configured to control a depth of penetration of scalpets of the scalpet array into the tissue, wherein the manifold is configured to control a vacuum force applied to evacuate the tissue from the target site, wherein the tissue includes skin plugs incised to form the fractional field during the fractional resection, and fat removed through the fractional field during the fractional lipectomy.

Another aspect of the invention provides a device comprising:

a carrier comprising a proximal region and a distal region, wherein the proximal region is configured to be hand-held;

a scalpet assembly configured to couple to the distal region, wherein the scalpet assembly includes a scalpet array configured for at least one of fractional resection and fractional lipectomy of tissue at a target site of a subject, wherein the scalpet array includes scalpets that each comprise a tube comprising a hollow region and a sharpened distal end configured to penetrate tissue at a target site of a subject; and

a manifold configured to couple to the distal region, wherein the manifold is configured to control a vacuum force applied to evacuate the tissue from the target site, wherein the tissue includes skin plugs incised to form the fractional field during the fractional resection, and fat removed through the fractional field during the fractional lipectomy.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows the PAD Kit placed at a target site, under an embodiment.

Figure 2 is a cross-section of a scalpet punch or device including a scalpet array, under an embodiment.

Figure 3 is a partial cross-section of a scalpet punch or device including a scalpet array, under an embodiment.

Figure 4 shows the adhesive membrane with backing (adherent substrate) included in a PAD Kit, under an embodiment.

Figure 5 shows the adhesive membrane (adherent substrate) when used with the PAD Kit frame and blade assembly, under an embodiment.

Figure 6 shows the removal of skin pixels, under an embodiment.

Figure 7 is a side view of blade transection and removal of incised skin pixels with the PAD Kit, under an embodiment.

Figure 8 is an isometric view of blade/pixel interaction during a procedure using the PAD Kit, under an embodiment.

Figure 9 is another view during a procedure using the PAD Kit (blade removed for clarity) showing both harvested skin pixels or plugs transected and captured and non-transected skin pixels or plugs prior to transection, under an embodiment.

CLAIMS

What is claimed is:

1. A system comprising:

a carrier;

a scalpet assembly configured to couple to the carrier, and comprising a scalpet array, wherein the scalpet array includes at least one scalpet configured for at least one of fractional resection and fractional lipectomy of tissue at a target site of a subject, wherein the carrier is configured to control application of a rotational force to the at least one scalpet during the fractional resection and fractional lipectomy; and

a vacuum component coupled to the scalpet assembly and configured to evacuate the tissue from the target site using vacuum force.

2. The system of claim 1, wherein the tissue includes skin plugs incised to form the fractional field during the fractional resection, and fat removed through the fractional field during the fractional lipectomy.

3. The system of claim 1, wherein the at least one scalpet includes a lumen extending at least partially from a distal end towards a proximal end of the at least one scalpet.

4. The system of claim 3, wherein the vacuum component includes a vacuum manifold configured to couple to a distal end of the carrier, wherein the vacuum manifold includes a vacuum port configured to couple to a vacuum source.

5. The system of claim 4, wherein the vacuum manifold is configured to couple to the lumen and configured to direct the vacuum force to the target site intraluminally via the lumen.

6. The system of claim 4, wherein the vacuum manifold is configured to direct the vacuum force to the target site extraluminally.

7. The system of claim 4, wherein a distal end of the vacuum manifold is configured as a depth guide to control a depth of penetration of the scalpet array into the tissue.

8. The system of claim 4, wherein a distal end of the vacuum manifold is configured for use with a depth guide.

9. The system of claim 4, wherein the vacuum manifold comprises an overlay encasement.

10. The system of claim 4, wherein the vacuum manifold is removeably coupled to the distal end of the carrier.

11. The system of claim 4, wherein the vacuum component is configured for manual control of delivery of the vacuum force to the target site.

12. The system of claim 4, comprising a controller configured to automatically control at least one of the rotational force to the at least one scalpet and delivery of the vacuum force to the target site.

13. The system of claim 4, wherein the vacuum component includes a vacuum aspirator.

14. The system of claim 4, wherein the vacuum force is configured for vacuum stabilization of the target site during the fractional resection.

15. The system of claim 3, wherein the vacuum component is configured for placement in series with the carrier and the scalpet assembly.

16. The system of claim 3, wherein the vacuum component includes a carrier lumen in an interior region of the carrier, wherein the carrier lumen is coupled to the lumen of the at least one scalpet, wherein the carrier lumen is configured to route the vacuum force to the target site via the lumen of the at least one scalpet.

17. The system of claim 3, wherein the at least one scalpet comprises a cylindrical scalpet, wherein a distal region proximate to the distal end is configured to incise and receive tissue.

18. The system of claim 17, wherein the distal region includes a cutting surface.

19. The system of claim 18, wherein the cutting surface includes at least one of a sharpened edge, at least one sharpened point, and a serrated edge.

20. The system of claim 18, wherein the cutting surface includes a blunt edge.

21. The system of claim 17, wherein the lumen and the proximal end is configured to pass tissue from the target site.

22. The system of claim 17, wherein the at least one scalpet includes at least one aperture positioned axially in the scalpet adjacent the lumen.

23. The system of claim 22, wherein the at least one scalpet includes a plurality of apertures positioned axially in the scalpet adjacent the lumen.

24. The system of claim 22, wherein the at least one aperture is configured to pass tissue from the target site.

25. The system of claim 22, wherein the at least one aperture includes at least one cutting surface.

26. The system of claim 22, wherein the at least one aperture is configured to divert received tissue at least one of radially outward from the lumen and radially inward toward the lumen.

27. The system of claim 3, comprising a fractional marking system configured to indicate fractional resection density of a fractional field.

28. The system of claim 27, wherein the fractional marking system comprises a stencil including a grid pattern of markers.

29. The system of claim 28, wherein the stencil includes an ink stencil.

30. The system of claim 28, wherein the stencil includes at least one of a positive stencil and a negative stencil.

31. The system of claim 28, wherein the markers include at least one of circular markers and dot markers configured to mark the target site.

32. The system of claim 28, wherein the markers include at least one notch to mark at least one corner of the fractional field.

33. The system of claim 27, wherein the fractional marking system comprises a membrane including perforations.

34. The system of claim 33, wherein the membrane is configured as a depth guide to control a depth of penetration of the scalpet array into the tissue.

35. The system of claim 33, wherein the membrane comprises a material including at least one of plastic, polymer, and composite, wherein the membrane is semitransparent.

36. The system of claim 33, wherein the membrane is configured to adhere to the target site.

37. The system of claim 3, wherein the lumen of the scalpet is coupled to a reservoir configured to retain received tissue.

38. The system of claim 37, wherein the reservoir comprises a canister.

39. The system of claim 3, wherein the carrier is configured to be hand-held.

40. The system of claim 3, comprising a motor coupled to the scalpet assembly and configured to drive the at least one scalpet.

41. The system of claim 3, wherein the scalpet array includes a plurality of scalpets.

42. The system of claim 41, wherein each scalpet is configured to rotate around a central axis of the scaplet.

43. The system of claim 3, wherein the scalpet assembly includes a drive assembly coupled to each scalpet, wherein the drive assembly is configured to impart a rotational force to a proximal region of each scalpet, wherein the rotational force rotates each scalpet around the central axis.

44. The system of claim 43, wherein the drive assembly comprises at least one of a gear-drive system and a frictional drive system.

45. The system of claim 3, comprising a depth guide to control a depth of penetration of the scalpet array into the tissue.

46. The system of claim 3, comprising a housing including a distal region coupled to the vacuum component and configured to form a vacuum seal when in contact with proximate tissue adjacent the target site.

47. The system of claim 3, wherein the scalpet assembly includes a spring device configured to control a position of the scalpet array relative to the target site.

48. The system of claim 3, wherein the vacuum force is configured to control a position of the scalpet array relative to the target site.

49. The system of claim 3, wherein the scalpet assembly includes a spring device configured to control a position of the scalpet array relative to the target site in concert with the vacuum force.

50. A device comprising:

a scalpet assembly configured to couple to a carrier, wherein the scalpet assembly includes a scalpet array configured for at least one of fractional resection and fractional lipectomy of tissue at a target site of a subject, wherein the carrier is configured to control application of rotational force to scalpets of the scalpet array during the fractional resection and fractional lipectomy; and

a manifold configured to removeably couple to the scalpet assembly, wherein the manifold includes a depth control device configured to control a depth of penetration of

scalpets of the scalpet array into the tissue, wherein the manifold is configured to control a vacuum force applied to evacuate the tissue from the target site, wherein the tissue includes skin plugs incised to form the fractional field during the fractional resection, and fat removed through the fractional field during the fractional lipectomy.

51. A device comprising:

a carrier comprising a proximal region and a distal region, wherein the proximal region is configured to be hand-held;

a scalpet assembly configured to couple to the distal region, wherein the scalpet assembly includes a scalpet array configured for at least one of fractional resection and fractional lipectomy of tissue at a target site of a subject, wherein the scalpet array includes scalpets that each comprise a tube comprising a hollow region and a sharpened distal end configured to penetrate tissue at a target site of a subject; and

a manifold configured to couple to the distal region, wherein the manifold is configured to control a vacuum force applied to evacuate the tissue from the target site, wherein the tissue includes skin plugs incised to form the fractional field during the fractional resection, and fat removed through the fractional field during the fractional lipectomy.