Claims

What is claimed is:

1. A device for making a cold slurry at or near a target tissue underneath a subject's skin, the device comprising:

a first cannula for delivering a first component to a target tissue underneath a subject's skin, the first cannula comprising a first open distal end and first longitudinal axis extending from the first open distal end;

a second cannula for delivering a second component to the target tissue, the second cannula comprising a second open distal end and a second longitudinal axis extending from the second open distal end, the second longitudinal axis aligned with the first longitudinal axis;

wherein the first open distal end is proximate to the second open distal end for forming a cold slurry at or near the target tissue from an interaction between the first component and the second component;

wherein the first component comprises a liquid, and

the second component comprises a solid.

2. The device of claim 1, wherein the first component is liquid water and the second component is solid water.

3. The device of claim 2 further comprising a grinder disposed about the second open distal end to break the solid water into particles of solid water at or near the target tissue.

4. The device of claim 2 further comprising a vibrator disposed about the second open distal end to break the solid water into particles of solid water at or near the target tissue.

5. The device of claim 2 further comprising a third cannula extending along the second cannula for carrying a cooling gas to form the solid water from liquid water at or near the target tissue.

6. The device of claim 1, wherein the first component is supercooled water and the second component is pellets of solid water; and

wherein the interaction is crystal nucleation of the supercooled water caused by the pellets of solid water.

7. The device of claim 1 further comprising a temperature sensor extending beyond the first and second open distal ends to measure the temperature of the cold slurry made at or near the target tissue.

8. The device of claim 1, wherein the first and second cannulas each have a size and shape suitable for inserting through the subject's skin.

9. The device of claim 1, wherein the device is configured such that the interaction between the first component and the second component occurs at a position which is downstream of the first open distal end of the first cannula and the second open distal end of the second cannula.

10. The device of claim 1, wherein the first component comprises liquid water and the second component comprises solid water.

11. The device of claim 10, wherein the first component further comprises glycerol.

12. A device for making a cold slurry at or near a target tissue underneath a subject's skin, the device comprising:

a first cannula for delivering a first component to a target tissue underneath a subject's skin, the first cannula comprising a first open distal end and first longitudinal axis extending from the first open distal end;

a second cannula for delivering a second component to the target tissue, the second cannula comprising a second open distal end and a second longitudinal axis extending from the second open distal end, the second longitudinal axis aligned with the first longitudinal axis;

wherein the first open distal end is proximate to the second open distal end for forming a cold slurry at or near the target tissue from an interaction between the first component and the second component, characterized in that the device further comprises:

an inner balloon disposed around the first open distal end of the first cannula, the inner balloon comprising an outer surface and a volume in fluid communication with the first cannula to receive the first component;

an outer balloon disposed around the second open distal end of the second cannula, the outer balloon comprising an inner surface and a volume in fluid communication with the second cannula to receive the second component;

wherein the outer surface of the inner balloon and the inner surface of the outer balloon form a space for the interaction between the first and second components to occur, and form the cold slurry inside the inner balloon,

wherein the first component comprises a liquid; and

wherein the second component comprises a gas.

13. The device of claim 12, wherein the liquid comprises a mixture of water and glycerol; and wherein the gas comprises a cooling gas.

14. The device of claim 12, further comprising a puncture needle extending along the second cannula and movable between an extended position and a retracted position; and

wherein the puncture needle in the extended position breaks the inner balloon and the outer balloon, and releases the cold slurry at or near the target tissue.