What is claimed is:

1. A cryogenic medical system for use in patient treatment procedures, said cryogenic system comprising:

at least one cryoengine including a dewar containing a cryogen, a flow generator within said dewar; at least one pressurization system having one or more heaters arranged therein, at least one port, one or more control valves, a first vessel and a second vessel interconnected, wherein said first vessel is submersed in said cryogen and has a first temperature and said second vessel is positioned outside said cryogen and has a second temperature greater than said first temperature; at least a first attachment connecting said flow generator to said port of said pressurization system, and one or more cryolines connected to said port; and

one or more cryoinstruments comprising one or more tubular structures arranged therein, said cryoinstruments each having a proximal end which connects with said cryolines of said cryoengine and a distal end positioned at a treatment site;

wherein said pressurization system produces supercritical cryogen, pressurized cryogen, or one or more pseudo-fluids, alone or in combination.

2. The cryogenic medical system of Claim 1, wherein said cryolines comprise at least a supply tubing connecting said cryoengine to said cryoinstrument and supplying said supercritical cryogen to said one or more tubular structures; and at least a return tubing to return said cryogen to said dewar.

3. The cryogenic medical system of Claim 1, wherein said one or more tubular structures comprise at least a first tubing and a second tubing are positioned in a coaxial or side-by-side configuration.

4. The cryogenic medical system of Claim 3, wherein said first tubing and second tubing are positioned with a flexible tubular shaft.

5. The cryogenic medical system of Claim 1, wherein said pressurization system provides continuous flow of said supercritical cryogen.

6. The cryogenic medical system of Claim 1, wherein said treatment site is a mammalian cardiac tissue.

7. The cryogenic medical system of Claim 1, wherein said cryoinstrument is an epicardial cryogenic probe or an endocardial cryogenic catheter.

8. The cryogenic medical system of Claim 6, wherein said mammalian cardiac tissue freezes within about 10 seconds to about 180 seconds.

9. The cryogenic medical system of Claim 1, wherein said treatment site freezes by way of formation of an iceball in a diameter of about 2 mm to 30 mm or greater with a length of 1 mm to 130 mm or greater and within about 10 seconds to 180 seconds.

10. The cryogenic medical system of Claim 9, further comprising a plurality of said treatment sites.

11. The cryogenic medical system of Claim 9, wherein said cryoinstrument is released from said treatment site by a thawing mechanism used in combination with said cryoinstrument.

12. The cryogenic medical system of Claim 11, wherein said thawing mechanism is integral to said cryoinstrument, said thawing mechanism capable of extending and retracting.

13. The cryogenic medical system of Claim 1, further comprising one or more connectors that interconnect said cryolines of said cryoengine and said tubular structures of said cryoinstruments.

14. The cryogenic medical system of Claim 13, wherein said one or more connectors reversibly attach with and detach from said cryoengine or said cryoinstruments.

15. The cryogenic medical system of Claim 13, wherein said one or more connectors have a telescoping feature, snap-on, twist-on or quick-connect feature providing easy attachment.

16. The cryogenic medical system of Claim 15, wherein said telescoping feature extends and retracts to flexibly position said cryolines and said tubular structures.

17. The cryogenic medical system of Claim 1, wherein said cryoinstrument comprises a handle which maneuvers said distal end to said treatment site.

18. The cryogenic medical system of Claim 17, wherein said handle comprises one or more displays which monitor sensors and communicate information for operation of said cryoengine and said cryoprobes.

19. The cryogenic medical system of Claim 1, wherein said cryoinstrument comprises a telescoping feature which extends and retracts during a treatment procedure.

20. The cryogenic medical system of Claim 1, wherein said supply tubing is interconnected with said return tubing to form an integral cryotube and provide controlled rapid delivery of said supercritical cryogen to and from said distal end of said cryoinstrument.

21. The cryogenic medical system of Claim 20, wherein said integral cryotube is flexible.

22. The cryogenic medical system of Claim 1, wherein said cryoengine is a multi-port system wherein one or more of said pressurization systems include one or more manifolds to perform multiple treatment procedures.

23. The cryogenic medical system of Claim 22, wherein said pressurization systems and said manifolds are configured to perform said multiple treatment procedures simultaneously or sequentially.

24. The cryogenic medical system of Claim 23, wherein said multiple treatment procedures include one or more epicardial treatments, one or more endocardial treatments, individually or in any combination thereof.

25. The cryogenic medical system of Claim 1, wherein said cryoinstruments include a component that attach to said treatment site, wherein said treatment site is a mammalian cardiac tissue.

26. The cryogenic medical system of Claim 1, further comprising a monitoring system for visualizing placement of said distal end of said cryoinstrument through to said treatment site.

27. The cryogenic medical system of Claim 26, wherein said monitoring system is internal to said cryoinstrument and includes fiber optic visualization.

28. The cryogenic medical system of Claim 1, wherein said cryoengine and said cryoinstrument comprise sensors to monitor conditions including temperature, pressure, leakage, flow rate, cardiac electrical activity, freeze zone formation, computer simulated cryoinstrument configuration, and placement of said cryoinstrument.

29. The cryogenic medical system of Claim 1, wherein said cryoengine and said cryoinstrument has remote controls.

30. The cryogenic medical system of Claim 29, wherein said remote controls regulate treatment protocols, including treatment times, iceball formation, probe placement, probe angle, probe deflection, temperature and pressure.

31. The cryogenic medical system of Claim 29, further comprising a warming feature to maintain a determined size of said iceball formation, control treatment times, and allow for probe detachment, tissue thawing, and heating.

32. The cryogenic medical system of Claim 1, wherein said cryoinstrument creates a transmural linear lesion.

33. A cryo-apparatus for performing cryoablation in a mammalian heart, said cryo-apparatus comprising:

one or more cryoinstruments interconnected with a first cryoline and a second cryoline to form a unitary tubular structure which circulates a cryogenic medium to and from said one or more cryoinstruments;

a container having a cryogenic medium contained therein;

a heat exchanger surrounded by a subcooling chamber;

at least one pressurized apparatus having one or more heaters arranged therein, at least one port, and one or more control valves, wherein at least a first portion of said pressurized apparatus is inside said cryogenic medium and at least a second portion of said pressurized apparatus is outside said cryogenic medium;

a flow generator which delivers said cryogenic medium to said port of said pressurized apparatus, said control valves releasing said cryogenic medium in a supercritical state from said port to said heat exchanger, and through to said one or more cryoinstruments at a target site of cardiac tissue.

34. The cryo-apparatus of Claim 33, wherein said cryogenic medium is liquid nitrogen.

35. A method of performing cryotherapy on cardiac tissue using said cryogenic medical system of claim 1, comprising:

filling said pressurized system with said cryogen;

activating said pressurized system to form a pressurized supercritical cryogen; and

directing said pressurized cryogen through one or more supply lines to said cryoinstruments and from said cryoinstruments through said one or more return lines.

36. The method of Claim 35, wherein said step of directing includes a step of cryoablating said cardiac tissue.

37. The method of Claim 36, wherein said cryoinstruments utilize flexible interconnections to provide epicardial treatment upon a surface of a mammalian heart or to provide endocardial treatment by way of vessel access or cavity access through to an interior surface of the heart.

38. The method of Claim 36, wherein said step of cryoablating said cryoinstruments create transmural lesions.

39. The method of Claim 37, further comprising a step of utilizing hybrid ablation procedures, simultaneously or in tandem, to ablate tissue in any region of said mammalian heart or within vasculature in a mammalian body, alone or in combination with said epicardial treatments and said endocardial treatments.

40. The method of Claim 39, wherein said hybrid ablation procedures comprise cryoablation in combination with surgical intervention or one or more ablative energy sources including radiofrequency, HiFu, and laser therapy.

What is claimed is:

1. A cryoengine for a cryogenic medical system, said cryoengine comprising:

a dewar that can be filled with liquid cryogen to create a cryogen reservoir;

a pressurization system having a first vessel positioned in the dewar and and being fluidly connected by a line having a control valve to a second vessel positioned outside the dewar, wherein a heater is arranged internal to the first vessel;

a fill valve;

a cryogenic flow actuator positioned in the dewar, wherein activation of the cryogenic flow actuator creates a flow of liquid cryogen from the cryogen reservoir, through the fill valve, into the first vessel;

a vent valve connected to the first vessel; and

one or more cryolines for connecting the cryoengine to one or more cryoinstruments and supplying cryogen to the one or more cryoinstruments;

wherein the first vessel includes a thermocouple that protrudes through the first vessel to measure a liquid cryogen level in the first vessel.

2. A cryogenic medical system comprising:

the cryoengine of claim 1; and

one or more cryoinstruments.

3. A method of generating supercritical nitrogen comprising the steps of:

a. providing the cryoengine of claim 1;

b. filling the dewar of the cryoengine with liquid nitrogen to create a cryogen reservoir, the first vessel being positioned in the cryogen reservoir;

c. activating the cryogenic flow actuator to fill the first vessel with liquid nitrogen and opening the vent valve connected to the first vessel to allow venting of vapor while filling;

d. following filling, closing the vent valve and opening the control valve between the first vessel and the second vessel to create a continuous pressurization system comprising approximately equal volumes of liquid nitrogen and nitrogen vapor; and

e. activating the heater in the first vessel to create a boiling microenvironment in the liquid nitrogen in the first vessel, the first vessel being positioned in the cryogen reservoir, thereby increasing pressure within the pressurization system to create supercritical nitrogen.

4. The method of claim 3, wherein the first vessel has a first temperature and the second vessel is positioned outside the cryogen reservoir and has a second temperature greater than the first temperature.

5. The method of claim 3, wherein the one or more one cryolines are immersed in the cryogen reservoir.

6. The method of claim 3, further comprising the step of allowing flow of supercritical nitrogen from the pressurization system, through the one or more cryolines, to the one or more cryoinstruments.

7. The method of claim 3, wherein the pressurization system is pressurized to a pressure of about 1,000 psi or greater.

8. The method of claim 3, wherein after the pressurization system is pressurized to a pressure of about 1,000 psi or greater, the method further comprises the step of allowing flow of supercritical nitrogen from the pressurization system, through the one or more cryolines, to the one or more cryoinstruments.