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Abstract

Delivery systems for spray and probe use are available to dermatologists and other practitioners. Their body is a small dewar or double lined flask, the lid features a release valve, a trigger, and a nozzle to which tips and probes are to adapt. One manufacturer adds a temperature monitor. In this section we present some of the systems available for liquid nitrogen (LN) delivery and the attachments with which they come.

Keywords

Delivery system • Dewar • Flask • Lid • Trigger • Valve • Nozzle • Tip • Probe

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LN must be delivered to lesions in a deliberate, controlled manner to ensure sufficient freezing of the target area to the necessary depth while sparing as much surrounding healthy tissue as possible.

Spray-release systems are the most commonly used in dermatology. Known for convenient, easy to use design, these small metal vacuum flasks contain a valve delivery system sealed under pressure that releases LN in an efficient and easily regulated manner. Several commercial LN delivery units are available virtually all share a few common features:

They are handheld, accommodating 300 ml, 350 ml, or 500 ml of LN. Holding times, average 12 h but can be up to 24; frequent usage will obviously decrease them. The body of the unit is a small dewar, with a tight-fitting screw-on lid that has a safety pressure valve to avoid excess pressure

buildup. A stem on the lid underside extends to the bottom of the inside of the canister when closed. A nozzle extends perpendicularly out of the top of the lid, with its tip having a mechanism to allow to interchange tips and probes. A trigger extends from the top of the lid downwards somewhat parallel to the canister. Evaporation of LN within the canister increases pressure; this pressure propels a stream of LN through the nozzle and spray tip or probe when the trigger is squeezed. The tip unit is held anywhere from less than one to a few centimeters from the surface of the skin when spraying.

Units vary by the ergonomics and shape of the canister itself and the shape and placement of the trigger and spray nozzle. Most have a fixed nozzle, one branded unit has a replaceable nozzle, which may be advantageous if the canister is dropped or tipped over. Recently, a manufacturer introduced an electronic attachment for certain spray units to provide visual indication of skin temperature and freezing levels.

Cotton tipped applicators can be soaked with LN and placed directly on lesions for freezing but may be less efficient in delivering coolant.

Handheld delivery systems for liquid nitrous oxide (N₂O) are smaller than LN spray units, barely larger than a fountain pen. Some N₂O units are cylindrical, accept a twist-in cartridge of NO₂ in their base, and have a button that releases N₂O when depressed. The N₂O escapes the cartridge and travels out through an interchangeable tip. The unit is held perpendicular to the lesion when used, and unlike LN spray units, the tip of the N₂O unit should contact the lesion directly during therapy because it is the liquid phase of N₂O that is the coolant. An cartridge once inserted can hold a charge for up to 3 months without use.

Examples of the above-described systems are shown below:

CRY-AC® and CRY-AC® 3 Brymill™

Fig. 14.1 Cry-Ac® 3 and Cry-Ac®



Product Features and Information:

- Slender, fingertip trigger for maximum control and ease of viewing – also rotates easily for left-handed users.
- Streamlined relief valve maintains a constant operating pressure to ensure consistent and accurate freezing.
- Patented safety Autovent design maximizes safety by allowing internal pressure to gradually vent, as the cap is unscrewed.
- Durable collar and cap cover insulates the user's hand and reduces condensation.
- Stainless steel and brass construction for long life.
- Sturdy base for extra stability.

Cry-Ac®-3

Smaller size for easier handling Weight Full: 618 g (24.0 oz.) Weight Empty: 412 g (14.5 oz.) Static Holding Time: 10–12 h Capacity: 300 ml.

Cry-Ac®

Larger size for greater capacity and longer holding time; Weight full: 895 g (31.6 oz.) weight empty: 540 g (19.0 oz.) Static Holding Time: 20–24 h. Capacity 500 ml.

Both the CRY-AC and CRY-AC-3 sets come complete with manual, 3 year unconditional warranty (both parts and labor), four regular tips: A (1 mm), B (0.8 mm), C (0.55 mm), and D (0.4 mm), a 20 gauge × 3" bent extension spray needle and a 20 gauge × 1" straight spray needle. All probes and sprays may be sterilized by steam or hot bead sterilizers.

The main valve body is made of stainless steel and a top is cover made of blue plastic to prevent sweating. It also has a narrow and slim design easing one-handed operation.

Delasco FrigiSpray® Liquid Nitrogen Spray Apparatus The FrigiSpray® features include an attached, black, sturdy base for better stability, a permanent, laser-etched label to keep contact information and caution statements in front of the user for the life of the unit and it comes in a custom-fitted sturdy canvas carrying bag, ideal for storing the unit or transporting it from one office to the next.

Other dermatologist-requested features include: a replaceable nozzle, which screws on and off the top of the FrigiSpray; a unique trigger sports an insulated and formed hand grip, to help with user control and handle temperature; a black plastic molding covers the top one third of the flask, protecting your hand better from the frigid temperatures of the nitrogen; and the screw-type connector allows any cryo-tip or probe to easily attach. Adapters are available to use Cry-AC tips on the FrigiSpray unit or to attach Luer-lock™ fitted tips such as probes.

FrigiSpray unit comes with a set of standard spray tips #1 extra small (0.4 mm), #2 small (0.5 mm), #3 medium (0.6 mm), #4 large (0.8 mm), bent extension spray, autoclavable tip tray and canvas carrying bag. It is a three hundred fifty milliliter flask with an average holding time of 12 h. One-year warranty.

CryoPro® Liquid Nitrogen Apparatus

CryoPro Liquid Nitrogen 500 ml (MAXI) and CryoPro Liquid Nitrogen 350 ml (MINI) units include six tips, tip/probe stand and unit base

Both offer cutting-edge design features creating ease of operation and reliability.

Spray tips and contact probes from other systems may be used with the CryoPro, making it a versatile addition to current LN equipment.

Each unit includes standard spray tips: A (1 mm), B (0.75 mm), C (0.55 mm), C (0.55 mm), D (0.45 mm), one bent extension spray tip, black plastic probe stand, and attached black base. Three-year worldwide warranty.



Fig. 14.2 (a) FrigiSpray® (b) Apparatus

Nitrospray Plus Nitrospray Plus, 16 oz and Nitrospray Plus Lite, 10 oz come with 5 Spray Tips (16, 17, 18, 19 and 20 gauge). Also comes with tip protector and base holder.

A lightweight self-pressurized, and easy-to-handle LN device simple to operate for fast and efficient treatments. It is trigger activated to permit perfect alignment of the outflow spray with the treatment site. The grooved neck makes the units easy to hold, and the position and shape of the trigger allows for unobstructed view of the area or lesion to be treated. Uses luerlock tip attachments. Has a 3-year warranty.

Frigitronics® Cryo-Plus™ Surgical System

This system has everything needed to perform cryosurgery procedures, from excellent thermoconductivity to temperature and pressure gauges. By monitoring the actual tip temperature with every freeze, you are assured an adequate freeze with each treatment. The Cryo-Plus System features interchangeable probes with safety pressure seals. All probes can be autoclaved for sterilization.



Fig. 14.3 CryoPro®: cryo/maxi and cryo/mini

Wallach. UltraFreeze Liquid Nitrogen Cryosurgical Sprayer Combines a cost-effective cryosurgical system with Wallach's proven reliability.

The compact, lightweight UltraFreeze is the new, easy-to-use, portable cryosurgical system ideal for most office skin procedures. A newly designed ergonomic handle offers comfort and control. Completely self-contained, the system delivers controlled spray. UltraFreeze is supplied with an assortment of easily attached Luer-lock closed tip or open apertures. It features:

- Available in two sizes (0.35 and 0.5 l).
- Ergonomically designed comfort handle.
- New smooth flow spray technology.
- Enhanced performance.
- New five spray apertures offer precision accuracy of liquid nitrogen spray for better control.
- Uniform pattern on skin.
- Three-year warranty.
- Available stand.
- Flat closed tips of 2 mm, 3 mm, 5 mm, 6 mm.
- Accu-shields to concentrate the LN spray within a limited area (six cones).
- 14 gage – 3 in. in length straight/ blue
- 14 gage –3 in. in length curved/blue
- 16 gage – 1 ½" in. in length straight/green
- 16 gage – 1 ½" in. in length curved/green



Fig. 14.4 (a) Nitrospray Plus®, (16 oz capacity) and (b) Nitrospray Lite® (10 oz capacity)



Fig. 14.5 Frigitronics® Cryo-Plus™ surgical system



Fig. 14.6 UltraFreeze®