

Cryo-Gel™

Orthopedic Surgical Device for Tumor

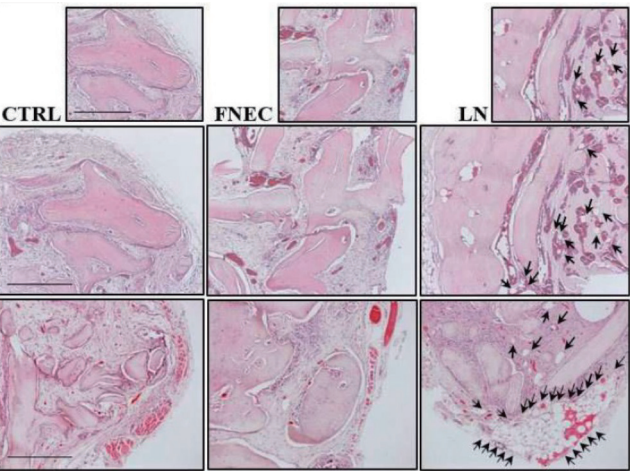


Cryotherapy in Bone Tumor Surgery –

Cryotherapy is widely used as an adjuvant treatment following tumor curettage to reduce the risk of local recurrence, particularly in the management of selected benign bone tumors. The therapeutic effect is achieved through exposure to cryosurgical temperatures, which induce tumor cell injury via ice crystal formation and subsequent necrosis. Clinical studies have demonstrated that cryotherapy can effectively devitalize tumor cells while preserving the structural integrity of the treated bone, supporting its use in limb-salvage procedures.^[1-3]

Limitations of Conventional Techniques –

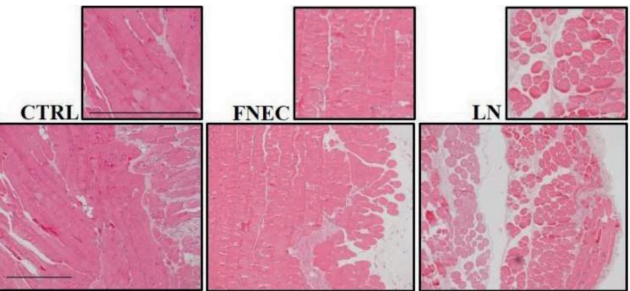
Conventional cryotherapy methods often rely on direct application of fluid cryogenic agents, which may present challenges in control, distribution, and containment. Its frozen temperature may lead to excessive exposure beyond the target area, increasing the risk of damage to surrounding soft tissues. In addition, the fluid nature of liquid nitrogen may result in uneven coverage within irregular cavities and introduce variability due to technique-dependent handling.^[4-7]



Vacuolation of bone sections^[7]



Difficulty in direct application of liquid nitrogen



Shrinkage area of muscle sections^[7]

Cryo-Gel Preparation System –

The Cryo-gel system is designed as a preparation platform for the intraoperative formation and delivery of a solidified ethanol-based cryogenic medium for localized application in cryosurgical procedures.

By utilizing an external cryogenic environment with liquid nitrogen, the system enables the 95% ethanol to undergo phase transition into a solid or semi-solid state that can be readily handled and placed within the cryosurgical site. Upon placement, the material gradually transitions into a semi-solid form that conforms to the local anatomy while maintaining an appropriate environment for cryosurgery.

This approach supports improved control of cryogenic medium during application, facilitating more consistent contact of the target area while reducing uncontrolled flow associated with conventional fluid-based techniques.

Aspect	Liquid Nitrogen (Conventional)	Solidified Cryogenic Medium (Cryo-Gel System)
Physical State	Fluid	Solid / semi-solid
Handling	Free-flowing, difficult to control	Can be held and placed precisely
Application Control	Risk of spread beyond target	Localized and controlled placement
Tissue Exposure	Risk of unintended exposure	Reduced risk through targeted application
Distribution in Cavity	May be uneven in irregular defects	Conforms and fills target more consistently
Temperature Intensity	Extremely low (-196°C)	Moderated via phase-controlled medium
Soft Tissue Safety	Higher risk of cryogenic injury	Improved control may reduce unintended damage
Operative Usability	Technique-dependent	More standardized handling
Containment	Difficult to confine	Intrinsic containment via form factor

Solidified Cryogenic Medium Formation Platform

The system is designed to support intraoperative preparation of a solidified cryogenic medium for localized cryosurgical application. By enabling controlled formation of the Cryo-Gel, the system facilitates filling of irregular surgical cavities and more consistent coverage within the target area, while helping to reduce unintended cryogenic exposure to adjacent non-target tissues.

Assistive Retrieval Feature

- Optional probes can be inserted into the medium prior to solidification
- Enables simple handling and transfer of the prepared cryogenic medium



Distributor

Dedicated Cryogen Filling Port

- Features a designated inlet area for controlled liquid nitrogen delivery
- Compatible with the provided distributor to facilitate controlled cryogen pouring

Medical-Grade Silicone Outer Chamber

- Designed to withstand cryosurgical conditions without structural failure



Preparation set for rectangular-shaped cryogenic unit

Integrated Metal Tray

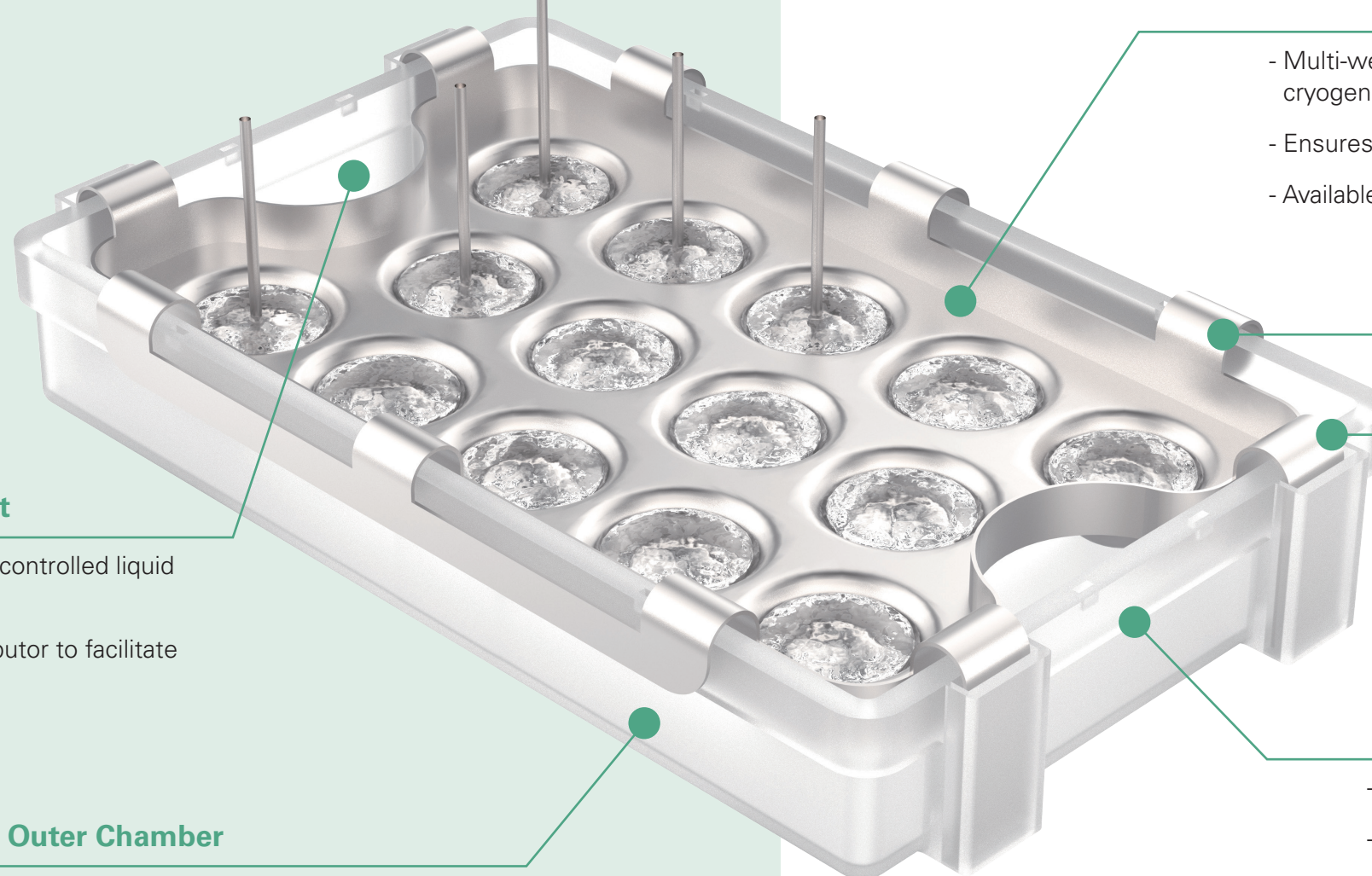
- Multi-well design enables simultaneous preparation of multiple cryogenic units
- Ensures uniform geometry for consistent application
- Available in round and rectangular well designs

Assembly Interface

- Designed to ensure standardized contact between tray and chamber
- Promotes uniform cooling and prevents displacement during operation

Reference Mark

- Visual guidance for adequate liquid nitrogen level
- Helps ensure continuous cooling performance



Order Information

Catalog Number		Description
	SPH-14	Cryo-Gel Preparation Set – Round, 14-well, Sterile
	CRO	Cryo-Gel Preparation Set – Round, 14-well, Non-sterile
	REC-12	Cryo-Gel Preparation Set – Rectangular, 12-well, Sterile
	CRO REC-12	Cryo-Gel Preparation Set – Rectangular, 12-well, Non-sterile
	DIS	Cryo-Gel Distributor with Ladle
	DL2000	Double-layer Insulation Cylinder

References

^[1] Marcove R. C. et al. (1978). Cryosurgery in the treatment of giant cell tumors of bone: a report of 52 consecutive cases. Clin Orthop Relat Res. (134):275-89.

^[2] Tsuchiya H. et al. (2010). Pedicle frozen autograft reconstruction in malignant bone tumors. J Orthop Sci. 15(3):340-9.

^[3] Gage A. A. (1992). Cryosurgery in the treatment of cancer. Surg Gynecol Obstet. 174(1):73-92.

^[4] Gage A. A. & Baust J. (1998). Mechanisms of tissue injury in cryosurgery. Cryobiology. 37(3):171-86.

^[5] Hindiskere S. et al. (2020) What are the challenges and complications of sterilizing autografts with liquid nitrogen for malignant bone tumors? A preliminary report. Clin Orthop Relat Res. 478(11):2505-2519.

^[6] Chen C. et al. (2017). Postoperative complications with cryotherapy in bone tumors. J Bone Oncol. 7:13-17.

^[7] Chen C. F. et al. (2018). A safety comparative study between freezing nitrogen ethanol composite and liquid nitrogen for cryotherapy of musculoskeletal tumors. Cryobiology. 83:34-39.

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