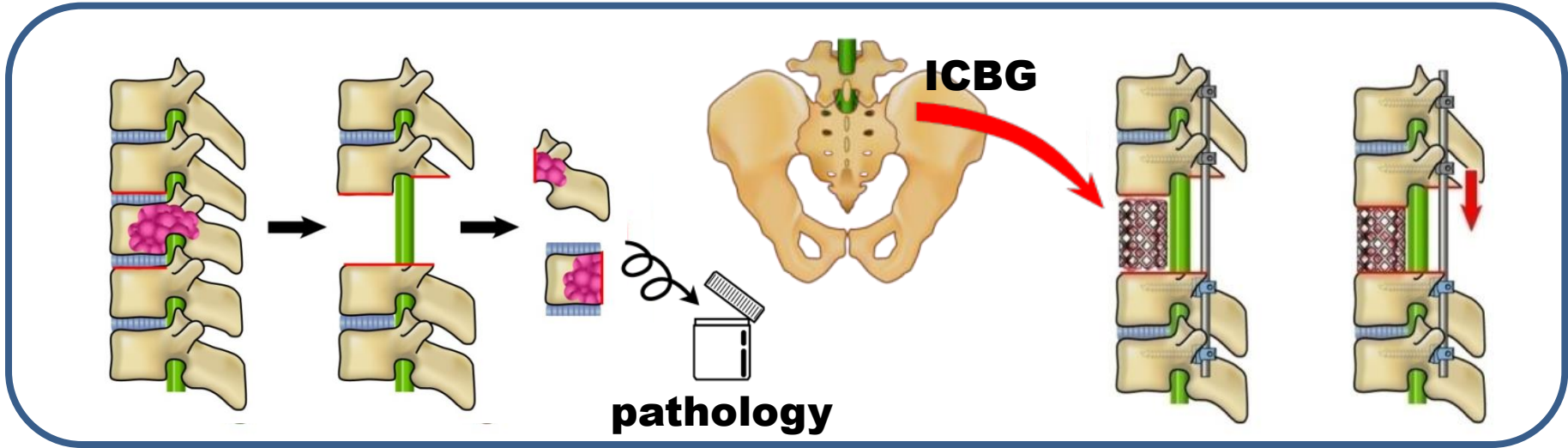


Novel Technique of Total En Bloc Spondylectomy Enhancing Antitumor Immunity for Spinal Tumors

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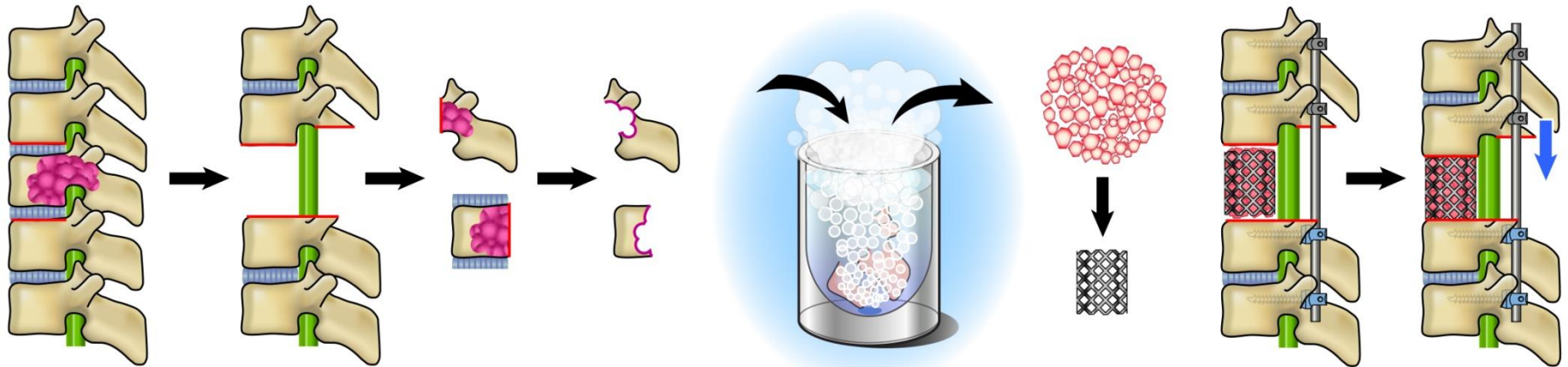
Total en bloc spondylectomy (TES)



In original TES, autograft from iliac crest or fibula are harvested.

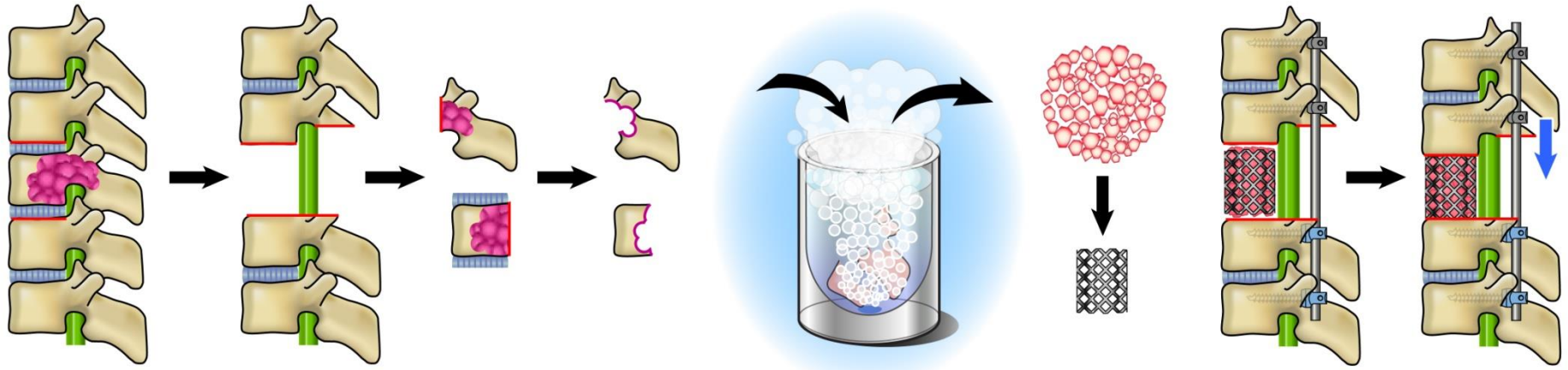


Second-generation TES



In second-generation TES, resected tumor spine is put into liquid nitrogen (-196°C) for 20 minutes. Then, the frozen spine is crushed, and packed into a titanium cage.

Why do we use frozen tumor spine?



**Tumor cells are totally killed
by liquid nitrogen for 20 minutes.**

**On the other hand,
tumor antigens are preserved,
rather strongly exhibited.**

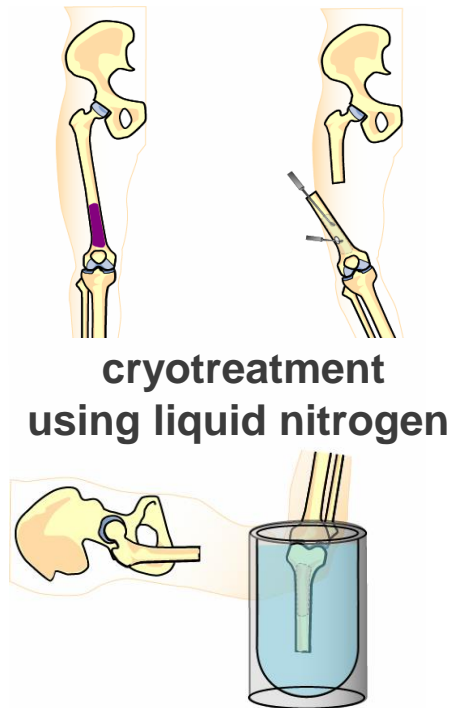


Tumor-specific immune response occurs !!

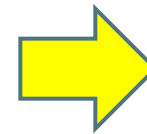
In cryosurgery, antitumor immunity is activated after cryoablation of tumor such as breast ca., HCC, RCC, or prostate ca., and so on. It has been reported that metastatic lesions decreased in size or metastases disappeared by cryoimmunological effect after cryosurgery.

1. Ablin RJ, et al. Prospects for cryo-immunotherapy in case of metastasizing carcinoma of the prostate. *Cryobiology* 1971; 8: 271-279.
2. Sabel MS, et al. Immunologic response to cryoablation of breast cancer. *Breast Cancer Res Treat* 2005; 90: 97-104.
3. Osada S, et al: Serum cytokine levels in response to hepatic cryoablation. *J Surg Oncol* 2007; 95: 491-498.

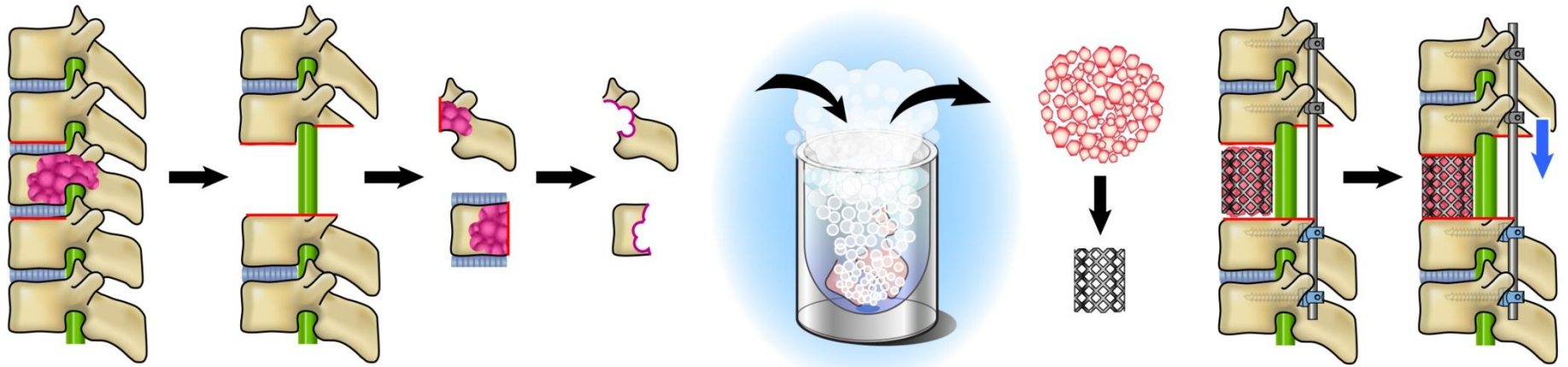
★ Tsuchiya H, et al. Reconstruction using an autograft containing tumor treated by liquid nitrogen. *J Bone Joint Surg* 2005; 87-B: 218-225.



**cryotreatment
using liquid nitrogen**



Cryotreatment for bone tumors was established in our (Kanazawa) University by Prof. Tsuchiya. This procedure has become popular in extremities and pelvis.



We applied tumor-induced cryoimmunology to TES surgery.

Second-generation TES

(2010.5 – 2013.1)

Metastatic tumor 57

Renal cell ca. 13

Breast ca. 11

Thyroid ca. 8

Colon ca. 3

Lung ca. 3

Leiomyosarcoma 2

Chondrosarcoma 2

others 15

Primary tumor 8

total 65

Evaluation of immunity-enhancing effect


IFN- γ


IL-12

cytokines suggestive of cancer immunity

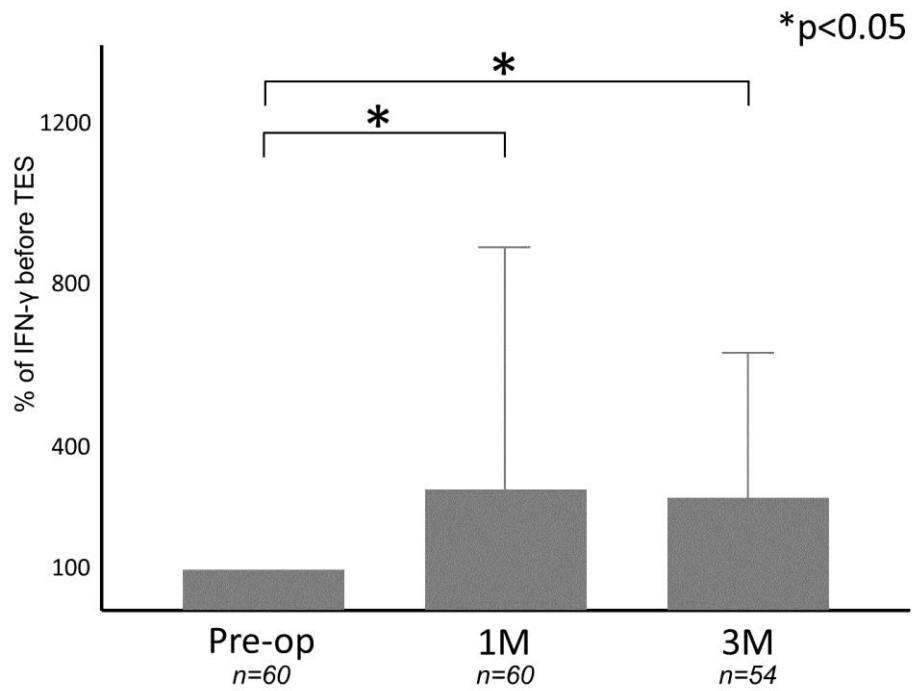
were analyzed before the surgery and 1 to 3 months after the surgery that is the time of general condition improvement.

Evaluation of immunity-enhancing effect

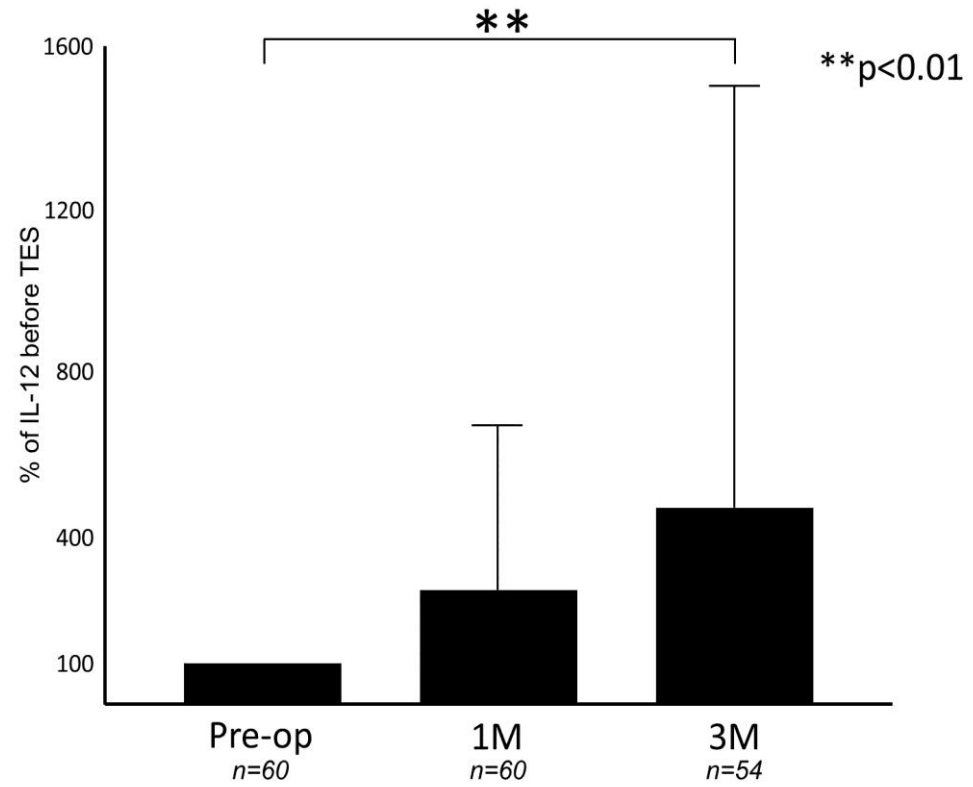
IFN- γ 45 / 60 (75.0%) 

IL-12 44 / 60 (73.3%) 

IFN- γ



IL-12



Advantages in “second-generation TES”

1) induce cryoimmunity

2) not need bone harvest

⇒ decrease operative duration

⇒ decrease blood loss

⇒ no pain from bone harvest site

Disclosure

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in support of this study*