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## Secondary hyperparathyroidism

Secondary hyperparathyroidism (SHPT) may occur in patients with renal insufficiency leading to abnormally high serum phosphate. Also, SHPT is a side effect in patients with decreased calcium uptake caused by diseases such as Morbus Crohn, celiac disease or cirrhosis of the liver. Continuously high phosphate levels induce overproduction of parathormone (PTH) in the parathyroid glands and its secretion<sup>1</sup>.

Untreated patients with SHPT may cause Bone diseases or cardiovascular diseases in leading to increased mortality<sup>2</sup>.

## Challenges of the cryopreservation for a later autologous transplantation

One way of treatment is the surgical excision of the parathyroid glands<sup>3</sup>. To avoid a later undersupply with the parathormone (PTH), the removed tissue has to be cryopreserved and stored in the gas phase of liquid nitrogen, to provide the possibility to the patient to autotransplant the parathyroid glands<sup>4</sup>.



Fig. 1: GMP-conformal Cryobank from BioKryo GmbH in 66280 Sulzbach/Saar with the permission to store therapeutic samples according § 20c AMG.

This cryopreservation and cryostorage of parathyroid glands had been done so far by the clinicians themselves. Due to the small number of cases and the low required standards, the hospital investment in providing necessary equipment was poor in some cases. The cryostorage needs special equipment and infrastructure. The storage in the gas phase of liquid nitrogen requires an expensive biobank infrastructure as well as special trained personal. Hence, only few clinics may offer the cryopreservation of parathyroid glands for their patients.

## HyperPara Service

BioKryo developed a new, validated process for the cryopreservation during transportation to the biobank.

For this, the clinic is supplied on time with all necessary material for the cryopreservation, including cryomedium, dry ice, packing material and a freezing device<sup>5</sup>.

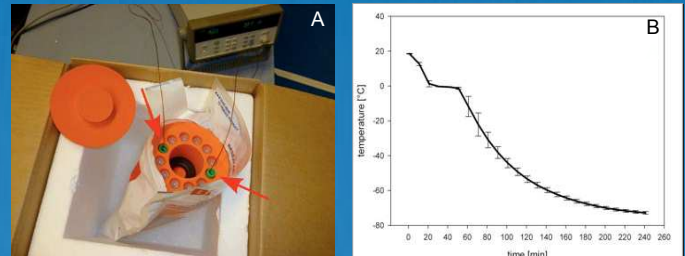


Fig. 2: Freezing rate determination of an alcohol-free freezing device; A: experimental set-up, thermocouples in 2 ml cryovials were placed in the freezing-device in secondary packaging in a dry ice box. B: freezing rate of 2 ml cryovials within alcohol-free freezing device. Error bars indicate standard deviation.

The tissue will be put into the cryomedia already in the Operating room, filled in vials and packed with the freezing device into the dry ice. The transport to the biobank of BioKryo GmbH is done by the cooperation partner TNT.

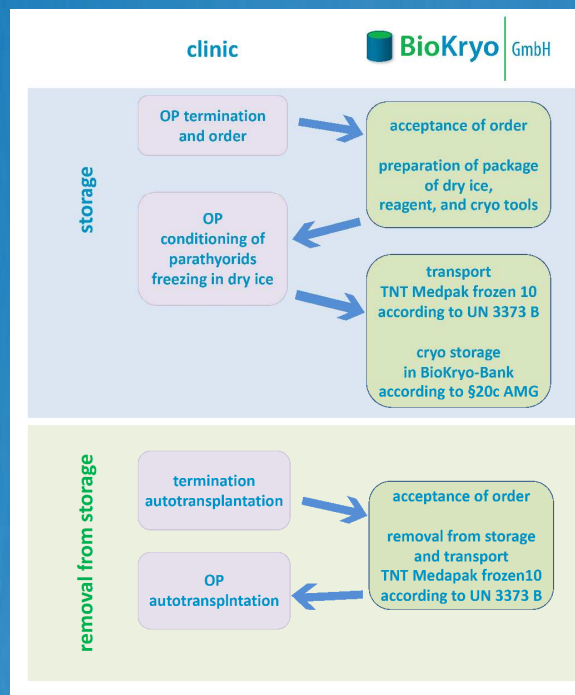


Fig. 3: Process of the HyperPara service from BioKryo GmbH

The GMP conform storage of the parathyroid glands occurs to the German Pharmaceuticals Act. While an upcoming autotransplantation the tissue will be shipped before the operating day to the clinic.



Fig. 4: Semiautomatic cryostorage system with the Fraunhofer-Cryostorage-Technology (Fa. Askion)

BioKryo GmbH offers cryostorage of valuable therapeutical and diagnostical biological samples, like stem cells and tissues. As a spin-off of the Fraunhofer-Institute for Biomedical Engineering (IBMT), the BioKryo GmbH profits from a 10 year-experience in cryotechnology and stem cell research. The BioKryo GmbH possesses a manufacturing license according to § 20c AMG for the storage of e.g. tissues or therapeutic stem cell lines and is therefore able to provide a GMP compliant storage service

<sup>1</sup> Almaden Y, Hernandez A, Torregrosa V, Canalejo A, Sabate L, Fernandez Cruz L, Campistol JM, Torres A, Rodriguez M, 1998, High phosphate level directly stimulates parathyroid hormone secretion and synthesis by human parathyroid tissue in vitro, *J. Am. Soc. Nephrol.*, 9: 1845-1852

<sup>2</sup> Block G, Port FK, 1999, Calcium phosphate metabolism and cardiovascular disease in patients with chronic kidney disease, *Semin. Dial.*, 16: 140-147

<sup>3</sup> Leapman SB, Filo RS, Thomalla JV, King D, 1989, Secondary hyperparathyroidism. The role of surgery., *Am Surg.*, 55:359-365

<sup>4</sup> Dt. Ges. f. Chirurgie 1999, Grundlagen der Chirurgie G 86, Mitteilungen der dt. Ges. f. Chirurgie, 28. Jg., Nr. 4

<sup>5</sup> BioCision, 2012, Cool Cell Overview, biocision.com