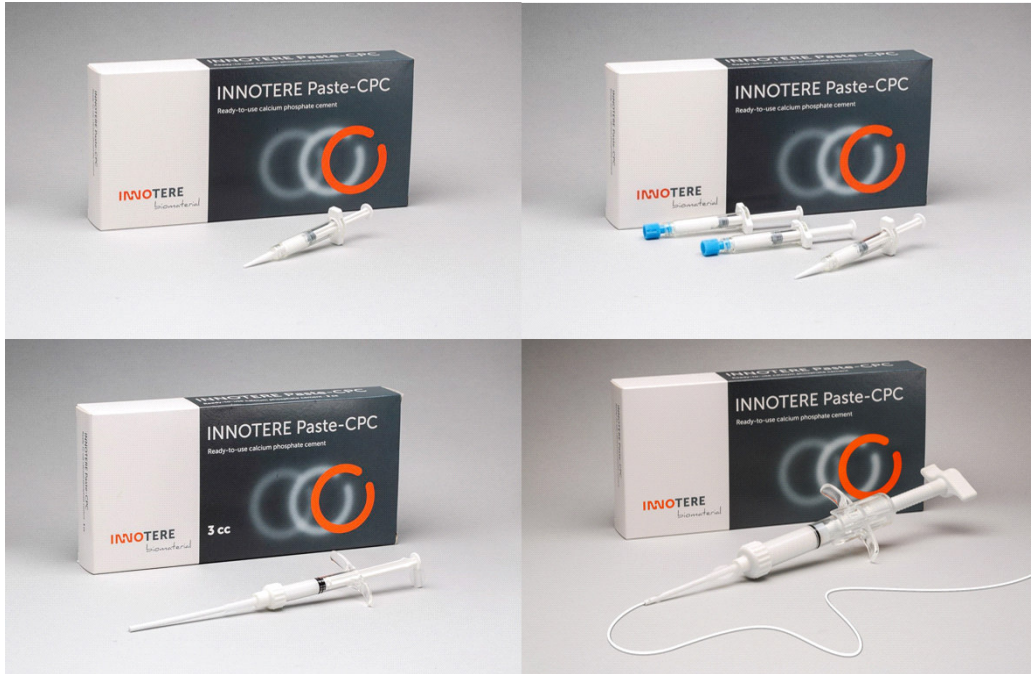


INNOTERE

Biomaterial



INNOTERE Paste-CPC

Product Information

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PRODUCT DESCRIPTION



INNOTERE Paste-CPC is a synthetic bone substitute material for filling non-infected bone defects.

INNOTERE Paste-CPC is a mineral bone cement consisting of calcium and phosphate salts finely dispersed in a biocompatible oil phase.

INNOTERE Paste-CPC does not contain any medical substances, tissues, cells or their derivatives of human and/or animal origin.

INNOTERE Paste-CPC is ready-to-use and does not require preparation.

INNOTERE Paste-CPC is minimally-invasive in application using the provided cannula.

INNOTERE Paste-CPC is cohesive, hence suitable for screw augmentations.

INNOTERE Paste-CPC is self-setting and hardening after contact with aqueous body fluids to a micro-crystalline, calcium deficient hydroxyapatite.

INNOTERE Paste-CPC is radio-opaque, hence clearly visible under the fluoroscope and on X-rays.

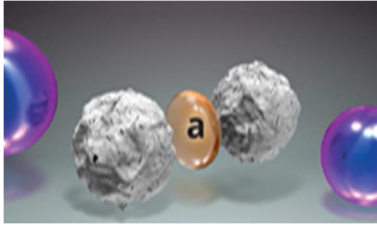
INNOTERE Paste-CPC is resorbed by cell-mediated processes and replaced by newly formed bone.

INNOTERE Paste-CPC is a gamma sterilized medical device and is intended for single use only.

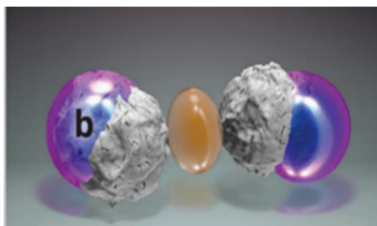
SCIENCE BEHIND INNOTERE PASTE-CPC

Setting process

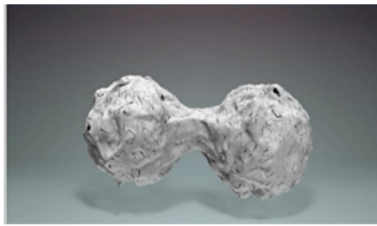
INNOTERE Paste-CPC consists of a mixture of biomineral powders in a biocompatible non-aqueous carrier liquid. Together, these components form a cohesive, viscous bone substitute paste with favourable flow characteristics. The setting reaction of Paste-CPC is triggered by the progressive exchange of the non-aqueous carrier liquid with aqueous body fluids in the bone defect.



The non-aqueous carrier liquid (a) prevents the biomineral powders (grey) from starting a reaction process in an anhydrous environment.



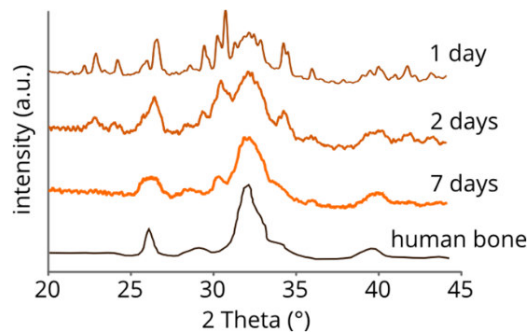
As soon as INNOTERE Paste-CPC comes into contact with aqueous body fluids (b), the non-aqueous carrier liquid is displaced into the vascular system and metabolized. The biomineral powder is then completely covered with aqueous body fluids and the setting process of INNOTERE Paste-CPC is initiated.



Once the crystallization process is initiated, the calcium phosphate crystals begin to interlock, increasing the mechanical strength of the implant. The surface shape stability is achieved after 10 to 15 minutes. INNOTERE Paste-CPC achieves a compressive strength of more than 15 MPa - typically 35 MPa once fully hardened.

BENEFITS

Chemical composition and crystalline structure

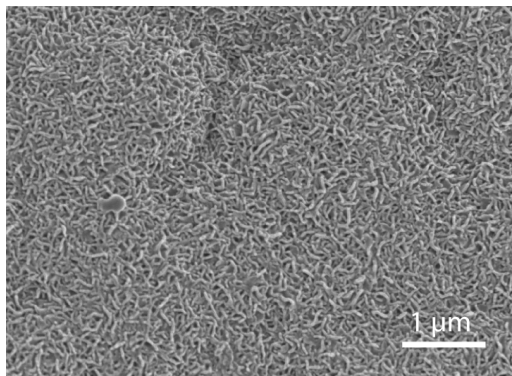


X-Ray-Diffraction of human bone (black curve) and INNOTERE Paste-CPC one, two and seven days after start of the setting reaction.

After initiating the crystallisation process of INNOTERE Paste-CPC the chemical composition starts to adapt to the surrounding bone. This reaction is confirmed by X-Ray-Diffraction (XRD) analysis, which shows continuous change to calcium deficient hydroxyapatite after seven days. XRD confirms that the chemical composition and crystalline structure of INNOTERE Paste-CPC (orange lines) is essentially the same as the mineral component of human bone (black line).

- ➔ Osteoconductive
- ➔ Resorption by cell-mediated processes

Surface area

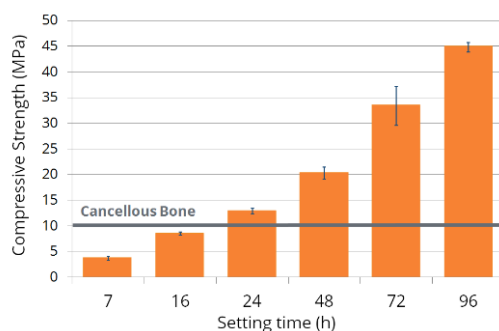


SEM image of INNOTERE Paste-CPC after setting.

Since INNOTERE Paste-CPC does not undergo a high-temperature sintering process, the crystals form in situ and result in a specific surface that is about 100 times higher ($50 \text{ m}^2 / \text{gr.}$) than for sintered bone substitutes. A large specific surface area is essential for the settlement of osteoclasts and osteoblasts and thus for rapid bone formation

- ➔ Efficient Osteointegration

Compressive strength



Compressive strength during the setting process of INNOTERE Paste-CPC.

Once the setting process is initiated, the compressive strength of INNOTERE Paste-CPC increases continuously. A hard outer layer forms already 10 minutes after injection, covering the paste-like core and allowing the surgeon to place an osteosynthesis implant. After 16 to 24 hours, the compressive strength is similar to that of cancellous bone. Final compressive strength is achieved after about four days (depending on the volume/geometry of the bone defect and supply of body fluid) and is three to four times higher than with healthy cancellous bone.

- ➔ Support for fixation

Viscosity and cohesion



X-ray showing cohesion properties of INNOTERE Paste-CPC after screw augmentation at proximal humerus.

The adjusted viscosity of INNOTERE Paste-CPC ensures complete filling of irregular bone defects and retention in the bone cavity. Excellent cohesion properties of INNOTERE Paste-CPC ensure a particle release of less than 2%.

- ➔ Ideal flow properties
- ➔ Low risk of extravasation

Radio-opacity



X-ray showing visibility of INNOTERE Paste-CPC after treatment of enchondromas on the foot (proximal phalanx)

The high mineral density of INNOTERE Paste-CPC results in improved visibility on X-ray images compared to other calcium phosphate cements. The convenient visibility allows monitoring and adjustment of the material flow of INNOTERE Paste-CPC in the fluoroscope during operation.

- ➔ Adjustable and controllable application

Ready-to-use



Application of INNOTERE PASTE-CPC out of a 3ml syringe

INNOTERE Paste-CPC is ready to use and can be applied directly without intermediate steps or prior mixing.

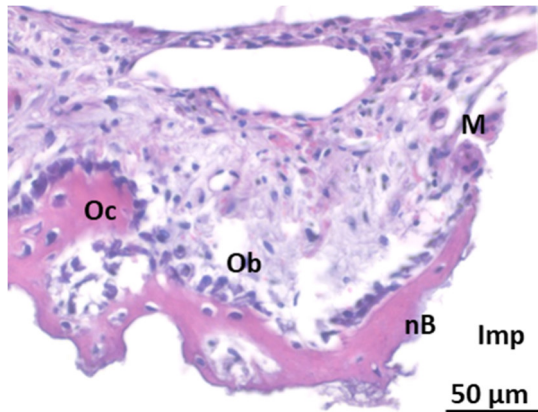
INNOTERE Paste-CPC is either applied directly from the syringe or minimally invasively via the enclosed cannula

- ➔ Fast and precise application

CLINICALLY APPROVED

Since 2014, INNOTERE Paste-CPC is available as a bone graft substitute in a wide range of indications. During that time, no unexpected side effects have occurred. Clinical data from post-marketing surveillance confirm that INNOTERE Paste-CPC performs safely in routine clinical practice when used as intended. INNOTERE Paste-CPC promotes efficient osteointegration followed by cellular resorption.

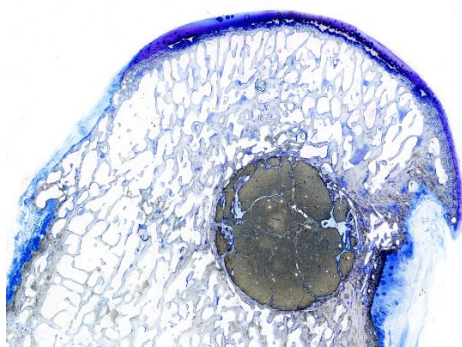
Osteointegration



Histology of a bone defect filled with INNOTERE Paste-CPC. The implant (Imp) is surrounded by newly formed bone tissue (nB) including osteoblasts (Ob) and osteocytes (Oc) as well as granulation tissue after 4 weeks. Mononuclear and polynuclear macrophages (M) (osteoclastic activity) promote resorption of both implant material and bone fragments formed during implantation. Thus, the histologic images show active bone remodeling processes typical of the early phase of implant healing and signs of osseointegration of the implant.

Histological image of the tibial defect after 4 weeks (University of Giessen-Marburg / Germany, sheep study in critical size tibial head & femoral condyle defects) :

Resorption



Histology of a bone defect filled with INNOTERE Paste-CPC. INNOTERE Paste-CPC is absorbed by cellular processes due to its chemical composition (CDHA) and microcrystalline structure similar to natural bone. Hence, bone remodeling occurs synchronously with the resorption of the implant material in a gradual substitution process. Resorption proceeds from the periphery to the center, whereby cracks and pores in the bone cement are first filled by new bone tissue.

Histological image of the tibial defect after 3 month (University of Giessen-Marburg / Germany, sheep study in critical size tibial head & femoral condyle defects)

INDICATIONS

INNOTERE Paste-CPC is intended for filling non-infected and non-load-bearing bone defects or for filling bone defects that have been sufficiently stabilised by appropriate means.

Trauma

Treatment of metaphyseal bone defects, e.g. fractures of the tibia, radius and humerus.

Reconstruction

Filling of bone cavities after resection of cysts and benign tumours.

Filling of bone cavities after removal or replacement of osteosynthetic implants.

Support

Support for the fixation of osteosynthetic implants, e.g. of bone screws.

Clinical Case Report

INNOTERE Paste-CPC

INNOTERE GmbH

E-Mail: contact@innotere.de
Internet: www.innotere.de

Tibia Plateau Fracture (Lateral split depression)



Surgeon/Institution:

- Senior physician Susann Schmidt
- Dresden Municipal Hospital, Friedrichstadt
- Specialist for Orthopedics and Trauma Surgery /Special Trauma Surgery/sports medicine/ATLS-Provider



Patient/Diagnose:

- 46 years old, female
- AO 41 B 3.1 Lateral split depression , right (Type II according to Schatzker classification)

Therapy:

- Open reduction and relining of the bone defect using INNOTERE Paste-CPC (3 cc)
- Osteosynthesis: traction screw, lateral tibia plate with angular stability (4 screw holes LCP Proximal Lateral Tibia Plate 3.5 mm; SYNTHES)

Follow-Up:

- Right knee joint: post-operative movement exercises (unlimited)
- 4 days post-op: pain adapted workout of the right leg
- 6 weeks post-op: unrestricted mobility, normal gait pattern



Conclusions:

- Easy handling of INNOTERE Paste-CPC (for surgeon as well as surgical staff)
- Since day 4 post-op, pain adapted workout was possible. Therefore, healing process and return to everyday life activities take place more faster.

Clinical case report

INNOTERE Paste-CPC

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Lateral tibial plateau fracture



Surgeon / Hospital

- Professor Dr. Dr. Volker Alt
- University Hospital Regensburg, Germany, Department of Trauma Surgery

Pre-operative X-rays



Patient/Diagnosis:

- 61 years old male
- Lateral tibial plateau fracture left tibia, type Schatzker V

Therapy:

- Open reduction and internal fixation with anatomical angular stable plate proximal tibia left
- Defect filling with INNOTERE Paste-CPC lateral tibial plateau left

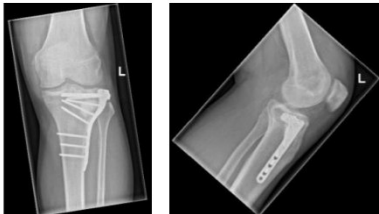
Intraoperative image, post-operative X-rays day 1



Results:

- INNOTERE Paste-CPC was easy to handle during the operation and allowed sufficient bone defect filling.
- 6 months post-op: X-rays showed complete fracture healing with osseous integration and initial degradation of INNOTERE Paste-CPC. No subsidence of articular surface.
- INNOTERE Paste-CPC supports the defect through good osseous integration and is gradually replaced by the newly formed bone.

Post-operative X-rays 6 months



Clinical case report

INNOTERE Paste-CPC

INNOTERE GmbH

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Internet: www.innotere.de

Ankle fracture with bone defect



Surgeon / Hospital

- Professor Dr. Dr. Volker Alt
- University Hospital Regensburg, Germany, Department of Trauma Surgery

Pre-operative X-rays



Patient/Diagnosis:

- 60 years old female
- Ankle fracture type WEBER C with bony defect of distal fibula

Therapy:

- Open reduction and internal fixation with plate and screws of distal fibula, medial malleolus and distal tibia
- Filling of the fibula defect with INNOTERE Paste-CPC

Results:

- Paste-CPC was easy to handle during the operation and allowed sufficient bone defect filling.
- 10 weeks post-op: X-rays showed complete fracture healing with beginning of osseous integration of Paste-CPC.
- INNOTERE Paste-CPC supports the defect through good osseous integration and is gradually replaced by the newly formed bone.

Post-operative X-ray day 1



Post-operative X-ray 10 weeks



Clinical case report

INNOTERE Paste-CPC

INNOTERE GmbH

E-Mail: contact@innotere.de
Internet: www.innotere.de

Enchondroma distal femur



Surgeon / Hospital

- Professor Dr. Dr. Volker Alt
- University Hospital Regensburg, Germany, Department of Trauma Surgery

Pre-operative MRT scan



Patient/Diagnosis:

- 40 years old male
- Enchondroma distal femur left side

Therapy:

- Minimally invasive resection of enchondroma with intraoperative navigation
- Defect filling with INNOTERE Paste-CPC calcium phosphate bone cement

Post-operative X-rays day 1



Results:

- The simple and easy application of the bone cement allowed a good defect filling of the enchondroma.
- Post-operative X-rays show complete filling of the former enchondroma lesion
- Good wound healing. No signs of inflammation.

Clinical case report

INNOTERE Paste-CPC

INNOTERE GmbH

E-Mail: contact@innotere.de
Internet: www.innotere.de

Enchondromatosis in the phalanx



Treating doctor/clinic:

- Dr. med. Jörg Rößler
- Practice for Hand and Plastic Surgery, Dresden

Pre-operative X-ray



Post-operative X-ray 2 years



Patient/Diagnosis:

- Child suffers from multiple, recurrent enchondromas (hand and foot area)
- Diagnosis: Enchondromas in the left foot, basic limb (D2, D3)

Therapy:

- Curettage of the enchondrome
- Defect filling with bone graft substitute INNOTERE Paste-CPC
- Biopsy → histopathological examination of the lesion
- Regular radiological follow-up

Results:

- Easy and simple application of INNOTERE Paste-CPC allowed good bone defect filling of the enchondromas.
- Examination after 6 weeks without abnormal findings, no signs of inflammation, bone stable under load.
- Clinical follow up after 2 years showed good integration of the bone cement INNOTERE Paste-CPC into the bone structure and signs of beginning resorption.

PRODUCT INFORMATION

INNOTERE PASTE-CPC is a single-use product sterilised with Gamma irradiation. Shelf life is 3 years.

PACKAGING, STORAGE AND TRANSPORTATION

The 3 ml, 6 ml and 12 ml INNOTERE PASTE-CPC syringe is contained in a sterile double blister within a protective cardboard box.

The 1 ml and 3x 1 ml INNOTERE PASTE-CPC syringe is contained in a sterile aluminium bag within a protective cardboard box.

INNOTERE Paste-CPC should be stored at room temperature (between 5° and 25°C).

ORDERING

Article Number	Article
111VX2	INNOTERE PASTE-CPC 3 ml, in syringe, sterile, with cannula
211IP1	INNOTERE Paste-CPC 1 ml, in syringe, sterile, with cannula
231IP1	INNOTERE Paste-CPC 3x 1 ml, in syringe, sterile, with cannula, triple package
311IP2	INNOTERE Paste-CPC 6 ml, in syringe, sterile, with cannula
311IP1	INNOTERE Paste-CPC 12 ml, in syringe, sterile, with cannula

INNOTERE GmbH, Meissner Str. 191
01445 Radebeul, Germany

www.innotere.de

 : order@innotere.de

 : +49 351 2599 9429

CE 0197

The product is manufactured in Germany.
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