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Preservation in motion



Ceros TCP granules
Synthetic bone substitute

Product information

Our Synthetic Bone – Features & Benefits

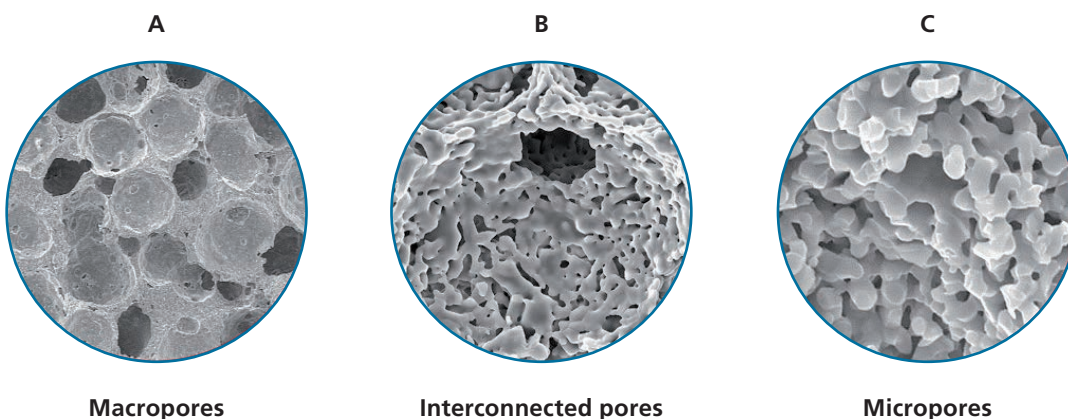
Chemical composition

The biological behaviour of bone substitutes is influenced by many factors, such as chemical composition, porosity, pore sizes and interconnections, vascularisation and cell and bone infiltration of the scaffold^{1,2,3}. Ceros TCP granules have been developed to mimic the porous structure, chemical composition and remodelling behaviour of cancellous bone.

Ceros TCP granules are synthetic, osteoconductive, resorbable and biocompatible bone substitutes consisting of β -tricalcium phosphate (β -TCP, $[\text{Ca}_3(\text{PO}_4)_2]$) complying with the standards ASTM F 1088 and ISO 13175-3. The solubility and Ca/P molar ratio of β -TCP are close to those of bone mineral. As a result, β -TCP is remodelled into bone by cellular processes. Ceros TCP granules are initially radio-opaque. As the bone remodelling process progresses the radio-opacity will resemble the one of autologous bone.

Porous structure

Ceros TCP granules have a total porosity (A) of 60 % with interconnecting macropores (B) of 100–500 μm , allowing vascularisation and bone tissue ingrowth¹. The microporosity (C) (1–10 μm) enlarges the surface area of the pores and increases the interface between bone and bone substitute.



Macropores

Interconnected pores

Micropores

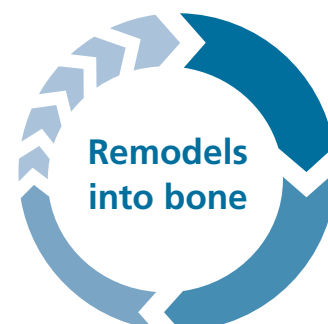
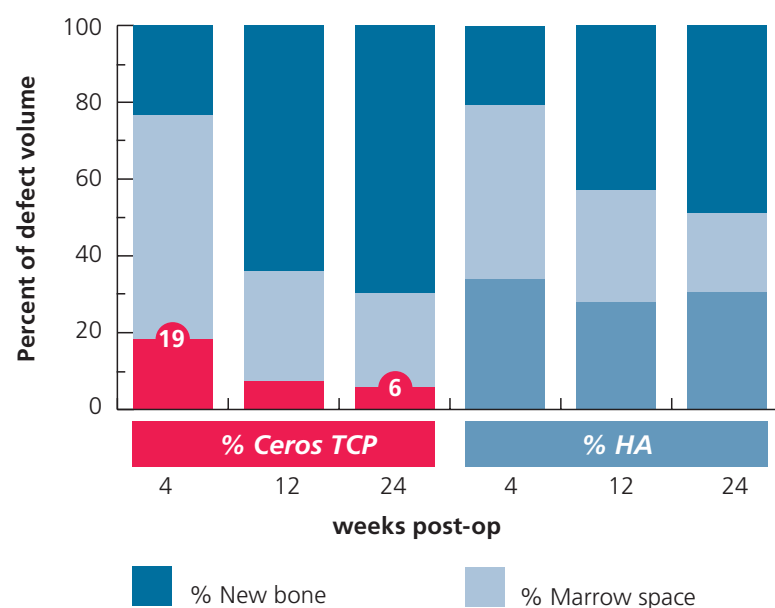
Remodelling into bone

Bone is a dynamic tissue which undergoes a continuous remodelling process. The complex process requires interaction between different cell types which are regulated by a variety of factors. Osteoclasts are the bone-crushing cells, whereas osteoblasts are the bone-building cells.

The chemical composition and porous structure of Ceros TCP granules allow for adaptation to the continuous remodelling cycle of healthy bone. Depending on the patient's constitution and age, (e.g. sex, metabolism) and the location and size of the bone defect, Ceros TCP granules are completely remodelled into vital bone within 6–18 months ^{4, 8, 11, 14, 16, 17, 22}.

Ceros TCP granules inserted in a defined mandibular defect in minipigs transformed almost completely into homogenous bone structure within 24 weeks (from 19% to 6%, see figure), whereas hydroxyapatite (HA) hardly resorbs ⁴.

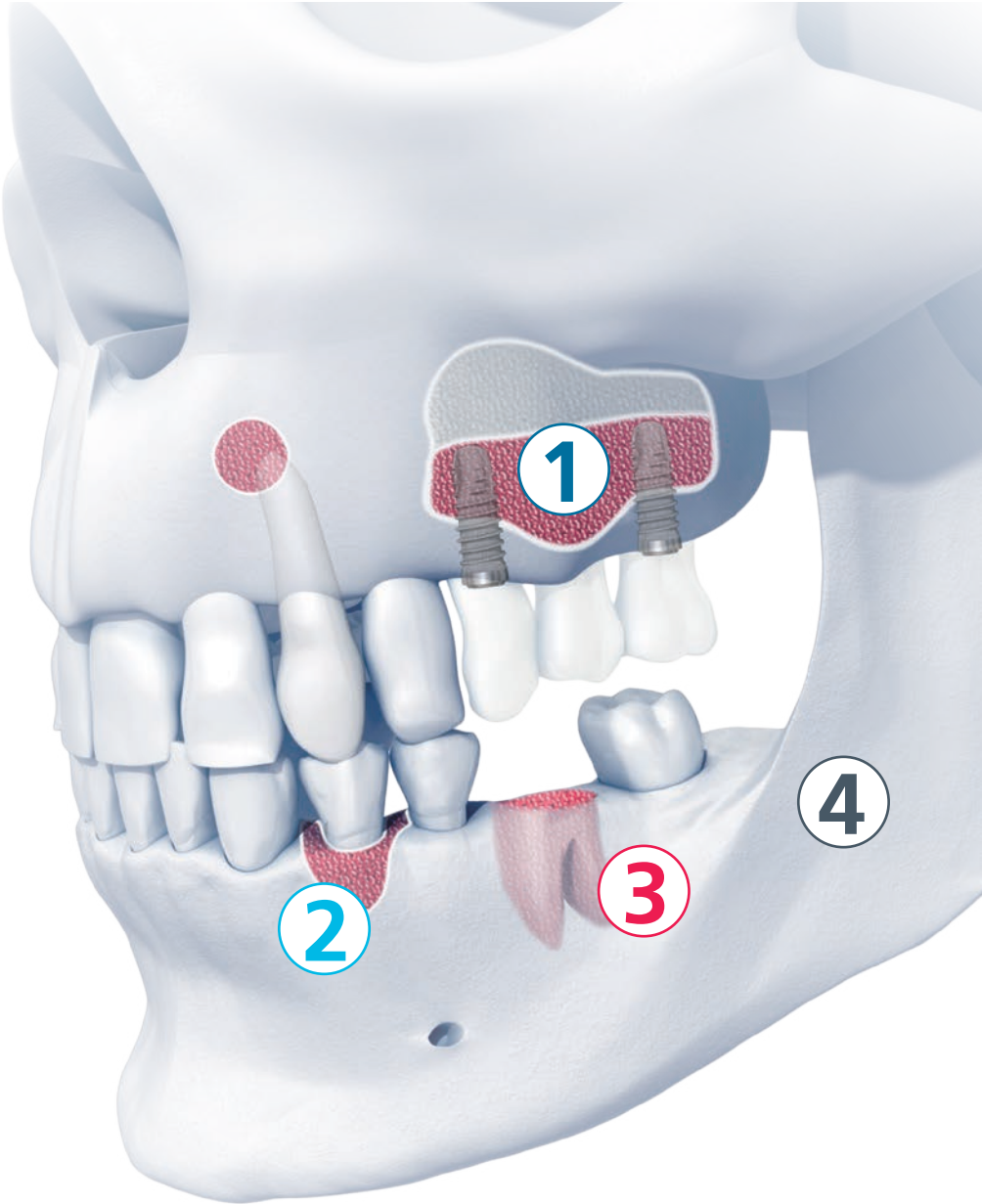
Remodelling of Ceros TCP granules



Its Performance

Intended use

Ceros TCP granules are indicated for use as bone void filler in non-load-bearing areas in the periodontal, oral and maxillofacial regions requiring cancellous rather than cortical bone material.



Evidence from clinical studies

No.	Field of application	Product	Reference
1	Sinus Floor Augmentation	Ceros 82 *, Ceros 82 with autologous bone	Lindenmüller 2006 ⁸
		Ceros TCP granules, Ceros TCP granules with autologous bone	Lambrecht 1999 ⁹
		Ceros TCP granules with autologous bone	Bornstein 2008 ¹⁰
		Ceros TCP granules mixed with venous blood	Stiller 2009 ¹¹
		Ceros TCP granules, 0.7–1.4 mm, with autologous bone	Stiller 2014 ¹²
	Sinus Floor Augmentation (transcrestal)	Ceros TCP granules, 0.5–0.7 mm	Trombelli 2013 ¹³ , Franceschetti 2014 ¹⁴
Sinus Floor Augmentation, in combination with Guided Bone Regeneration (GBR)	Ceros TCP granules, 0.7–1.4 mm	Schulten 2013 ¹⁵	
2	Horizontal augmentation, dehiscence, in combination with GBR	Ceros TCP granules with autologous bone	Merli 2015_a ¹⁶
		Ceros TCP granules with autologous bone	Merli 2015_b ¹⁷
	Periodontal defects in combination with GBR	Ceros TCP granules with autogenous platelet concentrate	Moder 2012 ¹⁸
	Lateral mandibular defect	Ceros TCP granules with autologous bone	Merli 2013 ¹⁹
3	Alveolar defect	Ceros TCP granules, 0.7–1.4 mm	Markwalder 1987 ²⁰

Evidence from animal studies

No.	Field of application	Product	Reference
4	Mandibular bone defect in minipigs	Ceros TCP granules, 0.7–1.4 mm	Buser 1998 ⁴ , Jensen 2005 ²²
	Mandibular bone defect in minipigs	Ceros TCP granules, 0.7–1.4 mm with blood or platelet concentrate	Jensen 2006 ²³
	Mandibular bone defect in sheep	Ceros 82 granules, 0.7–1.4 mm	Gatti 1990 ²¹
	Mandibular ridge augmentation in combination with GBR in dog	Ceros TCP granules, 0.7–1.4 mm	Von Arx 2001 ²⁴

Your Safety

Clinical application

For bone integration and remodelling of Ceros TCP granules, a mechanically stable situation as well as an appropriate defect configuration is most important. Ceros TCP granules must always be applied by endosseous or subperiosteal implantation, i. e. in direct contact with the vital bone to avoid a formation of connective tissue. For preparation of the implant bed, inflamed and necrotic tissue must be removed and the bone freshly exposed.

To improve the remodelling of Ceros TCP granules, the implants can be mixed with autologous bone, bone marrow aspirate or blood, enriching the scaffold with osteoinductive agents and osteogenous cells ^{6,7}. These mixtures also simplify an insertion into the bone defect.

The bone defect must be completely filled with Ceros TCP granules, over- or underfilling must be avoided, and the defect closed appropriately (e.g. periosteum or membrane).

Ceros TCP granules made of β -TCP were introduced in the market in 1982. Since then numerous studies demonstrating the biocompatibility, bone integration and remodelling properties of Ceros TCP granules have been published.

For complete indications, contraindications, precautions and warning notices, as well clinical application and handling please refer to the instructions for use.

Ordering information

Item no.	Description
42.34.0001	Ceros TCP granules, 0.5–0.7 mm, 0.5 g
42.34.0002	Ceros TCP granules, 0.5–0.7 mm, 1.0 g
42.34.0003	Ceros TCP granules, 0.5–0.7 mm, 2.5 g
42.34.0004	Ceros TCP granules, 0.5–0.7 mm, 5x0.5 g
42.34.0005	Ceros TCP granules, 0.7–1.4 mm, 0.5 g
42.34.0006	Ceros TCP granules, 0.7–1.4 mm, 1.0 g
42.34.0007	Ceros TCP granules, 0.7–1.4 mm, 2.5 g
42.34.0008	Ceros TCP granules, 0.7–1.4 mm, 5x0.5 g

Material: β -tricalcium phosphate, 60 % porosity



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* Ceros 82, former tradename of Ceros TCP

** chronOS, today's trademark of DePuy Synthes

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