



Neobone®

Calcium Phosphate Synthetic Bone Substitute

Bone substitutes are used to repair and rebuild diseased bones in hips, knees, spine, and sometimes other bones and joints. Bone substitutes can also repair bone loss caused by some types of fractures or cancers. Once the body accepts the bone substitute, it provides a framework for growth of new, living bone.

Synthetic bone substitutes made from calcium phosphates have been used in dentistry and in orthopaedics since the 1980s.^[1, 2] Today, calcium phosphates are the materials of choice in both dentistry and medicine^[3], of which, tricalcium phosphate and hydroxyapatite are the most used.^[4]

Tricalcium phosphate (TCP) ceramic has a stoichiometry similar to amorphous bone precursors, whereas hydroxyapatite (HA) has a stoichiometry similar to bone mineral.^[1]

Porous TCP-ceramic is removed from the implant site as bone grows into the scaffold, whereas HA is more permanent. The surface layers of TCP-ceramic, enhance bonding with adjacent host bone. This stimulates osteoclastic resorption and osteoblastic new bone formation within the resorbed implant^[1]

A ceramic with higher porosity and lower density construct provides greater surface area for vascularisation, and bone ingrowth. When attached to healthy bone, osteoid is produced directly onto the surfaces of the ceramic in the absence of a soft tissue interface. Consequently, the osteoid mineralises and the resulting new bone undergoes remodelling.

References

- [1] Peter V. Giannoudis, Haralambos Dinopoulos, Eleftherios Tsiridis, "Bone substitutes: An update", *Injury, Int. J. Care Injured* (2005) 36S, S20–S27
- [2] Johan Van der Stok, Esther M.M. Van Lieshout, Youssef El-Massoudi, Gerdine H. Van Kralingen, Peter Patka, "Bone substitutes in the Netherlands – A systematic literature review", *Acta Biomaterialia* 7 (2011) 739–750
- [3] Samar J. Kalita, Abhilasha Bhardwaj, Himesh A. Bhatt, "Nanocrystalline calcium phosphate ceramics in biomedical engineering", *Materials Science and Engineering C* 27 (2007) 441–449
- [4] R. Detsch, D. Hagmeyer, M. Neumann, S. Schaefer, A. Vortkamp, M. Wuelling d, G. Ziegler, M. Epple, "The resorption of nanocrystalline calcium phosphates by osteoclast-like cells", *Acta Biomaterialia* 6 (2010) 3223–3233

Neobone®

Calcium Phosphate Synthetic Bone Substitute



Neobone® is a calcium phosphate synthetic ceramic designed for filling bone defects. The ceramic consists in a mixture of two types of calcium phosphate, tricalcium phosphate and hydroxyapatite.

Properties-Effects

Neobone® ceramics are rapidly osseointegrated, due to their chemical composition similar to the human bone mineral phase and due to their interconnected porosity, which allows a total vascularization of the implant. The biphasic composition provides a more efficient bone growth, because, as tricalcium phosphate is dissolved faster than hydroxyapatite, the resorption rate enhances as well as the formation of new bone.

Advantages

- Biocompatible
- Radiopaque
- Avoid the use of autologous graft
- Shorter operating time

Applications

Neobone® calcium phosphate ceramics are designed for filling bone defects.

Properties

Density: $\sim 0.7 \text{ g/cm}^3$
Porosity: 60% - 80%
Foam Cells: 200 μm - 500 μm
Compression strength: $> 0.2 \text{ MPa}$

Composition

Hydroxyapatite ($\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$) and
Tricalcium Phosphate ($\text{Ca}_3(\text{PO}_4)_2$)

Sterility

Neobone® is sterilized by gamma irradiation.

Presentations

Neobone® is manufactured in the form of blocks, granules and wedges.

Shapes	Dimensions	Quantity (per box)	References
Granules (irregular)	2-4 mm	5 cc	G020405
		10 cc	G020410
		15 cc	G020415
		20 cc	G020420
		30 cc	G020430
	4-6 mm	5 cc	G040605
		10 cc	G040610
		15 cc	G040615
		20 cc	G040620
		30 cc	G040630
Granules (sphere like)	75-125 μm	0.5 g	Gd105
		1.0 g	Gd110
	125-355 μm	0.5 g	Gd205
		1.0 g	Gd210
	355-500 μm	0.5 g	Gd305
		1.0 g	Gd310
500-1000 μm	0.5 g	Gd405	
	1.0 g	Gd410	
Blocks	10x10x5 mm	1	B1010051
		3	B1010053
		5	B1010055
	10x30x5 mm	1	B1030051
		3	B1030053
		5	B1030055
	10x30x10 mm	1	B1030101
		3	B1030103
		5	B1030105
	15x15x20 mm	1	B1515201
		3	B1515203
		5	B1515205
	15x15x30 mm	1	B1515301
		3	B1115303
		5	B1515305
Wedges	20x15x8 mm	1	C2015081
		1	C2015101
		1	C2015121
		1	C2015141

Obs: for other dimensions please contact us.

