BIOHORIZONS® biologics

Supplementary to our "Biomaterials Product Catalog"

Product news Biomaterials

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New products in the portfolio

CeraOss®, SynMax®, Argonaut® and PermaPro®

The right choice of biomaterials is crucial to optimise the clinical outcomes and to achieve favourable functional, structural and esthetic results. This overview is intended to provide a short summary to guide the selection of barrier membranes and bone graft materials in oral rehabilitation.

CeraOss® Granules and **SynMax®** Granules deliver choices to clinicians by providing exceptionally high-quality pure bone mineral of bovine origin and a synthetic alternative to human bone graft materials. These products are indicated for use in bone repair, in procedures such as augmentation or reconstructive treatment of the alveolar ridge and filling of periodontal defects. Additionally, they are suitable for use in conjunction with products intended for Guided Tissue Regeneration and Guided Bone Regeneration and for horizontal and vertical augmentation, ridge preservation, socket preservation, bone defect augmentation, periodontal intrabony defects as well as furcation defects (class I and II).

Argonaut® and **PermaPro®** membranes are intended for use in oral surgical procedures as e. g. augmentation procedures around implants placed in immediate extraction sockets as well as delayed extraction sockets. Furthermore, they can be used in horizontal/vertical augmentation, fenestration and dehiscence defects, intraosseous defects (1 to 3 walls) as well as furcation defects (class I and II).

Quality standards

Clinical proven

Novel solutions

Partner of success

Safety standards and material properties

Both the product and the production process comply with the required safety standards and requirements of the German and the EU regulations and the as well as the safety regulations required for xenogenic processing if applicable, including EN ISO 22442-1, EN ISO 22442-2 and EN ISO 22442-3.

Properties of the bone graft substitutes

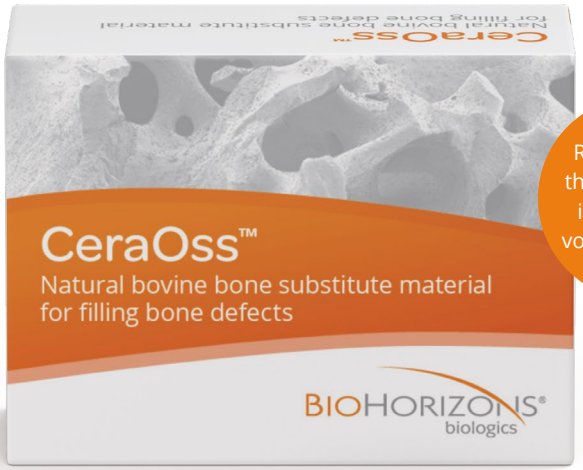
	CeraOss® (bovine)	**SynMax® (synthetic)**
Resorption rate	Very low due to highly crystalline natural hydroxyapatite (HA) structure	Medium due to synthetic HA and β-TCP (β-tricalciumphosphat) structure
Volume stability at the grafting site	Very high due to only superficial degradation	Medium due to bi-phasic resorption rate
Regenerative mechanism	Osseous cellular integration	Controlled cellular resorption
Hydrophilicity	High level	High level
Macroscopic structure	Human-like bone structure with three-dimensional pore-network	Foam-like structure
Particle structure and surface	Highly porous structure and rough surface	Highly porous structure and rough surface
Sterilization	Sterilized using irradiation	
Shelf life	3 years	5 years

Properties of the barrier membranes

	Argonaut® (porcine)	**PermaPro® (synthetic)**
Origin	Porcine pericardium, pure collagen matrix	100 % synthetic PTFE barrier membrane
Crosslinked	–	
Sterilization	Ethylene oxide gas treatment	
Resorption	12–28 weeks	Non-resorbable
Thickness	~0.15 mm	~0.08 mm
Shelf life	3 years	5 years

Bovine bone graft substitute

CeraOss®



Regeneration through osseo-integration – volume stability

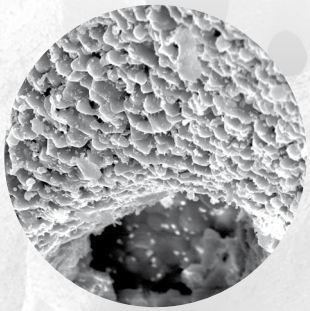
CeraOss® is a 100 % pure bone mineral of bovine origin manufactured by a unique 1200 °C production process. Its three-dimensional porous network enables a fast penetration and adsorption of blood and serum proteins and serves as a depot for proteins and growth factors. The unique processing ensures maximum safety and leads to an exceptionally high purity of CeraOss®, providing ultimate volume stability of the augmentation site [1–3].

Applications include

- Alveolar ridge augmentation/reconstruction
- Filling of bone defects (including after root resection, apicoectomy or cystectomy)
- Filling of extraction alveoli to support alveolar ridge preservation
- Sinus lift procedure
- Filling of periodontal bone defects
- Filling of extraction sockets as part of immediate implantations
- Filling of peri-implant bone defects

Product features

- 100 % pure natural bone mineral
- Human-like bone structure
- Rough, hydrophilic surface
- Ultimate volume stability
- Easy handling



SEM picture of CeraOss® at 5000-fold magnification showing microporous structure.

Synthetic bone graft substitute

SynMax®

SynMax® is a fully synthetic, safe and biocompatible material that, when brough into an osseous environment, serves as an osteoconductive scaffold to support the ingrowth and fusion of adjacent, vital bone. It's composed of 60 % hydroxyapatite and 40 % beta-tricalcium phosphate. After implantation, the material undergoes a natural remodeling and is gradually resorbed and replaced by new bone.

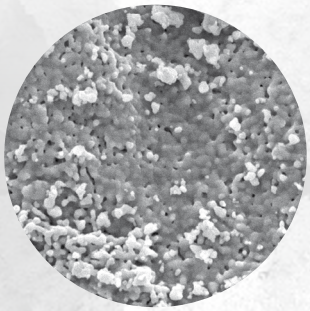
SynMax® is a bone graft material that provides clinicians and their patients with an ideal alternative to human allograft and animal origin bone graft material [4–6].

Applications include

- Sinus lift
- Ridge augmentation
- Intraosseous defects
- Extraction sockets
- Osseous defects
- Furcation defects

Product features

- 100 % synthetic, no risk of disease transmission, high safety
- Controlled resorption due to biphasic composition
- Very rough surface and high porosity supports integration and bone formation



SEM picture of SynMax® at 1000-fold magnification showing microporous structure.

Porcine collagen membrane

Argonaut®

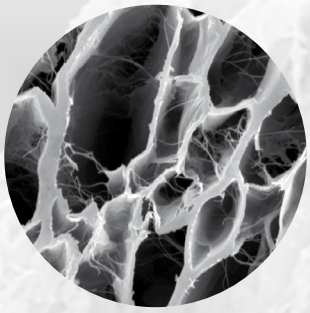
Argonaut® is a long lasting, conformable barrier membrane that drapes easily for graft site contours. It has excellent strength and stability for optimal graft site protection. Argonaut® membrane is a completely resorbable collagen membrane produced from porcine pericardium in a standardized, controlled purification process and used to support guided tissue and bone regeneration, for covering implants, and for periodontal tissue regeneration. Because of the special structure and strong fiber-linking of the pericardium, Argonaut® membrane offers a naturally long barrier function without chemical cross-linking, allowing for predictable regeneration, particularly of large defects [7–9].

Applications include

- Extraction sockets
- Periodontal defects
- Block graft coverage
- Ridge reconstruction

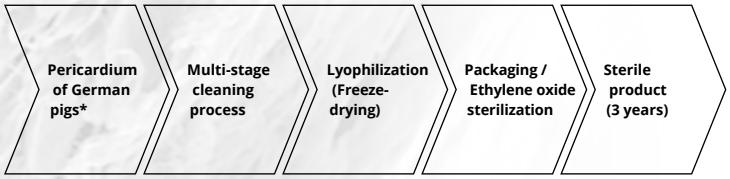
Product features

- Naturally long barrier function
- Low thickness
- Excellent tear resistance
- Very good surface adaption
- Not sticky after rehydration
- Can be pinned or sutured
- 3-year shelf life
- Can be stored at room temperature



SEM picture of Argonaut® at 1000-fold magnification.

Manufacturing process of Argonaut® – a native pericardium membrane



*animals destined for the food industry and certified according to international standards.

Synthetic PTFE membrane

PermaPro®

PermaPro® is an exceptionally thin, non-resorbable and biocompatible membrane. It is composed of biologically inert, high-density polytetrafluoroethylene (PTFE), which acts as an efficient barrier against bacterial and cellular penetration, and can therefore be used for open healing in certain indications.

Applications include

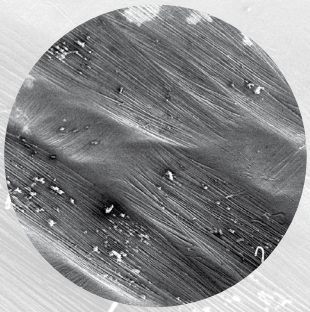
- Socket and ridge preservation (open healing)
- Horizontal/vertical ridge augmentation
- Fenestration and dehiscence defects
- Intraosseous defects (1 to 3 walls)

Preference for PermaPro® over a collagen membrane

- Higher form stability
- Augmentation outside the ridge contour
- Synthetic nature – no religious or dietary conflicts
- Exposure – situations where primary wound closure is not desired (indication dependent)

Product features

- 100 % synthetic PTFE barrier membrane
- Ultra-thin (~0.08 mm)
- Impervious to bacteria due to dense structure
- Easily removable due to minimal tissue ingrowth into the surface structure
- No need for primary soft tissue closure (indication-dependent) [10, 11]
- Easy recovery thanks to blue color
- Rounded edges for minimal tissue trauma
- Easy fixation with sutures or pins



SEM picture of PermaPro® at 30-fold magnification

Product overview

Bone graft substitutes

CeraOss® (bovine bone graft substitute)

Art. No.	Volume	Particle size
BM1011.1005	0.5 cm^3	500–1000 µm
BM1011.1010	1.0 cm^3	500–1000 µm
BM1011.1020	2.0 cm^3	500–1000 µm
BM1011.1050	5.0 cm^3	500–1000 µm
BM1012.1005	0.5 cm^3	1000–2000 µm
BM1012.1010	1.0 cm^3	1000–2000 µm
BM1012.1020	2.0 cm^3	1000–2000 µm
BM1012.1050	5.0 cm^3	1000–2000 µm

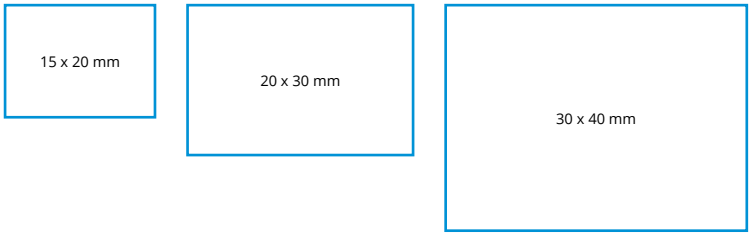
SynMax® (synthetic bone graft substitute)

Art. No.	Volume	Particle size
BM1013.1005	0.5 cm^3	500–1000 µm
BM1013.1010	1.0 cm^3	500–1000 µm
BM1014.1005	0.5 cm^3	800–1500 µm
BM1014.1020	2.0 cm^3	800–1500 µm

Barrier membranes

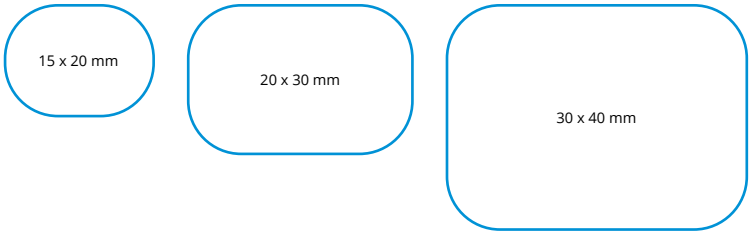
Argonaut® (porcine collagen membrane)

Art. No.	Product size
BM2004.1520	15 x 20 mm
BM2004.2030	20 x 30 mm
BM2004.3040	30 x 40 mm



PermaPro® (synthetic PTFE membrane)

Art. No.	Product size
BM2005.1520	15 x 20 mm
BM2005.2030	20 x 30 mm
BM2005.3040	30 x 40 mm



Science

It's the cells that make the decision

Functionality of biomaterials results from their optimal biological interactions with tissue cells. Bone is a structure difficult to duplicate. Research in tissue engineering, especially in nano topography, can lead to improved biomaterials. There are numerous biomaterials available, some of natural origin, others of synthetic origin. When choosing a biomaterial, many factors come into play next to functionality. From a biological point of view, the ideal biomaterial should promote formation of a stable blood coagulum. It should be functional, biocompatible, and it should favor healing processes.

Autogenous bone is still the gold standard in grafting. However, it is linked to higher costs, longer treatment times and it requires an additional surgical procedure, possibly leading to increased donor site morbidity. This needs to be considered when carrying out augmentation procedures. Therefore, the possibilty of reducing potential complications is an important factor. Easy handling of the materials is of advantage for the clinician. Aside from these decisive factors, it must not be forgotten that bone augmentation surgery is often performed as a part of dental implant surgery. Therefore, different biological aspects should be considered when choosing biomaterials.

Comparative studies have shown that different biomaterials can be safely used [12]. The needs and preferences of the treating clinician play as important a role as the indication, the requirements of the patient, as well as time and costs. In the end, selection of the appropriate biomaterial must be made with the knowledge of its properties and its clinical outcome. The goals are always predictable results and clinical success.

Conclusion: Prior to using a biomaterial, it is recommended to balance and consider the biological interaction between the biomaterial and the endogenous cells [13] – it's the cells that make the decision.

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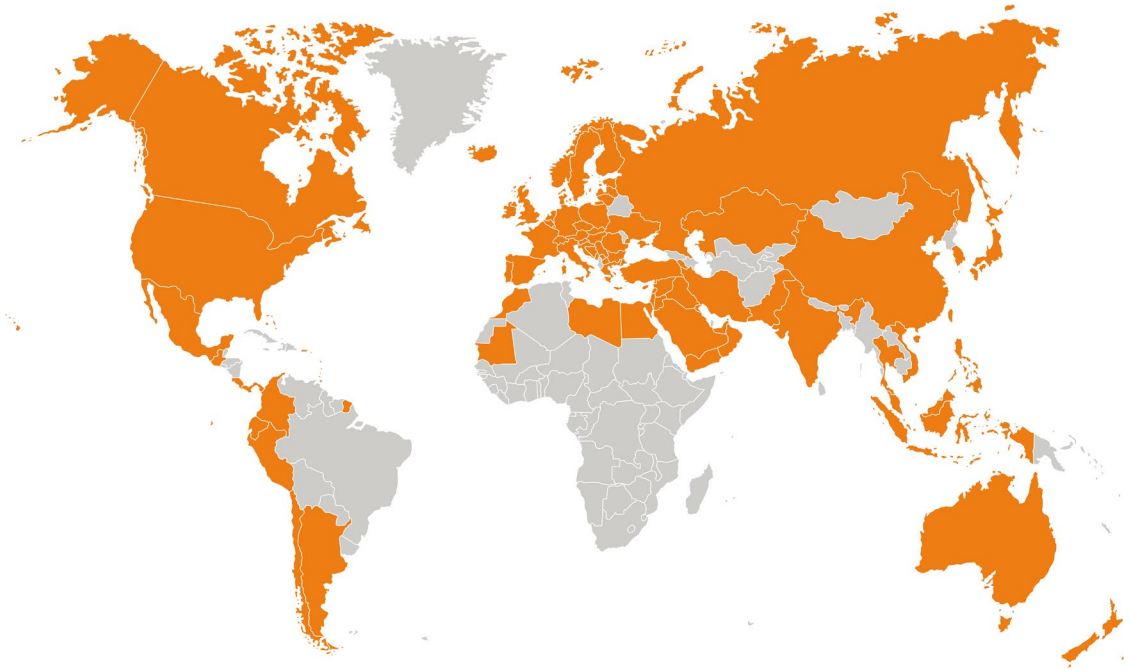

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