bone & tissue regeneration

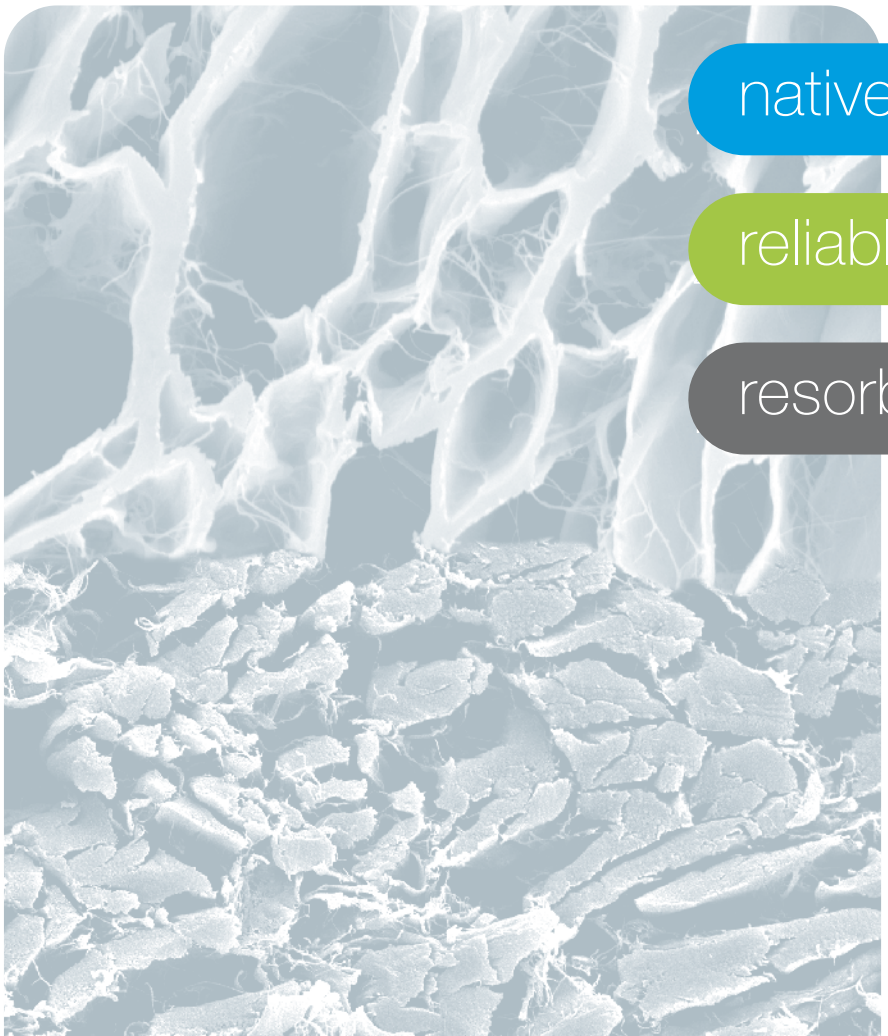
botiss biomaterials

Jason® membrane & collprotect® membrane

Natural collagen membranes for GBR/GTR technique

SCIENTIFIC AND CLINICAL EVIDENCE

soft tissue

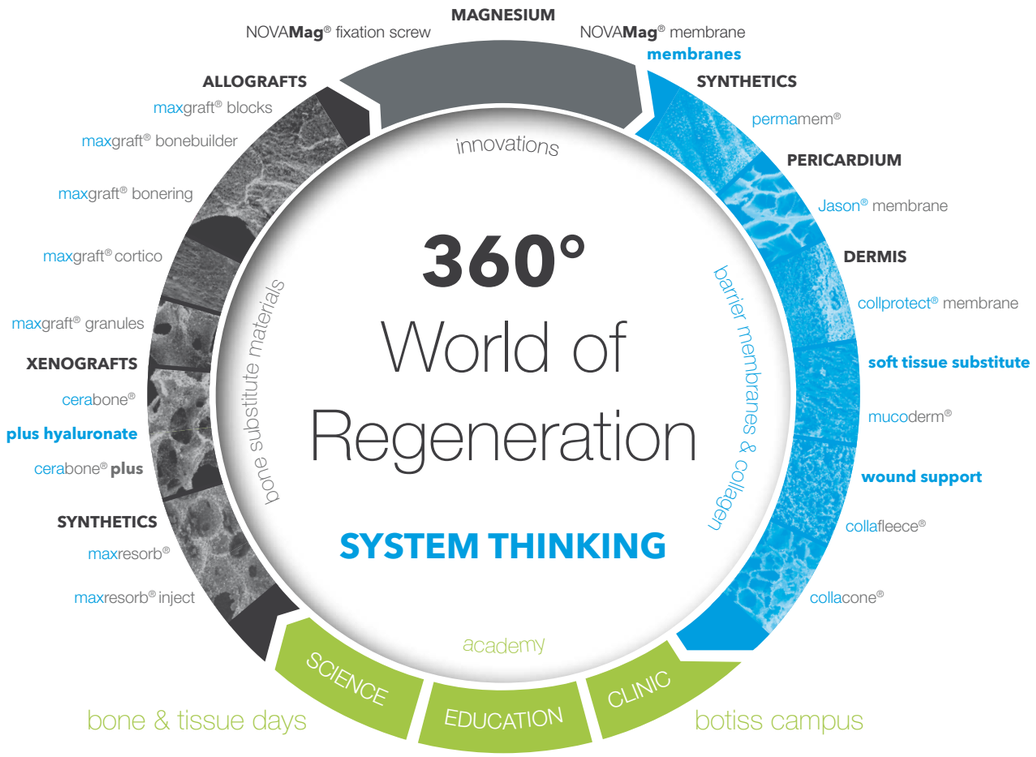


native

reliable

resorbable

botiss regeneration system



Development / Production / Distribution

maxresorb®

Synthetic biphasic calcium phosphate

maxresorb® inject

Synthetic injectable bone paste

cerabone®

100% pure bovine bone mineral

cerabone® **plus**

cerabone® mixed with hyaluronate

maxgraft®

Processed allogenic bone graft

maxgraft® cortico

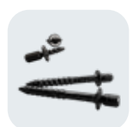
Processed allogenic bone plate

maxgraft® bonering

Processed allogenic bone ring

maxgraft® bonebuilder

Patient matched allogenic bone implant



NOVAMag® fixation screw

Resorbable magnesium screw

NOVAMag® membrane

Resorbable magnesium membrane

permamem®

High-density PTFE barrier membrane

Jason® membrane

Native pericardium GBR / GTR membrane

collprotect® membrane

Native collagen membrane

mucoderm®

3D-stable soft tissue graft (Collagen)

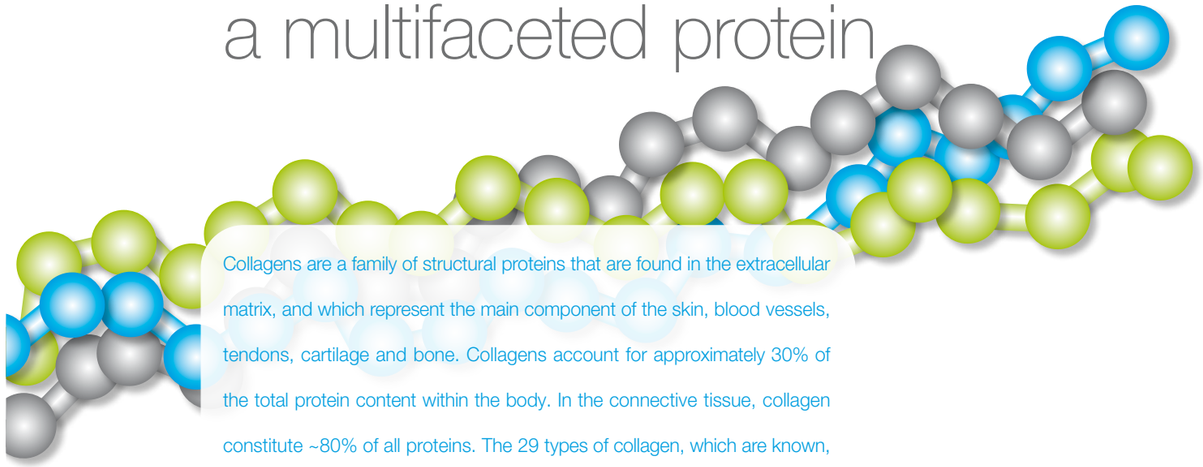
collacone®

Collagen hemostat (Cone)

collafleece®

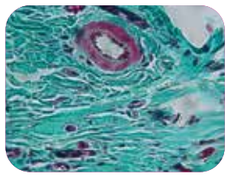
Collagen hemostat (Sponge)

Collagen – a multifaceted protein



Collagens are a family of structural proteins that are found in the extracellular matrix, and which represent the main component of the skin, blood vessels, tendons, cartilage and bone. Collagens account for approximately 30% of the total protein content within the body. In the connective tissue, collagen constitute ~80% of all proteins. The 29 types of collagen, which are known, differ in the primary sequence of their peptide chains[1].

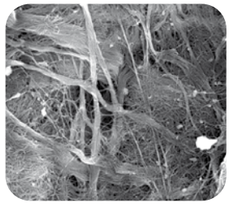
Three collagen molecules are twisted together into a triple helix, thus forming the collagen fibril. The fibrils aggregate and form collagen fibers. These fibers show a remarkable tear resistance, and provide the basis for the structural properties of many tissues, such as the tensile strength of tendons as well as the flexible properties of the bone. Collagens are synthesized by specific cells, such as fibroblasts and osteoblasts.



Histological staining of the skin showing the dense collagen network

Collagen types

Collagen type I is the most abundant protein in the body, with the largest quantitative share. It is a fibrous protein of the connective tissue, most frequently found in the skin, bone, tendons, ligaments and fibrous cartilage, but also in internal organs and their fibrous membranes, for example the pericardium and the peritoneum.
Gingival connective tissue is composed of approximately 60% collagen type I. Other important collagens are collagen type II, III and IV.
Collagen type II is an important component of the extracellular matrix found in hyaline- and elastic cartilage, while collagen type III is responsible for the elastic properties of blood vessels, the skin, and the lung. Collagen type IV is the major structural element of the basal lamina.

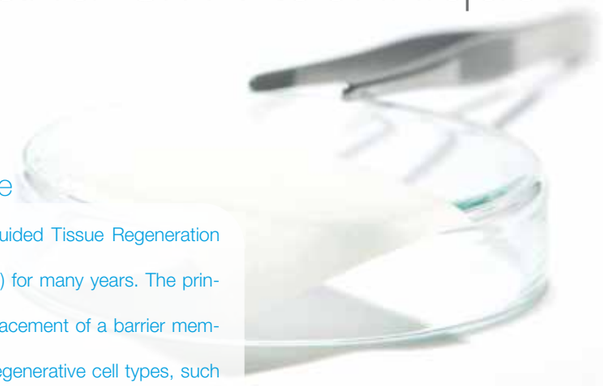


Network of collagen fibers of a collagen fleece made of porcine dermis

The most common types of collagen

COLLAGEN TYPE I	skin, bone, tendons, ligaments, fibrous cartilage, cornea
COLLAGEN TYPE II	cartilage (hyaline and elastic), spinal discs, vitreous body
COLLAGEN TYPE III	skin, cardiovascular system
COLLAGEN TYPE IV	basal lamina

Collagen membranes for the GBR and GTR technique

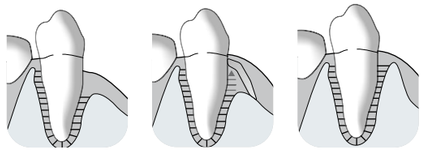


The GBR and GTR technique

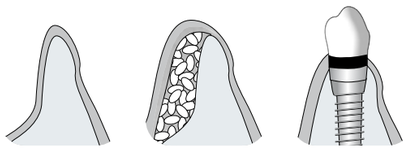
Collagen membranes have been used in Guided Tissue Regeneration (GTR) and Guided Bone Regeneration (GBR) for many years. The principle of these techniques is based on the placement of a barrier membrane for separation of slowly proliferating regenerative cell types, such as osteoblasts and periodontal cells, from fast proliferating epithelial and connective tissue cells, thus enabling the regeneration of lost tissue[1].

GTR aims at the regeneration of the periodontium. A barrier membrane is placed between the epithelium and the tooth, to provide space and time for regeneration of the periodontal ligament. In GBR procedures, membranes are normally applied in combination with a bone graft material. The membrane is placed over a bony defect filled with a bone graft material. The bone graft material prevents collapse of the membrane and serves as an osteoconductive scaffold for ingrowth of bone and precursor cells. The barrier membrane prevents migration of bone graft particles into the oral cavity and ingrowth of soft tissue into the defect area, thus enabling bony regeneration.

Guided Tissue Regeneration (**GTR**)



Guided Bone Regeneration (**GBR**)



MEMBRANE TYPES

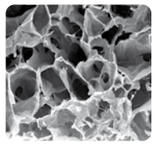
The first generation of barrier membranes was based on non-resorbable materials e.g. cellulose acetate, titanium and expanded polytetrafluoroethylene (ePTFE). These membranes gained satisfying results but had disadvantages such as the secondary surgery required for removal, which is associated with graft site morbidity. To avoid the limitations of the non-resorbable membranes, resorbable membranes were developed. Resorbable membranes are either synthetic polymers such as polyglycolides, polylactides (acidic degradation) or animal-derived, e.g. collagen. Due to the manifold positive natural properties of collagen, collagen membranes are commonly the material of choice[3].

Barrier membrane requirements[2]

- Biocompatibility
- Tissue integration
- Cell occlusiveness
- Dimensional stability
- Easy handling

The advantages of collagen

Several factors make collagen an optimal biological material for the use as barrier membranes. One important characteristic is the excellent biocompatibility of collagen and its degradation products. Collagen is widely distributed throughout the body, making up approx. 60% of all proteins within the gingival connective tissue. Due to their low antigenicity, animal collagens may be used in humans without causing tissue rejection.



3D structure of a collagen fleece

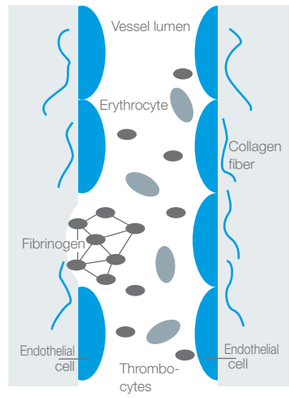
Collagens are resistant to any unspecific proteolytic degradation and are only degraded by specific enzymes called collagenases. Collagens are involved in the primary hemostatic reaction. Thus, collagen membranes contribute to a fast stabilization of the wound area. Another advantage of collagen is its chemotactic attraction of regenerative cells such as osteoblasts, gingival fibroblasts and periodontal ligament cells. Following dehiscence, the exposure of a collagen membrane leads to its quick proteolytic degradation. However, a secondary granulation without any inflammatory reaction may be observed[4].

ADVANTAGES of collagen membranes[3]

- Exceptional biocompatibility
- Support of hemostasis
- Low antigenicity
- Degradation by specific enzymes
- Chemotactic attraction of regenerative cells

Collagen a natural hemostatic agent

Damage to the blood vessel wall leads to subendothelial collagen exposure. The collagen directly or indirectly interacts with the surface receptors on thrombocytes. The binding of collagen initiates a reaction cascade leading to transformation and aggregation of the thrombocytes. Additionally, the thrombocytes are cross-linked by fibrinogen. The resulting (white) thrombus initially stabilizes the wound[5]. Accordingly, collagen membranes support the formation of a blood coagulum and contribute to a rapid stabilization of the wound area. Due to their hemostatic effect, collagens are not only used as barrier membranes, but also as collagen sponges and cones for stabilization of biopsy harvesting sites or covering of minor oral wounds and extraction sockets, respectively.



Origin of collagen membranes

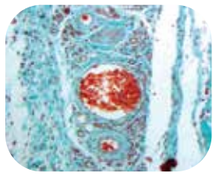
The first collagen membranes available on the market were of bovine origin (Achilles tendon and pericardium). Nowadays, porcine membranes are widely used because their application excludes the risk of BSE transmission.

Moreover, porcine collagen exhibits a high homology to human collagen and therefore a very low antigenicity[6]. Due to these reasons, botiss membranes are exclusively produced from porcine collagen.

Collagen membranes may be derived from various tissues, ranging from dermis, to peritoneum and pericardium. Accordingly, these membranes differ in their handling and degradation properties, as well as their barrier function.

PROPERTIES OF BARRIER MEMBRANES – vascularization versus barrier function

Despite its low thickness, Jason® membrane exhibits an excellent multidirectional tear resistance



Histology after subcutaneous impantation in rats demonstrating the presence of blood vessels within a collagen membrane

Many collagen membranes have a limited barrier function due to their rapid enzymatic degradation. The stability and barrier function of collagen membranes are tightly linked to the properties of the native tissue from which they originate. The Jason® membrane is produced from pericardium. Due to its structural characteristics it undergoes slow degradation and thus offers a prolonged barrier function[7]. Furthermore, Jason® membrane is distinguished by its extraordinarily high tear resistance and excellent handling properties (e.g. good adaptation to surface contours, no sticking)[8].

The barrier function may also be influenced by the density of the membrane. Denser collagen structures offer longer barrier functions. However, extremely dense collagen structures may hinder early angiogenesis of the grafting site. The ingrowth of blood vessels into the augmentation area is important not only for the nutrition of the grafting site, but also for attraction of circulating progenitor cells (pericytes). These cells have the potency to differentiate into osteoblasts, which produce new bone matrix. Therefore, the selective permeability of membranes for blood vessels is desirable[5].
One example of such a membrane is collprotect® membrane. This membrane possesses loosely structured areas (pores) that penetrate the compact collagen matrix and support a fast vascularization of the membrane[9].

Production process

botiss membranes
PROVIDE EXCELLENT HANDLING AND STABILITY

All botiss soft tissue products consist of natural porcine collagen originating from animals destined for the food industry and certified according to EN ISO 22442.

PERICARDIUM DERMIS

Multi-stage cleaning process

Lyophilization

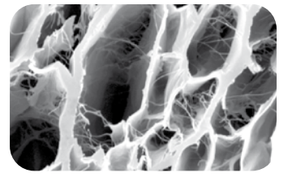
Packaging
EO-sterilization/γ-Sterilization

Sterile product

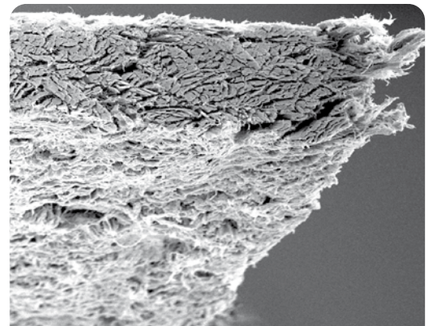
Jason® membrane collprotect® membrane

botiss‘ barrier membranes are native membranes, the natural properties of the original tissue (dermis or pericardium) are preserved during the production process[7,9]. The inherent architecture of the collagen structure provides superior handling properties, such as tear resistance, tensile strength, and adaptation to surface contours, in comparison to „non-native“ collagen membranes (e.g. made from a solution)[10].

The particular multi-stage cleaning process effectively removes all non-collagenic proteins and antigenic components. The resulting membranes exhibit a natural three-dimensional collagen structure mainly composed of collagen type I and a lower share of collagen type III[9,7].



Natural three-dimensional collagen network of Jason® membrane



collprotect® membrane

NATIVE **COLLAGEN MEMBRANE**

collprotect® membrane is a native collagen membrane made of porcine dermis. Its multistep cleaning process ensures the removal of all antigenic and non-collagenous components, at the same time preserving its natural collagen structure.

Histology six weeks after implantation of collprotect® membrane in a rat model: Blood vessels have penetrated the porous structure. Collagen fibers are visible and the degradation proceeds without any inflammatory response

The unique processing as well as the dense but open-porous collagen structure of collprotect® membrane are the basis for its safe application in dental bone and tissue regeneration. Owing to its natural hemostyptic function, the membrane enables early wound stabilization, thus supporting the natural wound healing[11]. The rough surface of collprotect® membrane facilitates a fast integration into the surrounding soft tissue[12].

SEM image of collprotect® membrane

Properties

- Natural compact, open-porous collagen structure[9]
- No artifical cross-linking
- Natural rough surface for cell adhesion and -migration[12]
- Pores for blood vessel ingrowth, support of vascularization[9]
- Controlled degradation[13]
- Natural collagen to support blot clot formation / natural healing[11]
- Easy handling in dry and wet status[14]

INDICATIONS:

Implantology,
Periodontology,
Oral and CMF Surgery

- Horizontal augmentation
- Socket and ridge preservation
- Sinus lift
- Protection and covering of minor perforations of the Schneiderian membrane
- Fenestration and dehiscence defects
- Intraosseous defects (1 to 3 walls)
- Furcation defects (class I and II)

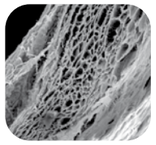
Jason® membrane

NATIVE **PERICARDIUM GBR/GTR MEMBRANE**

Jason® membrane is a native collagen membrane obtained from porcine pericardium, developed and manufactured for dental tissue regeneration. The advantageous biomechanical and biological properties of the natural pericardium are preserved during the production process.

Jason® membrane maintains the barrier function 56 days after subcutaneous implantation in rats

Owing to these unique properties, Jason® membrane exhibits beneficial handling characteristics such as remarkable tear resistance and effective surface adaptation[8,10]. Due to its pericardial origin Jason® membrane also exhibits a long barrier function, making Jason® membrane our recommended choice particularly for large augmentative procedures[7,15].



SEM image of Jason® membrane

Properties

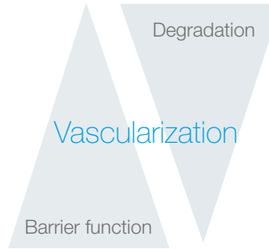
- Naturally long barrier function[7,15]
- Multidirectional strength and tear resistance[8,10]
- No sticking after hydration[8]
- Excellent surface adaptation[8]
- Very thin membrane

INDICATIONS:

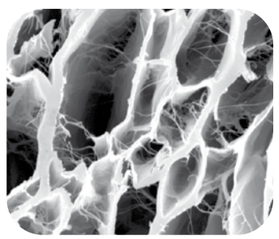
Implantology,
Periodontology and
Oral and CMF Surgery

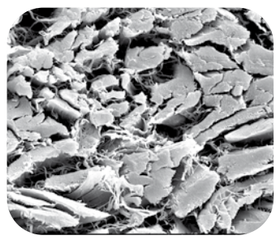
- Fenestration and dehiscence defects
- Sinus lift
- Socket and ridge preservation
- Alveolar ridge augmentation and reconstruction
- Intraosseous defects (1 to 3 walls)
- Furcation defects (class I and II)

	Jason® membrane	collprotect® membrane
Origin	**PORCINE PERICARDIUM**	**PORCINE DERMIS**
Degradation	8-12 weeks in a rat model[16], naturally long barrier function due to slow degradation	4-8 weeks in a rat model[16], intermediate barrier function
Structure	Multi-oriented collagen fibres providing strong tear resistance	Dense network of collagen bundles with pores for better vascularization



Key factors for barrier membranes





Product Specifications

Jason® membrane

Art.No.	Size	Content
681520	15 x 20 mm	1 membrane
682030	20 x 30 mm	1 membrane
683040	30 x 40 mm	1 membrane

collprotect® membrane

Art.No.	Size	Content
601520	15 x 20 mm	1 membrane
602030	20 x 30 mm	1 membrane
603040	30 x 40 mm	1 membrane

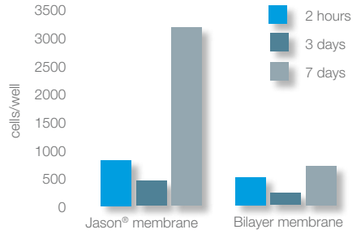
Pre-clinical testing

JASON® MEMBRANE SUPPORTS ATTACHMENT AND PROLIFERATION OF OSTEOBLAST-LIKE CELLS

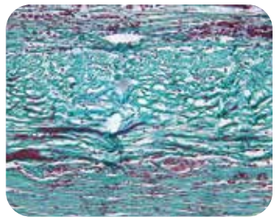
Results of *in vitro* cell cultures. Dr. M. Herten, University of Münster and Prof. Dr. Dr. D. Rothamel, Mönchengladbach Hospital, University of Düsseldorf[7]

Incubation of the multi-layered Jason® membrane and a competetive bilayer membrane with osteoblast-like SaOs-2 cells showed a significantly higher cell proliferation on the Jason® membrane after seven days.

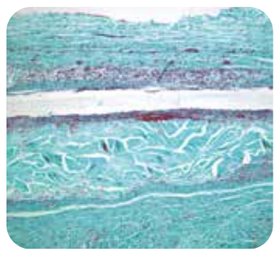
The excellent cell attachment and proliferation on Jason® membrane highlights its suitability as scaffold for osteoblast guidance, which supports the bony regeneration of covered defects.



In vivo pre-clinical testing
Results from a degradation study in a rat model[16], Prof. Dr. Dr. D. Rothamel, Mönchengladbach Hospital, University of Düsseldorf

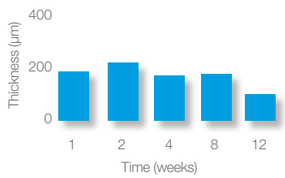


Structural integrity of Jason® membrane 28 days after implantation

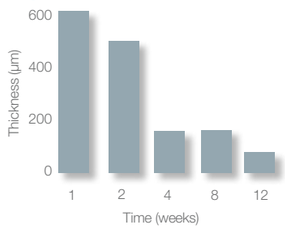


Only superficial cell invasion of collprotect® membrane 14 days after implantation

Degradation of Jason® membrane



Degradation of collprotect® membrane



The diagrams display degradation times of the membranes, from *in vivo* data obtained in an experimental rat model.

collprotect® membrane prepared for subcutaneous implantation

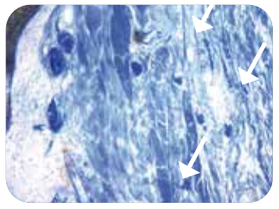
Resorption time and tissue integration of collagen membranes not only depend on the animal origin, but also differ between tissues. Tissue integration and degradation of Jason® membrane and collprotect® membrane were tested by subcutaneous implantation in rats. Jason® membrane, which originates from pericardium, was integrated within the first weeks and remained stable for a healing period of eight to 12 weeks (please note the different metabolic rates for rats and humans). The cell invasion of the dermal collagen of the collprotect® membrane took a little longer, but the membrane was mostly degraded within the first four to eight weeks.

In vivo pre-clinical testing

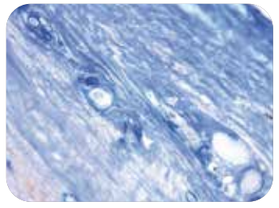
Jason® membrane –
EXCELLENT BIOCOMPATIBILITY AND TISSUE INTEGRATION
Results from an animal model, Prof. Dr. Dr. D. Rothamel, Möchengladbach Hospital, University of Düsseldorf[7]

Analysis of the tissue integration and morphological structure of Jason® membrane at four to 12 weeks after lateral augmentation in a dog model.

The membrane was integrated into the surrounding tissue without any inflammation. Significant degradation of the membrane started at week eight and proceeded until week 12. A bilayer membrane that was tested in the same model showed a comparably good tissue integration, but was almost completely degraded after eight weeks[7].



Jason® membrane after four weeks healing time

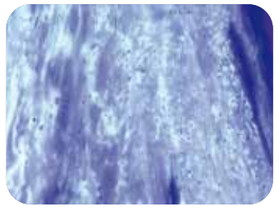


The bilayer membrane after four weeks healing time

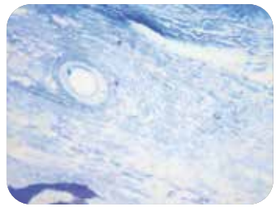
4 weeks healing time
Both membranes showed good tissue integration without any inflammatory reaction, as demonstrated by Toluidine staining.
Initial ingrowth of blood vessels improves nutrition of the graft and osseous regeneration.

8 weeks healing time
The bilayer membrane was almost completely resorbed.

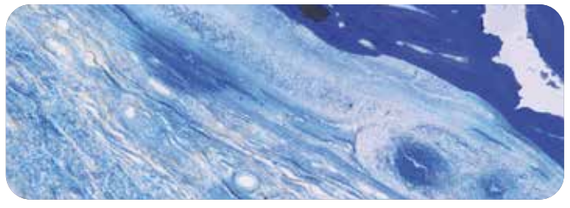
Jason® membrane was still intact, serving as barrier against ingrowth of surrounding soft tissue.



The bilayer membrane after eight weeks healing time



Jason® membrane after eight weeks healing time



Jason® membrane after 12 weeks healing time

12 weeks healing time
Jason® membrane was almost completely degraded and replaced by a periosteum rich in collagen fibers.

The collagen of the membrane is partially visible as cloudy fibrous areas.

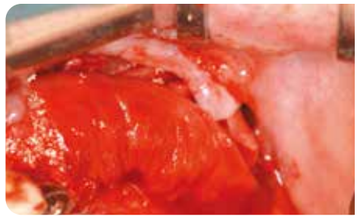
In vivo pre-clinical testing

collprotect® membrane –
RAPID ANGIOGENESIS AND TRANSMEMBRANOUS VASCULARIZATION
In vivo results from a rat model, Prof. Dr. Dr. D. Rothamel, Mönchengladbach Hospital, University of Düsseldorf[9]

One week after subcutaneous implantation of collprotect® membrane in rats, cells started to superficially invade the membrane. No signs of inflammatory reactions were observed.
collprotect® membrane exhibits good integration into the well-vascularized peri-implant tissue.

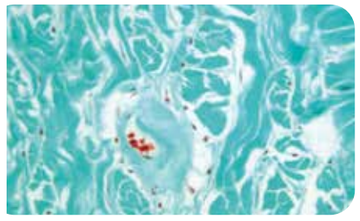
After four weeks, blood vessels within the pores of the membrane indicate transmembranous vascularization. Early vascularization of the membrane supports the nutrition and integration of the grafted site, thereby promoting osseous regeneration. Furthermore, the regeneration is promoted by circulating progenitor cells that reside in the blood vessels and evolve into bone forming osteoblasts.

7 days after implantation

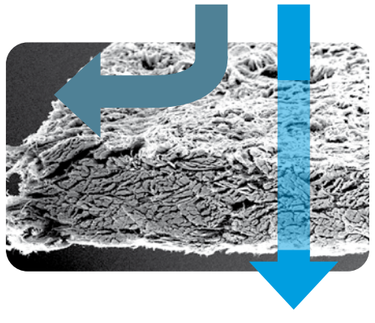


Seven days after implantation, only superficial invasion of cells into the membrane can be observed, an empty pore in the membrane in the lower left part is recognizable.

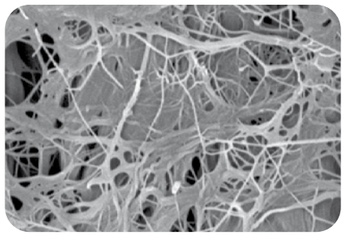
28 days after implantation



28 days after implantation, ingrowth of blood vessels into the pores of the membrane can be observed.



Areas of a fibrillary structure within the dense collagen fiber network of the collprotect® membrane (pores, see right picture and arrow in left picture) facilitate the ingrowth of blood vessels into the defect area through the membrane.

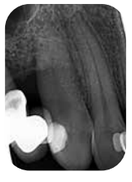


CLINICAL CASE BY

PD Dr. Raluca Cosgarea and Prof. Dr. Dr. Anton Sculean,
University Cluj-Napoca, Romania and University Bern, Switzerland

REGENERATION OF INTRABONY DEFECTS WITH CERABONE® AND COLLPROTECT® MEMBRANE

Preoperative defect measurement

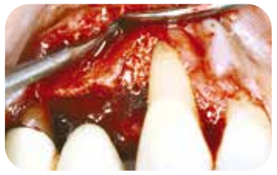


Preoperative X-ray showing intrabony defect

Defect presentation after preparation of mucoperiosteal flap

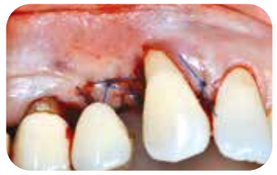
Rehydration of cerabone® particles

collprotect® membrane cut to shape

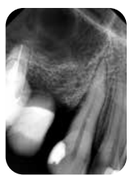


Filling of intrabony defect with cerabone®

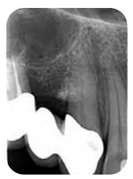
collprotect® membrane in place



Wound closure



X-ray control at 12 months post-operative



X-ray at 24 months post-operative

Final prosthetic restoration

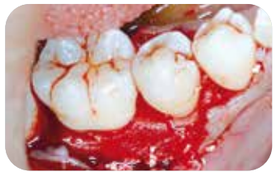
CLINICAL CASE BY

Dr. Dominiki Chatzopoulou, University College London (UCL), England

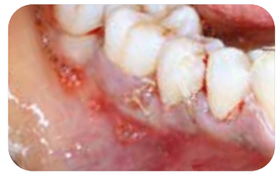
GTR WITH CERABONE® AND COLLPROTECT® MEMBRANE USING THE SIMPLIFIED PAPILLA PRESERVATION TECHNIQUE

PPD of 9 mm at mesial of LR6

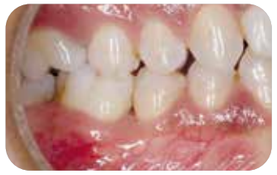
Raised flap showing the defect



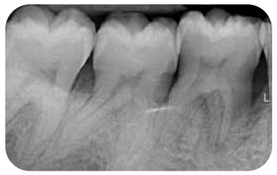
Defect filled with cerabone® and collprotect® membrane



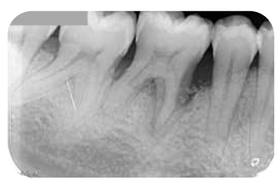
Flap sutured



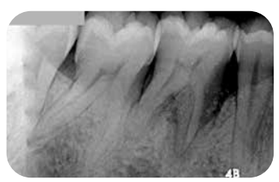
Healing six weeks post-operative



Preoperative radiograph



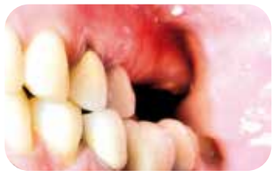
Six months post-operative radiograph

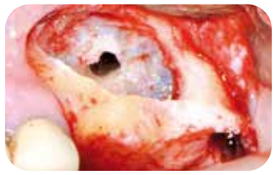


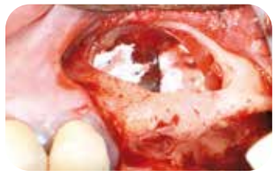
12 months post-operative radiograph

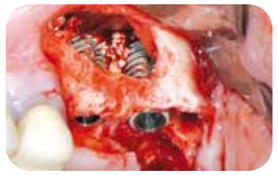
CLINICAL CASE BY
Dr. Viktor Kalenchuk, Chernivtsi, Ukraine

SINUS LIFT WITH IMMEDIATE IMPLANTATION


Clinical situation of the edentulous distal maxilla

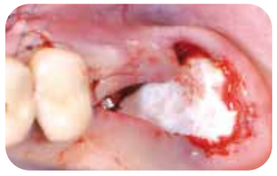

Visible perforation of the Schneiderian membrane after preparation of a lateral sinus window


Introduction of collprotect® membrane to protect the Schneiderian membrane


Immediate implantation and augmentation with cerabone®


Filling of the subantral cavity with cerabone® 1.0 - 2.0 mm

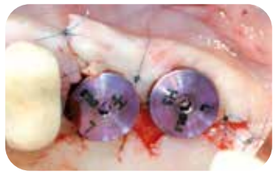

Covering of the augmentation site with collprotect® membrane

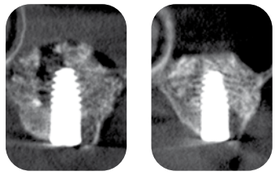

Soft tissue defect coverage with Jason® fleece


Wound closure and suturing


Satisfactory soft tissue situation after six months healing time


Bone regeneration after six months healing time


Placement of healing screws

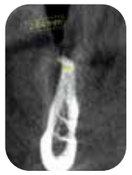
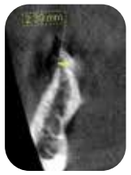

Alveolar ridge and sinus floor CT scan immediately after the surgery (l) and after six months (r)

In cases involving an unstable soft tissue situation, or if wound dehiscence is expected, a collagen fleece is recommended to cover the barrier membrane in order to provide extra protection for the healing area. Where applicable, the fleece can be loaded with antibiotics.

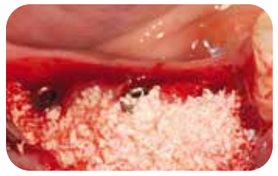
CLINICAL CASE BY
Dr. Viktor Kalenchuk, Chernivtsi, Ukraine

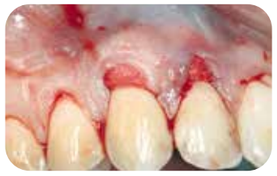
RIDGE AUGMENTATION WITH MAXGRAFT® BONEBUILDER


Clinical situation before augmentation

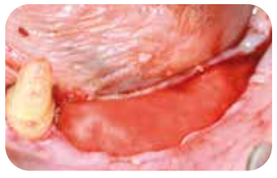


CT scan of regio 36, 37 before surgery


Situation after tooth extraction and mobilization of a mucoperiosteal flap

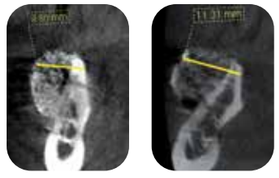

maxgraft® bonebuilder


Immediate implant insertion in regio 34, 35; positioning and fixation of maxgraft® bonebuilder


Placement of collprotect® membrane and filling of the residual volume with cerabone®

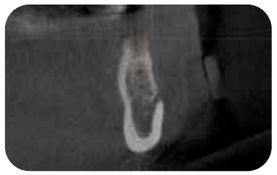

Covering of the augmentation site with collprotect® membrane

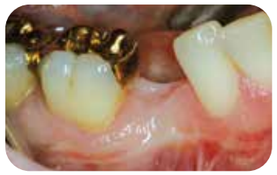

Wound closure and suturing

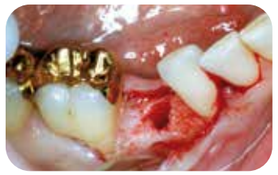

CT scan of regio 36, 37 after surgery

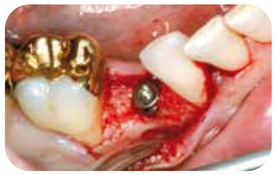
CLINICAL CASE BY
Dr. Georg Bayer, Landsberg am Lech, Germany

LATERAL AUGMENTATION


CBCT image showing the reduced amount of bone available in the area of the mental foramen

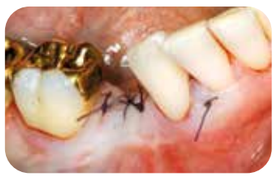

Lateral bone defect following root tip resection

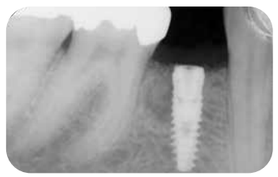

After preparation of the implant bed the thin vestibular wall is visible

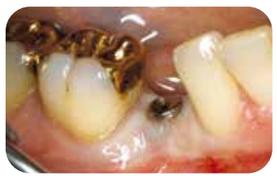

Insertion of implant in the reduced bone amount

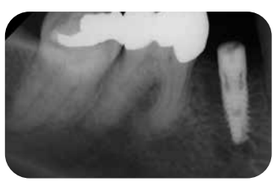

Lateral augmentation with maxresorb® and application of a dry collprotect® membrane


Complete covering of the augmentation site and implant with the membrane


Wound closure by soft tissue expansion without vertical releasing incisions


Post-operative X-ray


Stable keratinized gingiva after insertion of healing abutment at re-entry

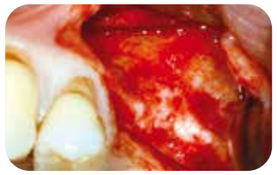

X-ray control at re-entry

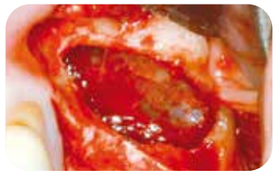
CLINICAL CASE BY
Prof. Dr. Dr. Daniel Rothamel, Mönchengladbach Hospital, University of Düsseldorf, Germany

SINUS LIFT WITH TWO-STAGE IMPLANT PLACEMENT


Clinical situation before sinus lift

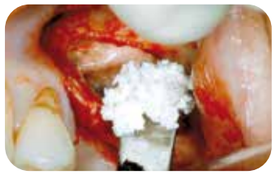

Clinical situation before sinus lift, occlusal view

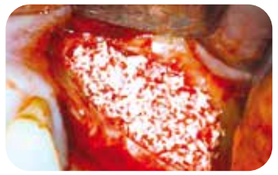

Clinical situation following preparation of the mucoperiosteal flap

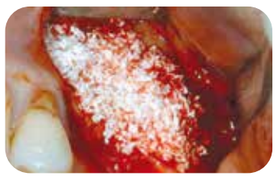

Preparation of a lateral sinus window


Placing of Jason® membrane in the sinus cavity


Jason® membrane serves as protection for the Schneiderian membrane

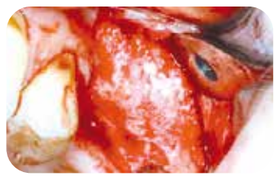

Filling the sinus cavity with cerabone®


cerabone® in the sinus cavity

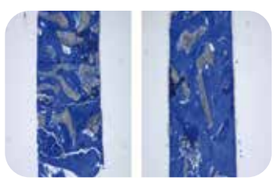

Additional lateral augmentation with cerabone®


Covering of the augmentation area with Jason® membrane

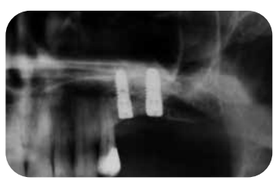

Tension-free wound closure with single interrupted sutures


Excellent osseous integration of the cerabone® particles without soft tissue ingrowth at re-entry, six months post-operative


Stable insertion of two implants into sufficient bone matrix

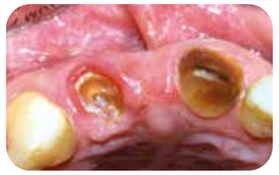

Histological sections of biopsy taken at the time of implantation


Magnification of the histological sample demonstrates complete integration of cerabone® particles within the newly formed bone matrix

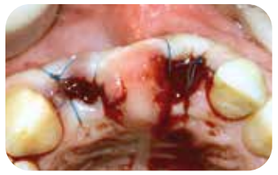

Post-operative X-ray

CLINICAL CASE BY
Dr. Sebastian Stavar, Houten, Netherlands

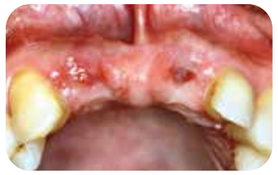
DEHISCENCE DEFECT



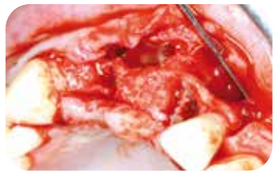
Initial clinical situation with broken bridge abutment in regio 12, tooth 21 not worth preserving and tooth 11 lost by a front teeth trauma several years ago



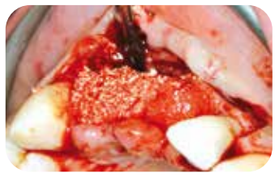
Situation after atraumatic tooth extraction and suturing of wound margins



Clinical situation five weeks after extraction



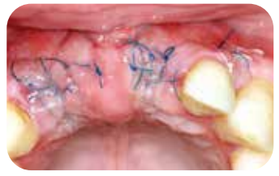
Preparation of a mucoperiosteal flap - extensive bone deficit in horizontal and vertical dimension



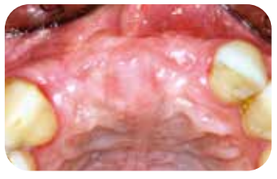
Horizontal and vertical augmentation with cerabone® and autologous bone after placement of two implants

Coverage of the augmentation site with Jason® membrane

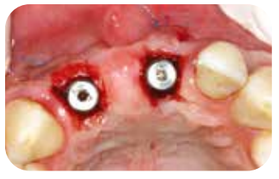
Tension-free wound closure



Clinical view two weeks post-operative



Complication free healing eleven weeks after augmentation



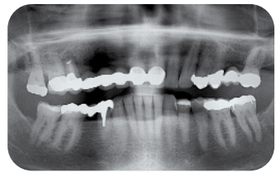
Exposure of implants and insertion of healing abutments

Shaping of the emergence profile using the temporary prosthesis

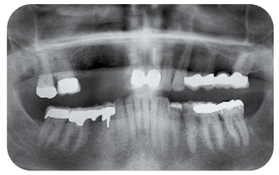
Final prosthetic restoration with implant-borne bridge in regio 12-21 and crown on tooth 22

CLINICAL CASE BY
Prof. Dr. Dr. Daniel Rothamel, Mönchengladbach Hospital, University of Düsseldorf, Germany

RIDGE AUGMENTATION

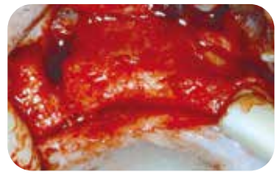


Instable bridge situation with abscess formation at tooth 15 after apicoectomy



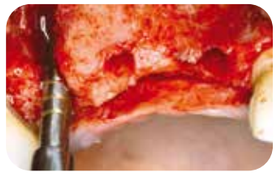
OPG six months after tooth extraction shows vertical deficiency at tooth 15

Clinical situation showing scar tissue formation at former abscess incision site

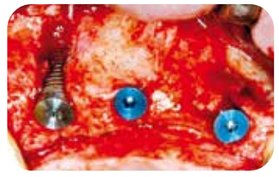


Mucoperiosteal flap elevation reveals a self-containing defect at tooth 15 and a non-containing lateral bone defect at teeth 14 to 12

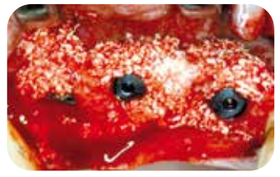
Bone spreading at tooth 12 for lateral widening of the crest



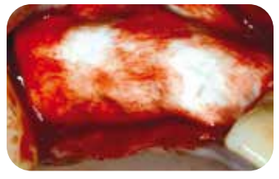
Internal sinus grafting to compensate the vertical deficiency at tooth 15



After implant placement, lateral bone defects require further augmentation

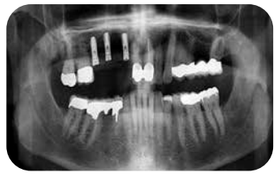


Application of cerabone® and autologous bone (mixture 1:2) on the lateral aspect



Covering of the augmentation site with Jason® membrane

Tension-free soft tissue closure



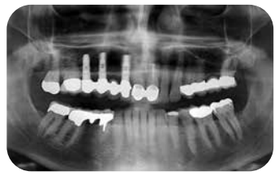
Post-operative x-ray showing the internal sinus grafting and implant positions

Stable soft tissue condition after six months of healing

Perfect integration of the cerabone® particles into the newly formed bone matrix

Implant uncovering, and insertion of gingiva formers

Prosthetic situation following professional dental hygiene treatment at one year post-operative

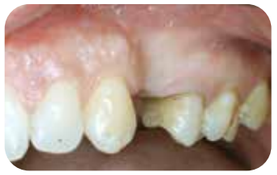


X-ray control one year post-operative

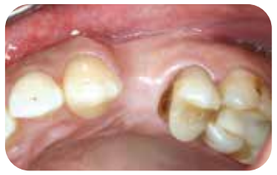
CLINICAL CASE BY

Prof. Dr. Dr. Daniel Rothamel, Mönchengladbach Hospital,
University of Düsseldorf, Germany

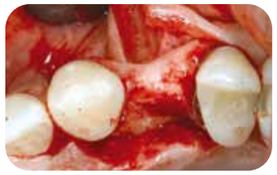
LATERAL AUGMENTATION



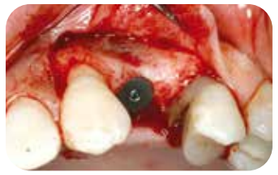
Lateral defect in regio 24 at six months after extraction



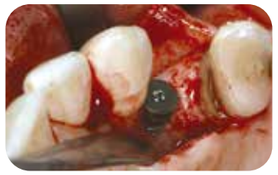
Crestal view of defect



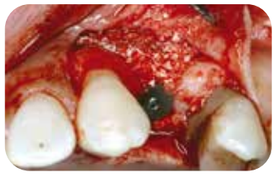
Surgical presentation of the bone defect



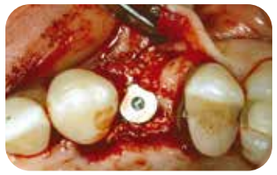
Thin buccal bone after implant installation



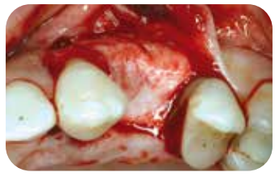
Dehiscence defect at palatal side



Lateral augmentation with cera-bone® and autologous bone (mixture 1:1)

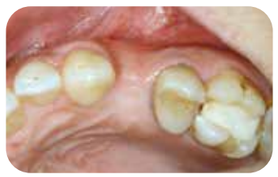


Further augmentation at the palatal side

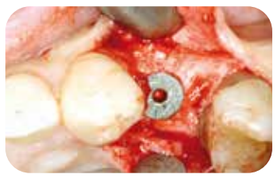


Application of Jason® membrane

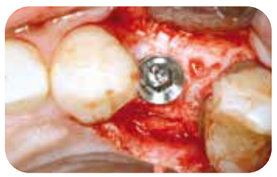
Soft tissue closure



Clinical situation after three months



Satisfactory bone formation and volume maintainance



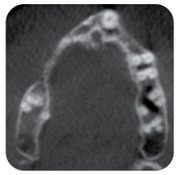
Stable hard tissue conditions on both buccal and palatal side

CLINICAL CASE BY

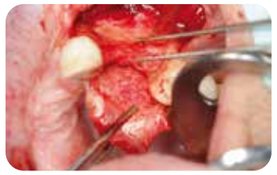
Dr. Dr. Dr. Oliver Blume, Munich, Germany

RIDGE AUGMENTATION IN THE MAXILLA

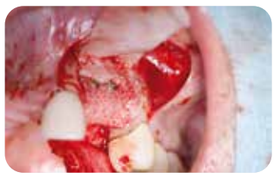
Preoperative clinical situation - severe atrophy of the maxillary bone



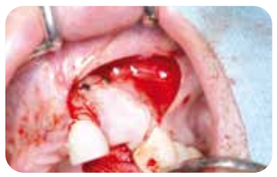
Three dimensional reconstruction of the bone defect and planned maxgraft® bonebuilder blocks (blue)



Upper left maxilla - severe atrophic ridge



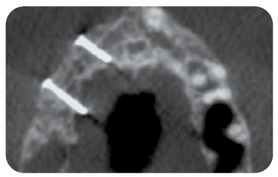
Fixation of maxgraft® bonebuilder and contouring with allogenic particulated material



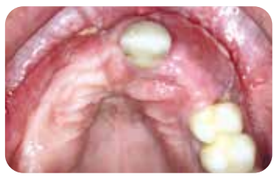
Covering with Jason® membrane and one layer of PRF matrices

Tension-free and saliva-proof wound closure

Fixation of two more maxgraft® bonebuilder blocks on upper right maxillary ridge



X-ray six months post-operative



Clinical situation six months after augmentation

Implant placement

Temporary provision

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