dental
bone & tissue
regeneration

botiss
biomaterials

Jason® membrane
collprotect® membrane

Natural collagen membranes for GBR/GTR

Scientific and clinical evidence

by PD Dr. Dr. Daniel Rothamel et al.

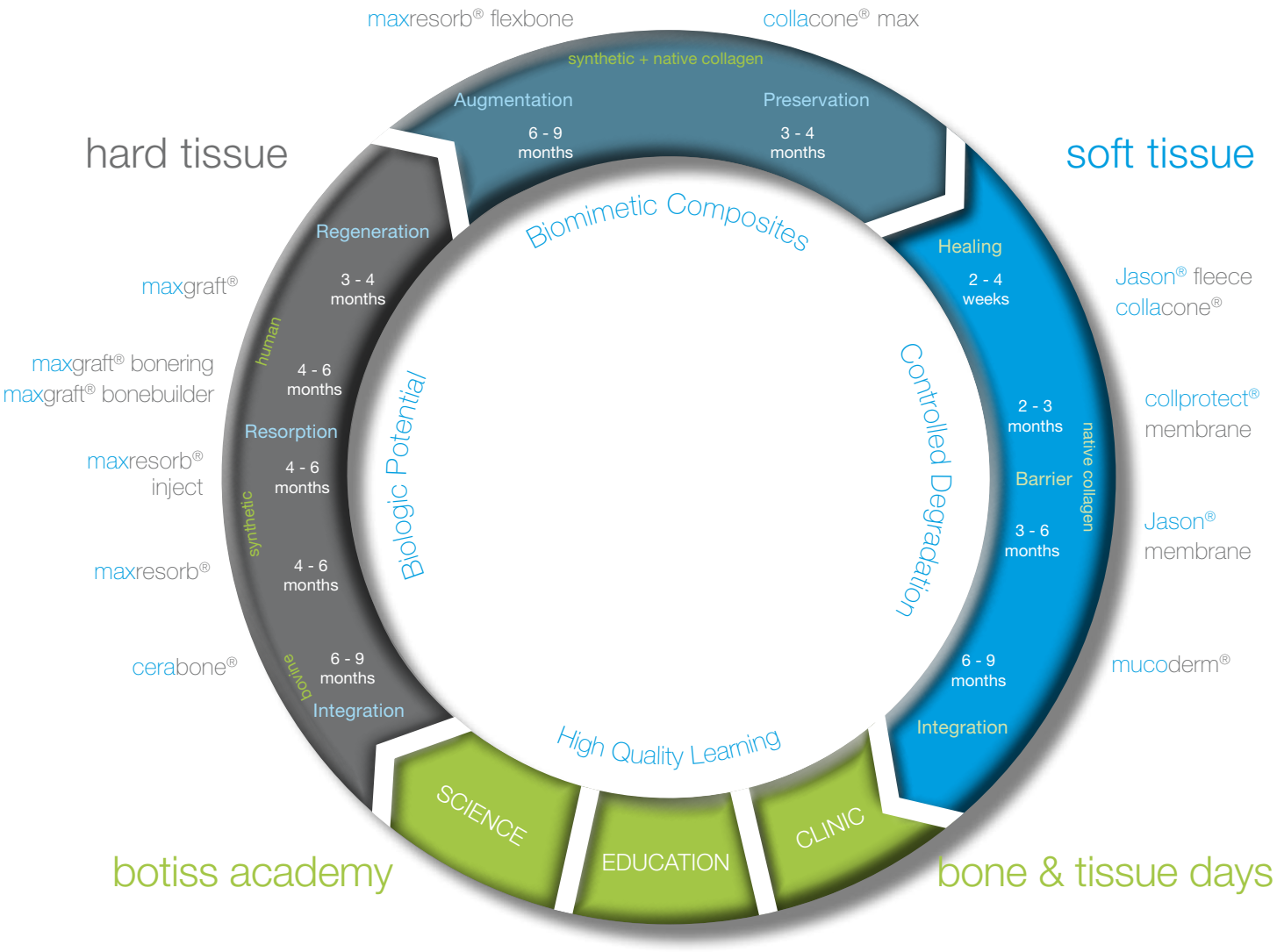
soft tissue

native

reliable

resorbable

botiss regeneration system



cerabone®

natural bovine bone graft

maxresorb®

bi-phasic calcium phosphate

maxresorb® inject

synthetic injectable bone paste

maxgraft®

processed allogenic bone graft

maxgraft® bonering

processed allogenic bone rings

maxgraft® bonebuilder

patient matched allogenic bone implants

maxresorb® flexbone

flexible blocks (CaP/collagen composite)

collacone® max

cone (CaP/collagen composite)

mucoderm®

3D-stable soft tissue (collagen) graft

Jason® membrane

native pericardium GBR/ GTR membrane

collprotect® membrane

native collagen membrane

Jason fleece® collacone®

collagenic haemostypt (sponge/cone)

PD Dr. med. Dr. med. dent. Daniel Rothamel

Department of Oral and Maxillofacial Plastic Surgery,
University of Cologne, Germany

- Since 2010 Assistant Professor at the Department of Oral and Maxillofacial Plastic Surgery (Prof. Dr. Dr. J. Zöller), University of Cologne, Germany
- 2009, habilitation (post-doctoral lecturing qualification), University of Cologne
  Thesis: “Reconstruction of defects of the alveolar ridge using artificial and autogenous bone blocks and growth factors”
- 2008, doctorate in human medicine (Dr. med.), Heinrich-Heine University of Düsseldorf
  Thesis: “Biocompatibility, biodegradation and angiogenetic aspects of native and cross-linked collagen membranes”
- Since 2007 specialist in Oral Surgery
- 2004, doctorate in dental medicine (Dr. med. dent.), Heinrich-Heine University of Düsseldorf, Germany
  Thesis: „Establishing a new method for quantification of tooth hypersensitivity“

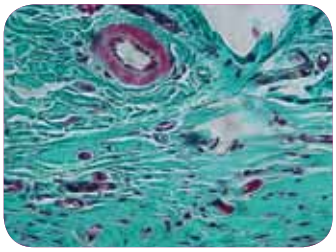
PD Dr. Dr. Daniel Rothamel

Already during his medicine studies, PD Dr. Dr. Daniel Rothamel was focused on scientific subjects in the field of bone regeneration and implantology. He has published more than 80 articles, many of them in renowned international scientific journals. He acts as a reviewer for several journals and frequently participates as a lecturer on congresses and training courses in Germany as well as other countries. His research and lecture activities are focused on subjects such as Guided Bone Regeneration (GBR), socket preservation, implant surfaces, collagen membranes, bone substitute materials, growth factors, face trauma, cancer rehabilitation and hemostyptics.

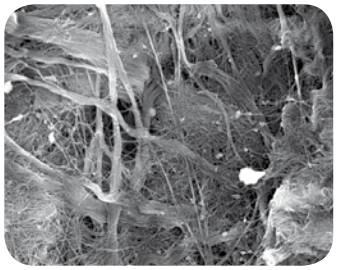
Collagen – a multifaceted protein

Collagens are a family of structural proteins that are found in the extracellular matrix and represent the main component of the skin, blood vessels, tendons, cartilage and bone. Approx. 25% of all proteins found in the body are collagens, in the connective tissue collagens account for ~80% of all proteins. About 28 types of collagen are known that differ in the primary sequence of their peptide chains[1].

Three collagen molecules are packed together as a triple helix, thus forming the collagen fibril. Collagen fibers then evolve from the aggregation of several fibrils. These fibers show a remarkable tear resistance providing 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 specialized cells such as fibroblasts or osteoblasts.



Histological staining of the skin showing the dense collagen network



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

Collagen types

Collagen type I is the most broadly distributed protein and has the largest quantitative share in the body. 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 or the peritoneum. The gingival connective tissue is made up of up to 60% of 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 type III, also called elastine, is responsible for the elastic properties of blood vessels and many tissues such as the skin and lunge tissue. Type IV collagen is the major structural element of the basal lamina.

Most common types of collagens

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

[1] The collagen superfamily. Brown JC, Timpl R., Int Arch Allergy Immunol. 1995 Aug;107(4):484-90.

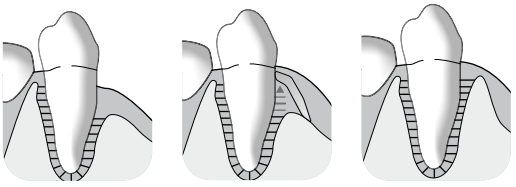
Collagen membranes for the GBR and GTR technique

The GRB/GTR technique

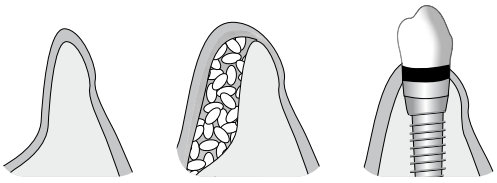
Collagen membranes have been used in Guided Tissue Regeneration (GTR) and Guided Bone Regeneration (GBR) for many years. The principle of these techniques is based on the placement of a barrier membrane to separate the slowly proliferating regenerative cell types like osteoblasts and periodontal cells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

GTR aims at the regeneration of the periodontium. A barrier membrane is placed between the epithelium and the tooth, therefore giving the cells of the periodontal ligament the time and space for regeneration. 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, which prevents the collapse of the membrane and serves as an osteoconductive scaffold for the ingrowth of bone cells (or bone precursor cells). The barrier membrane prevents the ingrowth of soft tissue into the defect area and the encapsulation of the bone graft material, thus enabling the bony regeneration.

Guided Tissue Regeneration (GTR)



Guided Bone Regeneration (GBR)



Membrane types

The first generation of barrier membranes was based on non-resorbable materials like expanded polytetrafluorethylene (ePTFE) and cellulose acetate or titanium. These membranes gained predictable good results, but had the disadvantage of a secondary surgery for removal associated with a potential grafting site morbidity. Therefore, the development proceeded in the direction of resorbable membranes. As material for resorbable membranes synthetic polymers such as polyglycolides and polylactides (acidic degradation) and the natural polymer collagen were used. Due to the manifold positive natural properties of collagen the use of collagen membranes has emerged as the material of choice[2].

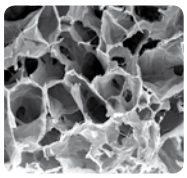
Barrier membrane requirements

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

[2] Rothamel D, Schwarz F, Sager M, Herten M, Sculean A, Becker J. Biodegradation of differently cross-linked collagen membranes: an experimental study in the rat. Clin Oral Implants Res 2005;16:369-78

The advantages of collagen

Several factors make collagen an optimal biologic material for resorbable barrier membranes. One important characteristic is the excellent biocompatibility and also the degradation products of collagens are biocompatible. Collagen is widely distributed throughout the body, making up approx. 60% of all proteins of the gingival connective tissue. Furthermore, it exhibits a very low antigenicity.



3D structure of a collagen fleece

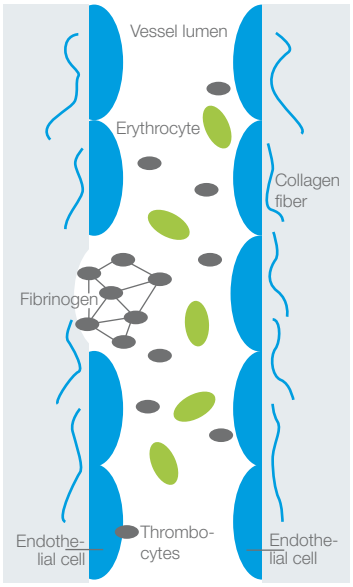
Therefore, collagens can be transferred from animal to human without problems. Collagens are degraded only by specific enzymes called collagenases and are resistant to an unspecific proteolytic degradation. Collagens are involved in the primary haemostatic reaction. Thus, collagen membranes can contribute to a fast stabilization of the wound area. Another advantage is the chemotactic attraction of regenerative cells like osteoblasts, gingival fibroblasts and periodontal ligament cells by collagen. An exposure following dehiscence leads to a quick proteolytic degradation of collagen membranes, yet a secondary granulation without any inflammatory reactions can be observed[3].

Advantages of collagen membranes

- Exceptional biocompatibility
- Support of haemostasis
- Low antigenicity
- Specific degradation by collagenases
- Chemotactic attraction of osteoblasts, fibroblasts and ligament cells

Collagen as a natural haemostypt

A damage of the walls of blood vessels leads to the release of subendothelial collagen that directly or indirectly interacts with surface receptors of thrombocytes. This 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[4]. Accordingly, collagen membranes support the formation of the blood coagulum and contribute to a rapid stabilization of the wound area. Based on their haemostatic effect, collagens are not only used as barrier membranes, but also as collagen sponges and collagen cones for the stabilization of extraction sockets and biopsy harvesting sites or to cover minor oral wounds respectively.



[3] Frank Schwarz, Martin Sager, Daniel Rothamel, Monika Herten, Anton Sculean and Jürgen Becker Einsatz nativer und quervernetzter Kollagenmembranen für die gesteuerte Gewebe- und Knochenregeneration. Schweiz Monatsschr Zahnmed, Vol116:11/2006

[4] Nuyttens BP, Thijs T, Deckmyn H, Broos K. Platelet adhesion to collagen. Thromb Res. 2011 Jan;127

Origin of collagen membranes

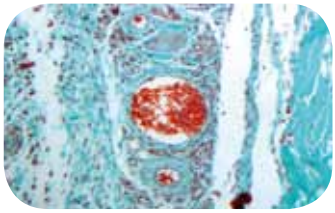
The first collagen membranes available on the market were of bovine origin (Achilles tendon and pericardium). Nowadays, porcine membranes are more widely used because their usage excludes the risk of a BSE transmission. Moreover, porcine collagen exhibits a high homology to human collagen and therefore a very good biocompatibility. Due to these reasons botiss membranes are produced from porcine collagen.

Collagen membranes can originate from various tissues ranging from dermis, to peritoneum or pericardium. Accordingly, these membranes differ in their handling and degradation properties and the resulting barrier function.

Properties of barrier membranes – vascularization versus barrier function

The disadvantage of most collagen membranes, other than the botiss membranes, lays in their rapid enzymatic degradation by collagenases, resulting in a limited stability and correspondingly short barrier function. A possibility to influence the barrier function is to choose a specific original tissue to impart the membranes with a better stability. In that way membranes made of pericardium, such as the Jason® membrane, due to a structural speciality, exhibit a slowed degradation and thus offer a prolonged barrier function. Furthermore, pericardium membranes can be distinguished by an extraordinarily high tear resistance and excellent handling properties (e.g. good adaptation to surface contours, no sticking).

Jason® membrane is very thin, but exhibits an excellent multidirectional tear resistance



Histology of a big blood vessel and some smaller ones

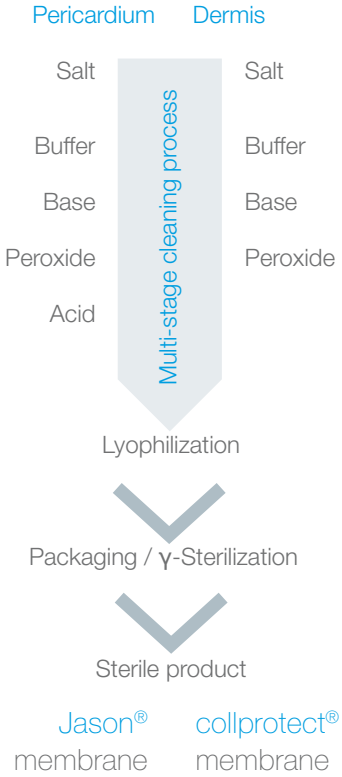
The barrier function can also be extended by the use of membranes with a very dense collagen structure, but this dense structure might oppose the early angiogenesis of the grafting site. The ingrowth of blood vessels into the augmentation area is important not only for the nutrition of the grafting site, but also because the surrounding connective tissue of small capillaries contains undifferentiated progenitor cells (pericytes). These cells can evolve into osteoblasts that are responsible for new bone formation. Therefore, the selective permeability of membranes for blood vessels is desirable[5].
One example of such a semi-permeable membrane is the collprotect® membrane. This membrane possesses loosely structured areas (pores) punctuating the compact collagen matrix and supporting a fast vascularization.

[5] Daniel Rothamel, Roland Torök, Jörg Neugebauer, Tim Fienitz, Martin Scheer, Matthias Kreppel, Robert Mischkowski and Joachim E. Zöller. Clinical aspects of novel types of collagen membranes and matrices: Current issues in soft- and hard-tissue augmentation. EDI Journal 1rst Issue 2012

Production process

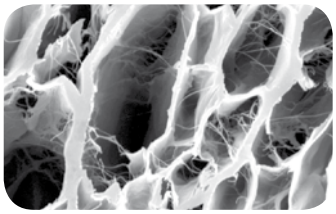
botiss membranes provide better handling and stability

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

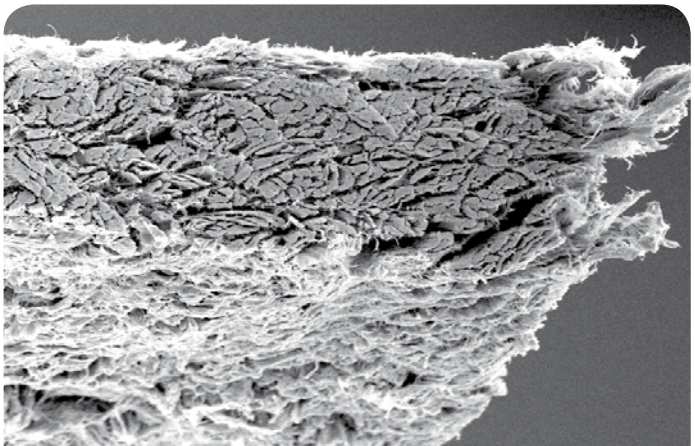


The botiss membranes are native materials, meaning that the natural collagen structure of the original tissue (pericardium or dermis) and thus their natural properties are preserved in the special production process. Naturally grown membranes exhibit especially good handling properties, such as pull and tear resistance, and a good adaptation to surface contours compared to membranes made of pressed collagen.

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 of collagen type I and a lower proportion of collagen type III.

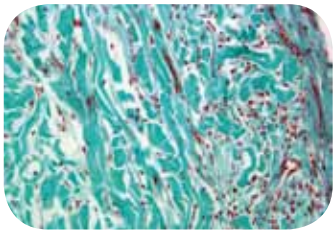


Natural three-dimensional collagen network of Jason® membrane



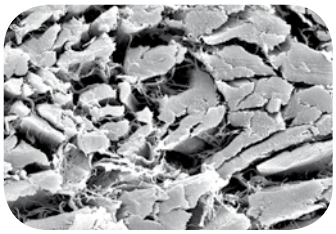
collprotect® membrane natural collagen membrane

collprotect® membrane is a natural collagen membrane. Due to the rough and porous three-dimensional collagen structure, controlled wound healing in combination with Guided Bone and Tissue Regeneration achieves optimal treatment results. During the regeneration process collprotect® membrane offers the necessary barrier function balanced with a controlled degradation time without inflammatory reaction.



Histology 6 weeks after implantation of collprotect® membrane: blood vessels have penetrated the porous structure. Collagen fibres are visible and the degradation proceeds without any inflammatory response.

The soft tissue around a collprotect® membrane usually heals without any problems, even if postoperative dehiscences occur. The biologic structure of the collprotect® membrane surface prevents ingrowth of soft tissue, but allows cell and blood vessel penetration and quick integration into the surrounding tissue. This unique biologic function provides a perfect basis for hard and soft tissue healing.



SEM image of collprotect® membrane

Properties

- Three-dimensional natural collagen matrix
- Controlled wound healing and blood clot support
- Optimal barrier function in GBR/GTR procedures
- Degradation time approx. 8-12 weeks
- Easy application and handling in dry or wet status
- Rough and porous structure for cell guidance
- Natural collagen structure

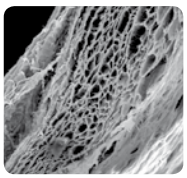
Indications:

Implantology, Periodontology, Oral Surgery & CMF

- Protection or covering of minor perforations of the Schneiderian membrane
- Sinus lift
- Socket preservation
- Horizontal and/or vertical ridge augmentation
- GBR/GTR simultaneous use with bone substitutes
- Fenestration and dehiscence defects
- Intraosseous and furcation defects

Jason® membrane

Jason® membrane is a native collagen membrane originating from pericardium, developed and produced for dental tissue regeneration. Due to the unique, proprietary production process, the superior properties of the native pericardium are preserved, maintaining the characteristics of this natural tissue.



SEM image of Jason® membrane

Easy handling, optimal wound healing and the natural biomechanics combined with highly predictable results are the essential properties of the Jason® membrane.

Jason® membrane shows a good barrier function 56 days after implantation

Due to the natural, strong multidirectional-linking of the collagen network, Jason® membrane provides a long-lasting, adequate barrier function for 3-6 months. The use of Jason® membrane for regeneration of bone and tissue is an essential component of the GBR and GTR concept.

Properties

- Long-lasting barrier function for ~12-24 weeks
- Natural structure and low thickness
- Easy manipulation, can be applied dry and wet
- Supple but strong, with exceptional adaptability to surface contours
- No stickiness after rehydration
- Fast vascularization due to 3-dimensional structure
- Multidirectional strength and tear resistance

Jason® membrane – excellent drapability and adaptation to surface contours

Indications:

Implantology, Periodontology, Oral Surgery & CMF

- Implant dehiscence
- Sinus lift
- Protection of Schneiderian membrane
- Fenestration defects
- Extraction sockets
- Ridge preservation
- Horizontal & vertical augmentation
- Alveolar ridge reconstruction
- Intraosseous defects (1-3 walls)
- Furcation defects (class I-II)

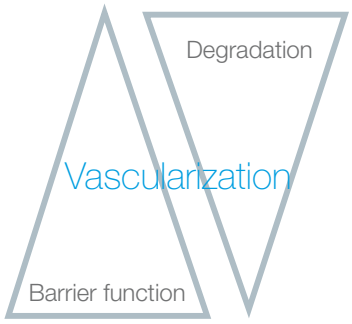
Product comparison

Jason® membrane

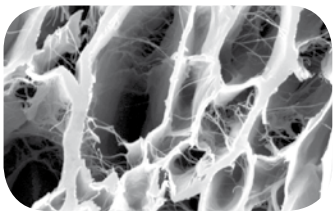
versus

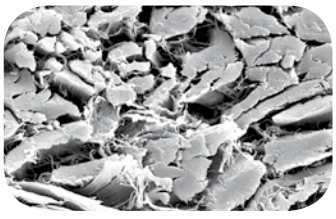
collprotect® membrane

	Jason® membrane	collprotect® membrane
Origin	Pericardium	Dermis
Degradation	12-28 weeks	8-12 weeks
Structure	Differently oriented collagen fibers providing multi-directional tear resistance	Dense network of collagen bundles with pores for better vascularization
Handling	Highly adaptive	Slightly rigid



Keyfactors for barrier membranes





Product Specifications

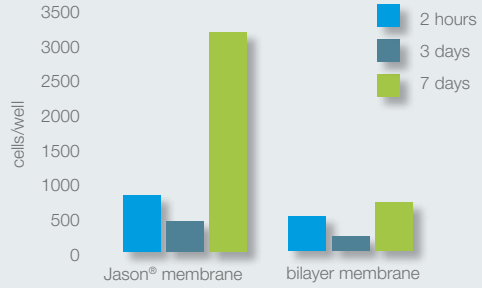
Jason® membrane Art.-No.	Size	Content	collprotect® membrane Art.-No.	Size	Content
0681520	15x20mm	1 Membrane	601520	15x20mm	1 Membrane
0682030	20x30mm	1 Membrane	602030	20x30mm	1 Membrane
0683040	30x40mm	1 Membrane	603040	30x40mm	1 Membrane

In vitro testing

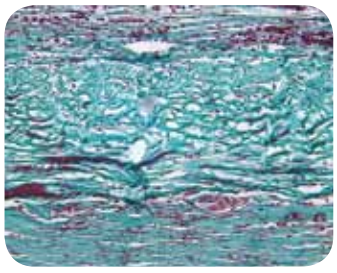
Jason® membrane supports attachment and proliferation of osteoblast-like cells
Results from cell culture, Dr. M. Herten, University of Düsseldorf and PD Dr. Dr. D. Rothamel, University of Cologne

The incubation of Jason® membrane (multilayer) and a bilayer membrane with osteoblast-like SaOs-2 cells showed a significantly superior proliferation of the cells on Jason® membrane after 7 days.

This excellent cell attachment makes Jason® membrane a good scaffold for the guidance of osteoblasts, therefore supporting the bony regeneration of covered defects.

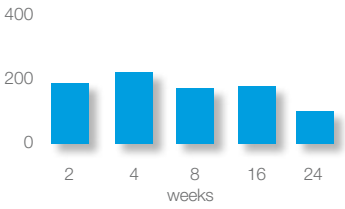


In vivo pre-clinical testing
Results from a degradation study in a rat model[6], PD Dr. Dr. D. Rothamel, University of Cologne

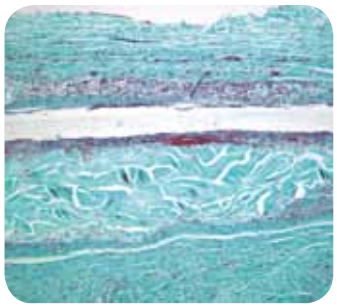


Structural integrity of Jason® membrane 28 days after implantation

Degradation of Jason® membrane

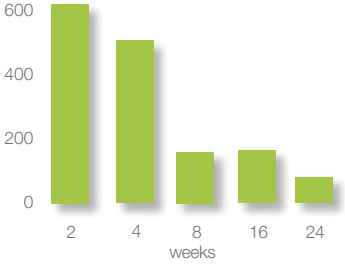


collprotect® membrane prepared for subcutaneous implantation



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

Degradation of collprotect® membrane



The diagrams show the degradation times of the membranes in humans, data result from the convertion of the data from the rat model

Resorption time and tissue integration of collagen membranes not only depend on the animal origin, but also differs between tissues. Tissue integration and degradation of Jason® membrane and collprotect® membrane were tested by subcutaneous implantation in rats. Jason® membrane that originates from pericardium was integrated within the first weeks and remained stable for a healing period of 8-12 weeks (please note the different metabolism rates for rats and humans).
For the dermal collagen of collprotect® membrane cell invasion took a little longer, but the membrane was degraded in the first 4-8 weeks.

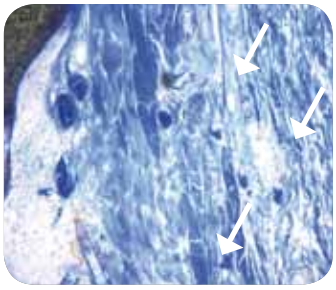
[6] Biodegradation patterns of native and cross-linked porcine collagen matrices – an experimental study in rats. Daniel Rothamel, Tim Fienitz, Marcel Benner, Arndt Happe, Matthias Kreppel, Martin Scheer and Joachim Zöller, University Hospital of Cologne, Cologne, Germany, Poster EAO 2011

In vivo pre-clinical testing

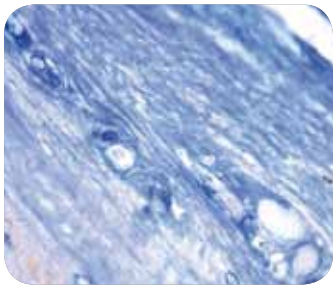
Jason® membrane – Excellent biocompatibility and tissue integration
Results from an animal model, PD Dr. Dr. D. Rothamel,
University of Cologne

Analysis of the tissue integration and morphological structure of Jason® membrane 4 to 24 weeks after lateral augmentation in a dog model (Toluidine blue staining)

The membrane was integrated into the surrounding tissue without any inflammation. Significant degradation of the membrane started at week 8 and proceeded until week 12. A bilayer membrane that was tested in the same model showed a comparably good tissue integration, but was nearly completely degraded after 8 weeks.



Jason® membrane after 4 weeks healing time



Bilayer membrane after 4 weeks healing time

4 weeks healing time

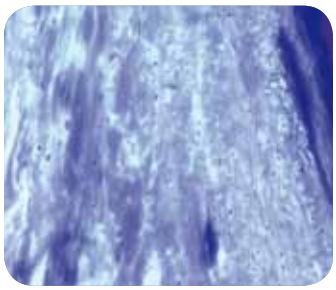
Both membranes show good tissue integration without any inflammatory reaction.

Initial ingrowth of blood vessels improves nutrition of the graft and osseous regeneration.

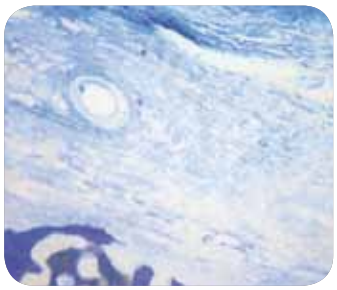
8 weeks healing time

The bilayer membrane is nearly completely resorbed.

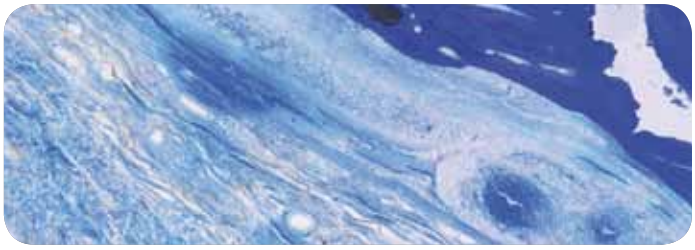
Jason® membrane is still intact, providing barrier against ingrowth of surrounding soft tissue.



Bilayer membrane after 8 weeks healing time



Jason® membrane after 8 weeks healing time



Jason® membrane after 12 weeks healing time

12 weeks healing time

Jason® membrane is almost degraded and replaced by a periosteum rich in collagen fibers.

The membrane collagen is partially visible as cloudy fibrous areas.

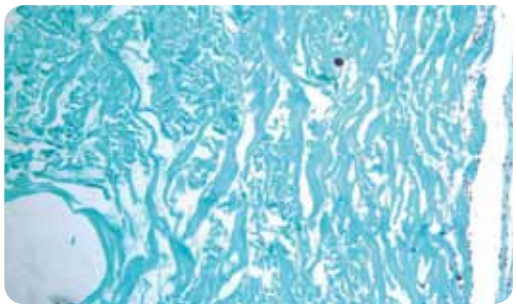
In vivo pre-clinical testing

collprotect® membrane –
rapid angiogenesis and transmembranous vascularization
In vitro results from a rat model, PD Dr. Dr. D. Rothamel, University of Cologne

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

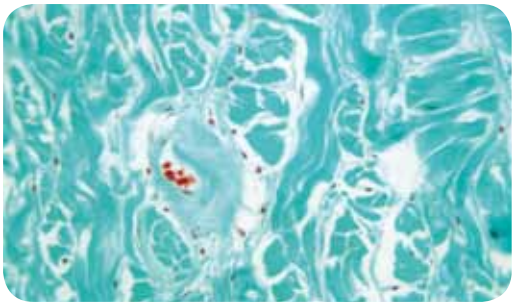
After four weeks, blood vessels in the pores of the membrane indicate a trans-membranous vascularization. The early vascularization of the membrane supports the blood supply and nutrition of the grafting site, therefore promoting the ossoeus regeneration. Furthermore, the regeneration is promoted by progenitor cells lining the blood vessels and evolving into bone forming osteoblasts.

7 days after implantation

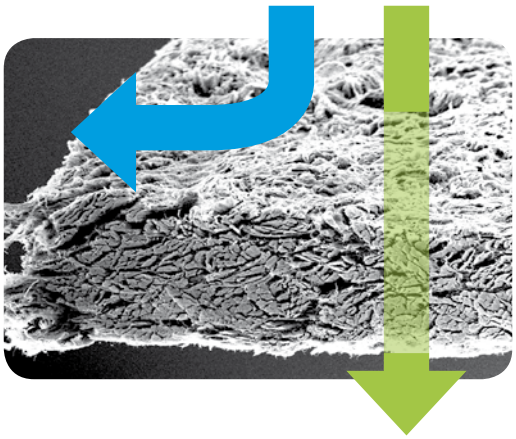


7 days after implantation, only superficial invasion of cells into the membrane can be observed, an empty pore in the membrane in the lower left part is recognizable.

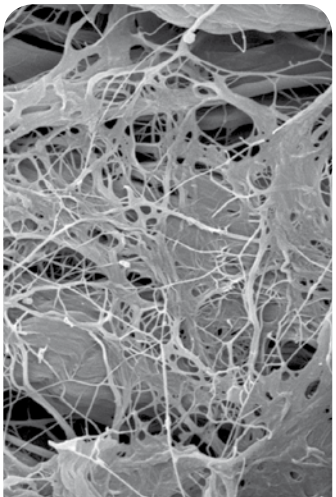
28 days after implantation



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



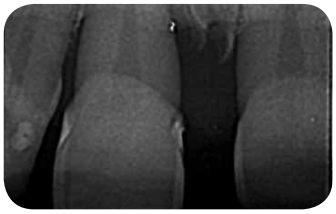
Areas of a fibrillary structure within the dense collagen fiber network of collprotect® membrane (pores, see green arrow and right picture) facilitate the ingrowth of blood vessels into the defect area through the membrane.



Clinical application of collprotect® membrane

Clinical Cases by Dr. Raluca Cosgarea and Prof. Dr. Dr. Anton Sculean Cluj, Romania and Bern, Switzerland

Regeneration of intraosseous defects



Pre-operative x-ray showing intrabony defect

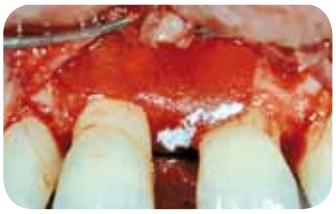
Situation before surgery

Defect presentation after preparation of mucoperiosteal flap

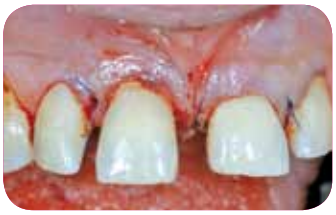
Intraoperative measurement of intrabony defect

collprotect® membrane cut to shape

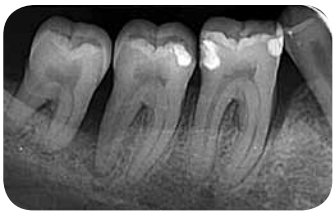
Filling of intrabony defect with cerabone®



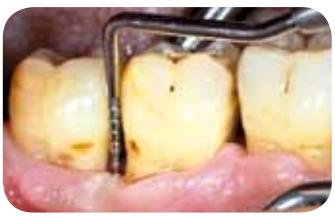
collprotect® membrane in place



Saliva-proof wound closure



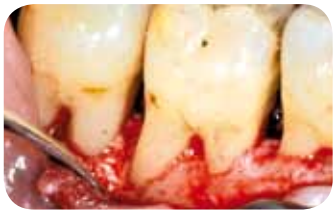
Pre-operative radiograph



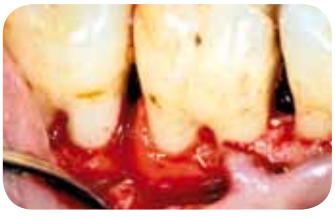
Pre-operative defect measurement

Intraoperative probing of defect depths

collprotect® membrane cut to shape



Defect filling with cerabone® granules

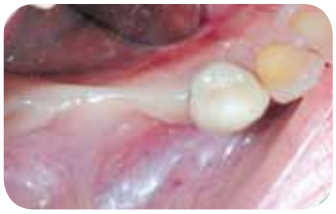


Adaptation of collprotect® membrane

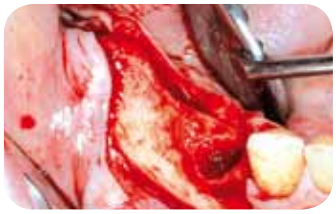
Saliva-proof wound closure

Clinical case by Dr. Roland Török, Nuremberg, Germany

Ridge augmentation

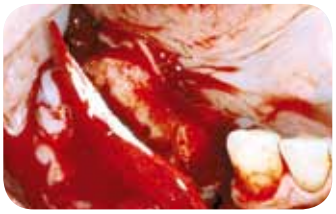


Clinical situation before augmentation, thin alveolar ridge



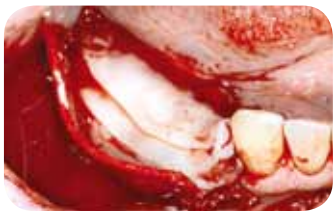
Surgical presentation of atrophic alveolar ridge

Perforation of cortical bone and insertion of screws to support placement of bone graft material

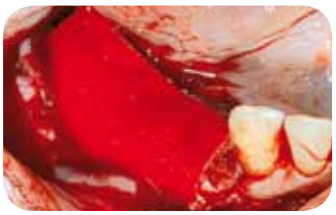


Placement of collprotect® membrane at buccal wall

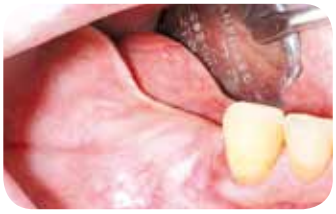
Ridge augmentation with maxresorb® and maxgraft® mixture 1:1



Covering of augmentation site with PRF® matrices

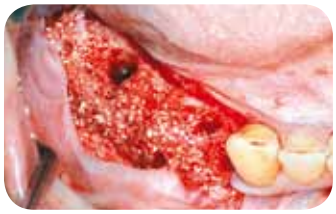


collprotect® membrane turned down over defect

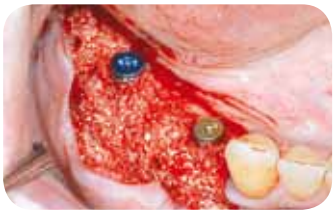


Situation after wound healing, 3 months post-OP

Stable integration of maxresorb® particles at re-entry 3 months post-OP



Situation after removal of screws and preparation of implant beds



Insertion of two implants in sufficient bone amount

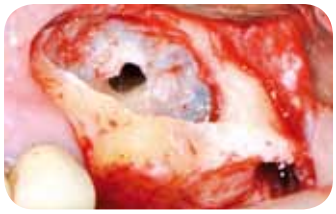
Tension-free wound closure

For lateral augmentation the initial placement of the dry membrane and following application of the graft material is advantageous. After rehydration the membrane can be turned down over the defect.

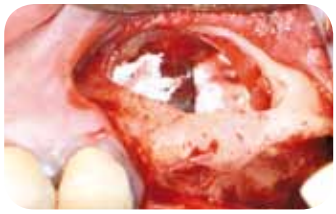
Clinical Case by Dr. Viktor Kalenchuk, Chernivtsi, Ukraine

Sinus lift with immediate implantation

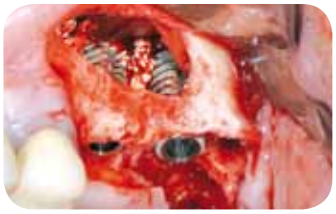
Clinical situation of the edentulous distal maxilla



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



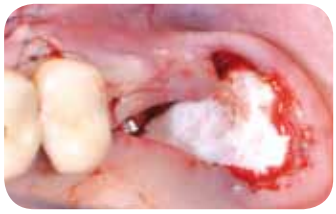
Introduction of collprotect® membrane to protect Schneiderian membrane



Immediate implantation and augmentation with cerabone®

Filling of subantral cavity with cerabone® 1.0-2.0 mm

Covering the augmentation site with collprotect® membrane



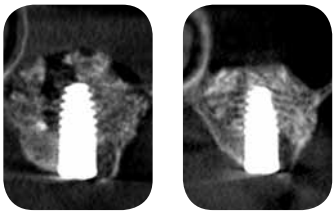
Soft tissue defect coverage with Jason® fleece

Wound closure and suturing

Good soft tissue situation after 6 months healing time

Bone regeneration after 6 months healing time

Placement of healing screws



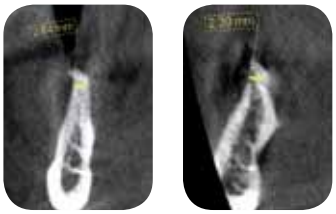
Alveolar ridge and sinus floor CT scan immediately after the surgery (l) and after 6 months (r)

In case of an unstable soft tissue situation or when you expect a wound dehiscence to occur, we recommend to cover the membrane with a Jason® fleece (where applicable, soaked with antibiotics), to protect the healing area by the fast resorbing fleece.

Clinical Case by Dr. Viktor Kalenchuk, Chernivtsi, Ukraine

Ridge augmentation with maxgraft® bonebuilder

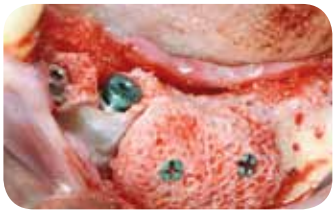
Clinical situation before augmentation



CT scan of region 36, 37 before surgery

Situation after tooth extraction and mobilization of mucosal flap

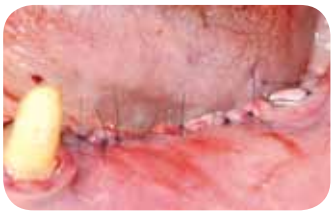
maxgraft® bonebuilder



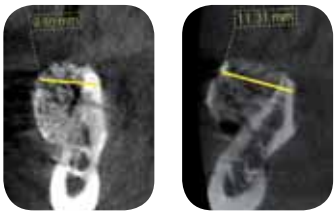
Immediate implant insertion in regio 34, 35; positioning and fixation of maxgraft® bonebuilder

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

Covering of the augmentation site with collprotect® membrane



Wound closure and suturing



CT scan of region 36, 37 after surgery

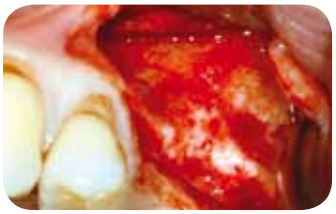
To protect the Schneiderian membrane from damage, a membrane can be introduced before filling the sinus cavity with the bone graft material.

Clinical case by PD Dr. Dr. Daniel Rothamel, University of Cologne, Germany

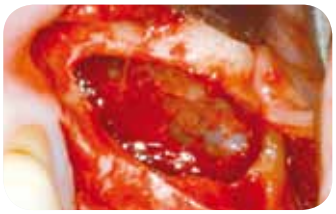
Sinus lift with two-stage implantation

Clinical situation before sinus lift

Clinical situation before sinus lift, occlusal view

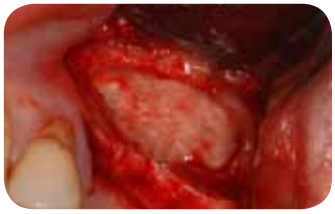


Surgical presentation of the buccal wall

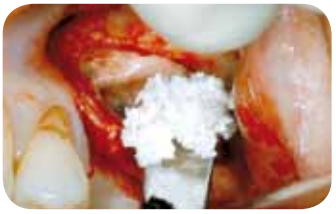


Preparation of a lateral sinus window

Introduction of Jason® membrane into the sinus cavity

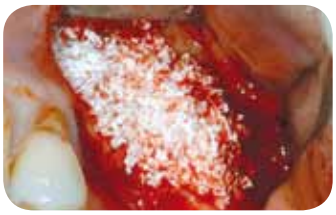


Jason® membrane in the sinus cavity to protect the Schneiderian membrane



Filling of the sinus cavity with maxresorb®

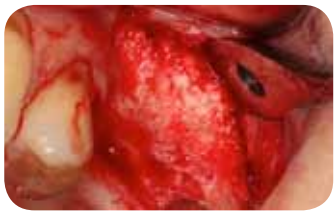
maxresorb® in the sinus cavity



Additional lateral augmentation with maxresorb®

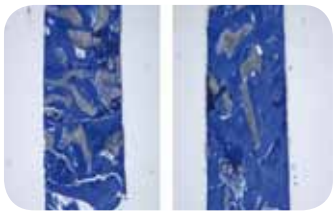
Covering of the augmentation area with Jason® membrane

Tension-free wound closure with single button sutures



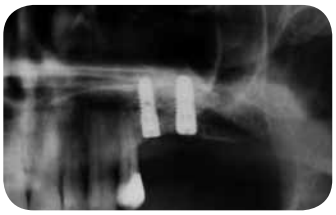
Good osseous integration of the maxresorb® particles without soft tissue ingrowth 6 months post-OP at re-entry

Stable insertion of two implants into sufficient bone matrix



Histology of biopsy taken at implantation

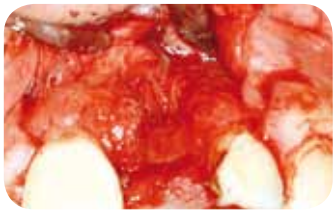
Detail image of histology showing complete integration of particle in new bone matrix



Post-operative radiograph

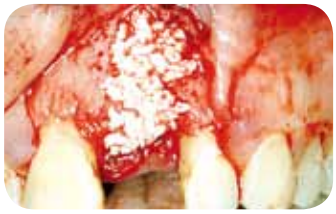
Clinical case by PD Dr. Dr. Daniel Rothamel, University of Cologne, Germany

Dehiscence defect

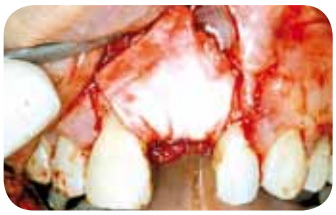


4 months after tooth extraction, resorption of the vestibular wall visible after flap elevation

Implant in place showing large buccal dehiscence defect

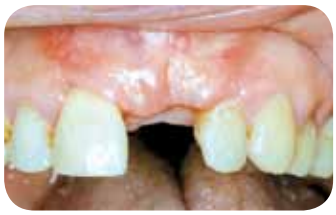


Augmentation of the defect with cerabone®



Covering of the augmentation site with Jason® membrane

Good soft tissue situation 6 months after implantation, occlusal view



Good soft tissue situation 6 months after implantation, vestibular view

Excellent bone formation at re-entry, implant covered by new bone matrix

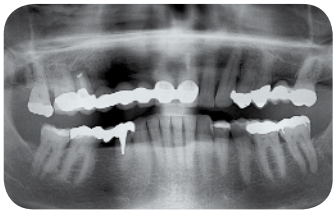
Uncovering of implant

Histology of biopsy taken at implant uncovering showing stable integration of cerabone® particles

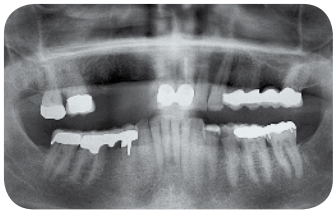
When using bone graft materials, the application of a barrier membrane is highly recommended, otherwise the fast proliferating soft tissue will oppose the complete osseous regeneration of the defect.

Clinical case by PD Dr. Dr. Daniel Rothamel, University of Cologne, Germany

Ridge augmentation

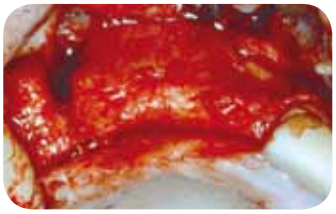


Instable bridge situation with abscess formation at tooth 15 after apicectomia



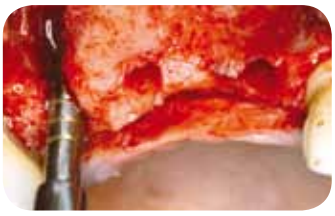
OPG 6 months after tooth extraction shows vertical deficiency at 15

Clinical situation with scar formation at former abscess incision site

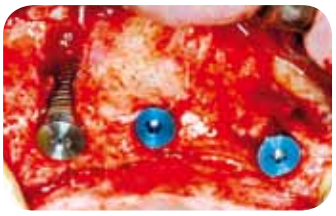


Mucoperiosteal flap elevation reveals a self-containing defect at 15 and a non-containing lateral bone defect at 14 – 12

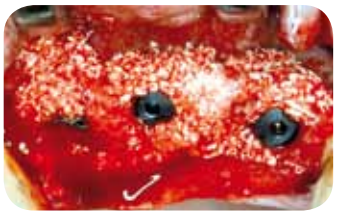
Bone spreading at 12 for lateral widening of the crest



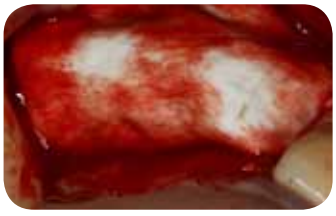
Internal sinus grafting to compensate the vertical deficiency at 15



After implant installation, lateral bone defects need further augmentation

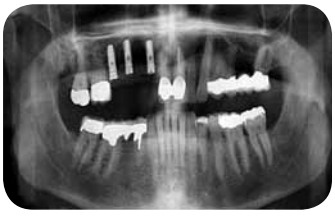


Application of cerabone® and autologous bone (mixture 1:2) on the lateral aspect



Covering of the augmentation site with Jason® membrane

Tension-free soft tissue closure



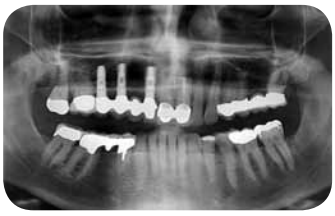
Post-operative x-ray showing the position of implants and internal sinus grafting

Stable conditions after 6 months healing period

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

Implant uncovering and insertion of gingiva formers

Prosthetic situation after one year following professional dental hygiene

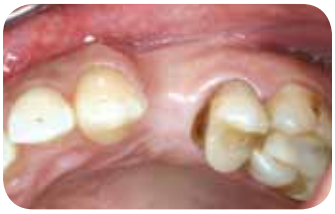


Radiological situation after one year

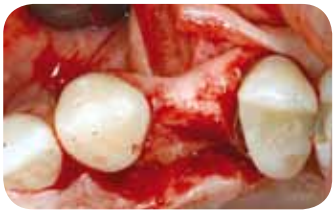
Clinical case by PD Dr. Dr. Daniel Rothamel, University Cologne, Germany

Lateral augmentation

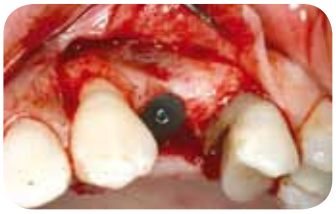
Lateral defect in regio 024 six months after extraction



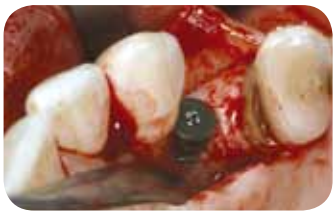
Crestal view of defect



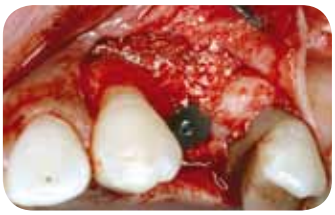
Surgical presentation of the bone defect



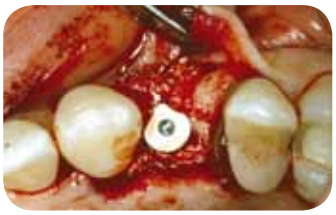
Thin buccal bone after implant installation



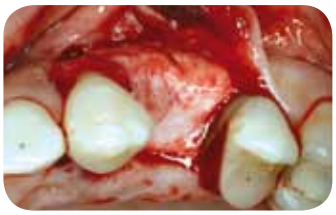
Dehiscence defect at palatal side



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

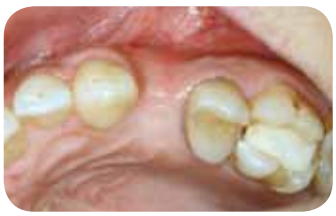


Further augmentation at the palatal side

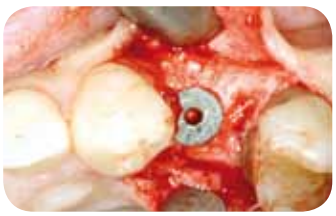


Application of Jason® membrane

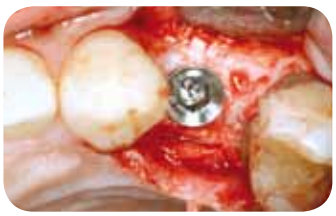
Soft tissue closure



Situation after 3 months



Good bone formation and volume maintainance

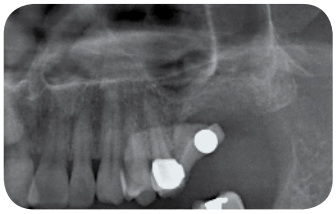


Stable and predictable hard tissue conditions on both buccal and palatal side

Studies showed that highest implant survival rates were achieved with the GBR technique, combining the use of a bone graft material and a barrier membrane.

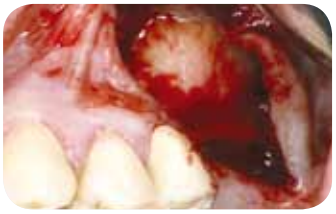
Clinical case by PD Dr. Dr. Daniel Rothamel, University Cologne, Germany

Sinus lift with two-stage implantation



Pre-operative OPG showing vertical and lateral defect after cystectomy and tooth extraction

Situation before surgery



Surgical presentation of the atrophic alveolar ridge

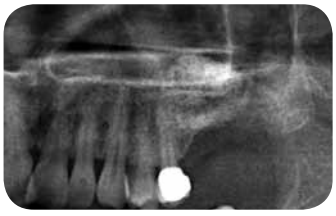
Preparation of a lateral sinus window

Filling of the sinus cavity with cerabone®

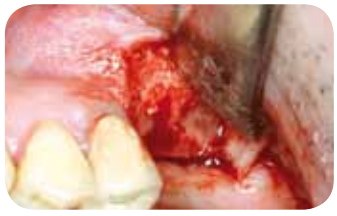
Additional lateral augmentation with cerabone®

Covering of the augmentation site with the Jason® membrane

Tension-free wound closure

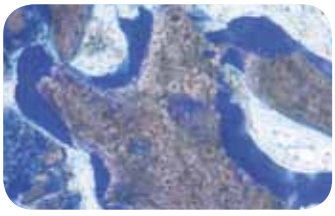


OPG 6 months post-OP



Very good integration of cerabone® particles without soft tissue encapsulation

Stable insertion of implant



Histology of biopsy showing cerabone® particles covered by newly formed bone matrix

In case of a small perforation (< 5 mm) of the Schneiderian membrane in progress of sinus floor elevation, the application of a collagen membrane is a useful tool for perforation coverage. Make sure that the patient doesn´t sneeze for two weeks and prescribe antibiotics and swelling prophylaxis (e.g. Xylomethazoline).
Never continue if you find an acute sinusitis with presence of pus.

dental
bone & tissue
regeneration

botiss
biomaterials

Innovation.
Regeneration.
Aesthetics.

soft tissue

education

hard tissue

botiss dental GmbH
Uhlandstraße 20-25
10623 Berlin / Germany

Fon +49 30 20 60 73 98 30
Fax +49 30 20 60 73 98 20

contact@botiss.com
www.botiss.com
facebook: botiss biomaterials

Rev.: CMen-01/2013-02