

bone & tissue
regeneration

botiss
biomaterials

maxgraft®

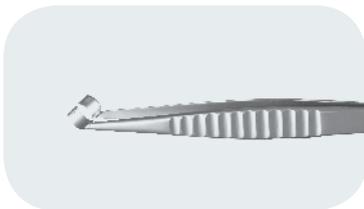
maxgraft® bonering

maxgraft® bonebuilder

maxgraft® cortico

Processed human allograft

hard tissue

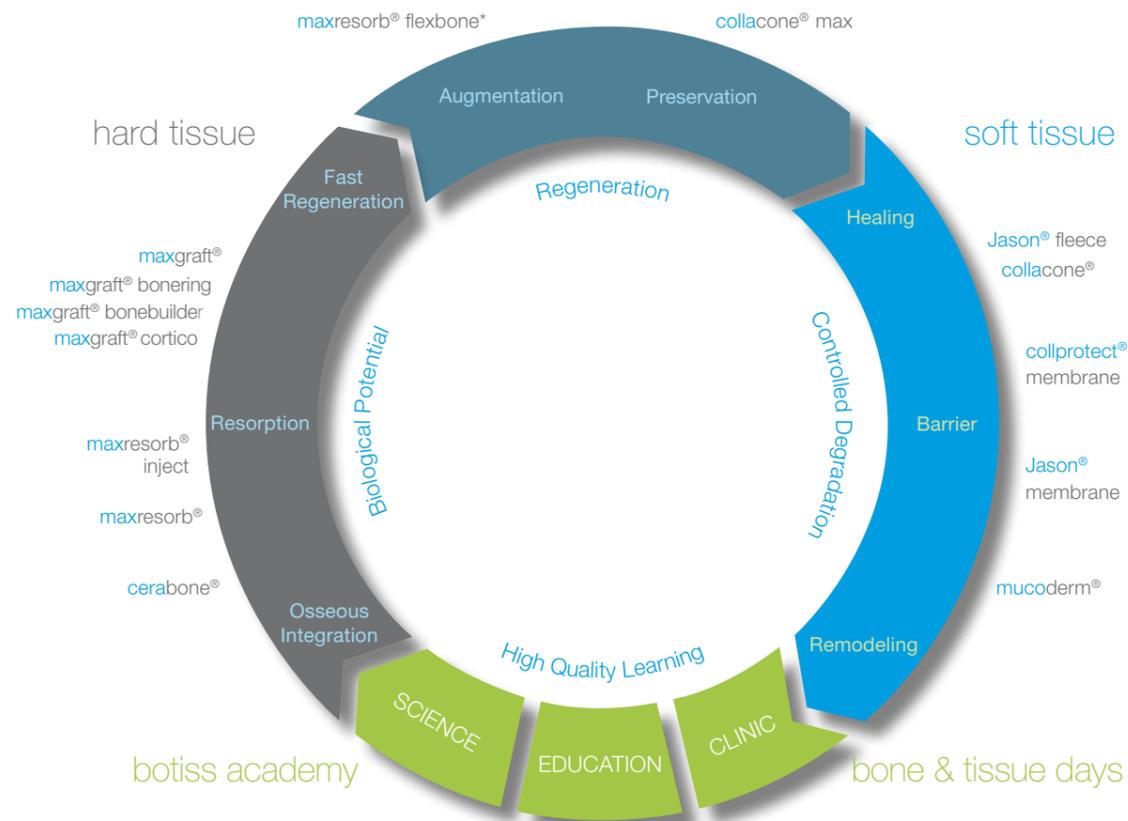


safe

biologic

successful

botiss regeneration system



Development / Production / Distribution

| | | | | | |
|---|--|--------------------------------------|--|--|--|
| | | | | | |
| cerabone® | maxresorb® | maxresorb® inject | maxgraft® bonebuilder | maxgraft® bonering / maxgraft® cortico | maxgraft® |
| Natural bovine bone graft | Synthetic biphasic calcium phosphate | Synthetic injectable bone paste | Patient matched allogenic bone implant | Allogenic bone ring / Processed allogenic bone plate | Processed allogenic bone graft |
| | | | | | |
| maxresorb® flexbone* | collacone® max | Jason® fleece / collacone® | collprotect® membrane | Jason® membrane | mucoderm® |
| Flexible block (CaP / Collagen composite) | Alveolar cone (CaP / Collagen composite) | Collagenic haemostat (Sponge / Cone) | Native collagen membrane | Native pericardium GBR / GTR membrane | 3D-stable soft tissue (Collagen) graft |

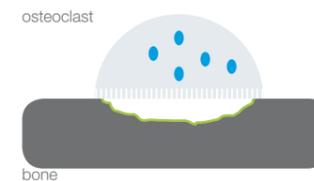
Processed human allograft Introduction



Various bone graft materials are available to replace and regenerate bone matrix lost by tooth extraction, cystectomy or bone atrophy followed by loss of teeth or inflammatory processes.

Of all grafting options autologous bone is considered the „gold standard“, because of its biological activity due to vital cells and growth factors.

Yet, the autologous bone from intra-oral donor sites is of restricted quantity and availability¹. The bone tissue obtained from the iliac crest is described to be subject to fast resorption². Moreover, the harvesting of autologous bone requires a second surgical site associated with an additional bone defect and potential donor site morbidity. Thus, application of processed allogenic bone tissue represents a suitable alternative.



New bone formation after grafting with allogenic bone tissue begins with an acute inflammatory response, within which granulation tissue gradually accumulates, and by activation of osteoclasts. Subsequently the incorporation process begins with the vascularization of the allograft. By activation of osteoclasts the immune system facilitates the remodeling of the graft. These large cells completely degrade medullary bone, thereby allowing its substitution by osteoblasts. The immunological compatibility of processed allogenic bone is not different from autologous tissue. No circulating antibodies could be detected in blood samples from patients that underwent allograft surgery³. Moreover, several histological and morphological studies have well documented that there was clinically no difference in the final stage of incorporation between allograft and autologous graft^{4,5,6}.



Classification

Autologous:

- Patient's own bone, mostly harvested intra-orally or from the iliac crest
- Intrinsic biological activity

Allogenic:

- Bone from human donors (multi-organ donors or femoral heads of living donors)
- Natural bone composition and structure

Xenogenic:

- From other organisms, mainly bovine origin
- Long-term volume stability

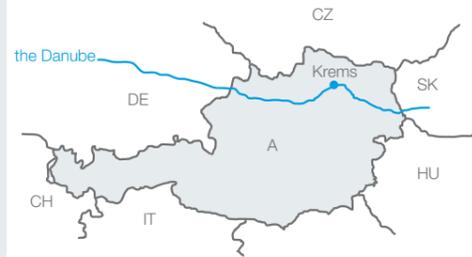
Alloplastic:

- Synthetically produced, preferably calcium phosphate ceramics
- No risk of disease transmission

1. Hiatt WH, Schallhorn RG. Intraoral transplants of cancellous bone and marrow in periodontal lesions. J Periodontol. 1973 Apr;44(4):194-208.
 2. Dragoo MR, Irwin RK. A method of procuring cancellous iliac bone utilizing a trephine needle. Periodontol. 1972 Feb;43(2):82-7.
 3. Gomes KU, Carlini JL, Biron C, Rapoport A, Dedivitis RA. Use of allogeneic bone graft in maxillary reconstruction for installation of dental implants. J Oral Maxillofac Surg. 2008 Nov;66(11):2335-8.
 4. Urist MR. Bone: Formation by autoinduction. Science 150:893, 1965
 5. Urist MR: Bone morphogenetic protein induced bone formation in experimental animals and patients with large bone defects, in Evered D, Barnett S (eds): Cell and Molecular Biology of Vertebrate Hard Tissue. London, CIBA Foundation, 1988
 6. Schlee et al.. Esthetic outcome of implant-based reconstructions in augmented bone: comparison of autologous and allogeneic bone block grafting with the pink esthetic score (PES). Head Face Med. 2014 May 28;10(1):21. doi: 10.1186/1746-160X-10-21.



C+TBA is a non-profit organization aiming to maintain continuous medical supply of allografts under pharmaceutical conditions. Serving as a platform for the definition of safety standards and assurance of compliance with defined product qualities, C+TBA focuses on the specifications of human bone tissue as required in a large number of diseases that are associated with the loss of bone tissue.



The quality standards for donor selection, procurement, processing, quality control, storage and distribution of human tissue and cells are mandatory committed in the European Directives 2004/23/EC and 2006/17/EC. In addition, at the national level, the legal requirements are defined by the Austrian Tissue Safety Act (GSG, 2009).



To meet and comply with both European and national requirements, C+TBA has implemented a quality assurance system at pharmaceutical level, which is regularly audited by the competent national authority, the Austrian Federal Office for Safety in Health Care (BASG / AGES).

The C+TBA is certified as a tissue bank according to §19 and §22 of the Austrian Tissue Safety Act.



Tissue donation and procurement



maxgraft® products are predominantly produced from living donor femoral heads after hip replacement surgery. Only cortico-cancellous blocks and cortical struts are produced from multi-organ donors.

The procurement, standardized by a predefined protocol, is carried out by certified procurement centers according to the European Directives. Tissue donations will only be carried out after the donor's written consent. In addition, the health status of the potential donor is assessed in the context of a risk analysis and the donor is then selected on the basis of strict exclusion criteria. For all multi-organ donors the highest ethical and safety-related requirements are met.

Donor tissue is only approved for processing after having passed a thorough inspection including a strict serological screening protocol

Serological testing

| Virus | Test | Specification |
|--|-------------------|---------------|
| Hepatitis B Virus (HBV) | HBsAg, HBcAb, NAT | negative |
| Hepatitis C Virus (HCV) | Ab, NAT | negative |
| Human Immunodeficiency Virus (HIV 1/2) | Ab, NAT | negative |
| Bacteria | Test | Specification |
| Treponema pallidum (Lues) | CMIA | negative |

After donor acceptance a series of serological testing is performed. In addition to antibody screening (Ab), nucleic acid tests (NAT) are performed. By using this method infections can be identified before antibodies are detected in the blood.

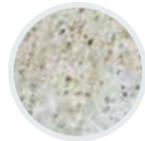


Blood samples are taken simultaneously to tissue explantation during total hip replacement surgery or within 24h post mortem in case of multi-organ donation

The C⁺TBA cleaning process

After shaping and crude cleaning, the donor tissue undergoes ultrasonication to remove blood, cells and tissue components, but mainly to promote the removal of fat from the cancellous structure of the bone, improving the penetration of subsequent substances.

During a chemical treatment non-collagenic proteins are denatured, potential viruses are inactivated and bacteria are destroyed. In the subsequent oxidative treatment, persisting soluble proteins are denatured and potential antigenicity is eliminated.

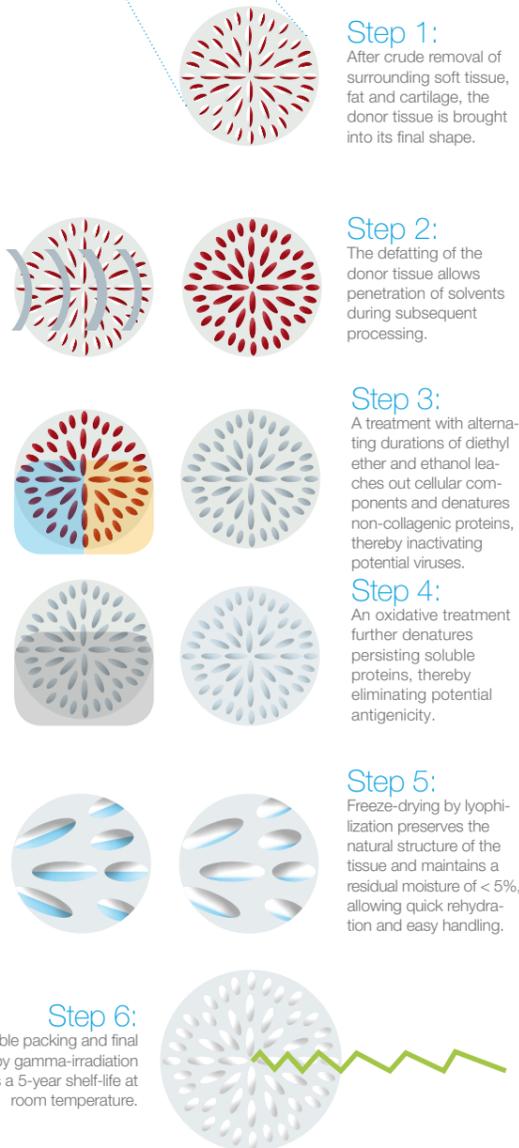


Finally, the tissue undergoes lyophilization, a dehydration technique which facilitates the sublimation of frozen tissue water from solid phase to gas phase, thereby preserving the structural integrity of the material.

The tissue can be reconstituted rapidly due to microscopic pores within the material, which were created by the sublimating ice crystals during lyophilization. It has been well established that the lyophilization process preserves structural properties that improve graft incorporation⁷.

The final sterilization by gamma irradiation guarantees a sterility assurance level (SAL) of 10⁻⁶ while ensuring structural and functional integrity of the product and its packaging.

Step 6:
Double packing and final sterilization by gamma-irradiation guarantees a 5-year shelf-life at room temperature.



Safety and quality

Thorough donor anamnesis and serological testing combined with chemical and radiological sterilization offer maximal safety.

Reference samples

Samples are stored one year after the expiration date of the products, in order to be able to exclude maxgraft[®] as a source of transmission in case of a doubt. Despite worldwide monitoring, there is no single case of the transmission of a disease, caused by allografts used in dental medicine.

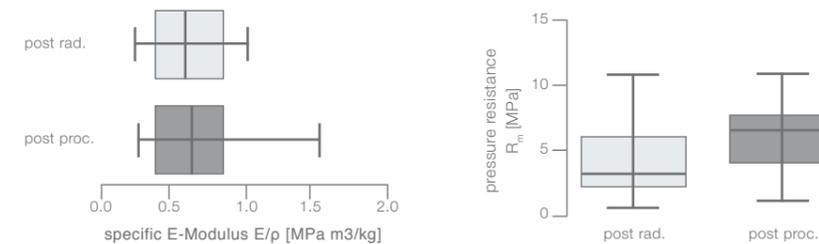
Virus inactivation

The critical viral inactivation steps of the process – dynamic immersion in ethanol, hydrogen peroxide and gamma irradiation – have been validated for reliability and reproducibility by an independent test facility. Suspensions of model viruses for non-enveloped and enveloped DNA viruses (HBV), and non-enveloped (HAV) and enveloped RNA viruses (HIV, HCV, HTLV) have been applied. The process shows an overall efficacy in inactivating all test viruses globally > 6 logs (reference value for efficient viral inactivation > 4 logs) and therefore can be considered effective in removing potential viral contaminants.



Biomechanical properties have recently been analyzed by the Institute of Material Science of the Technical University of Vienna, Austria. After the determination of E-modulus and pressure resistance no significant alterations were detected in irradiated products (post rad.) compared to non-irradiated ones (post proc.).

In an extensive experimental setting virus inactivating capacity of the process was validated and considered effective



C⁺TBA's allograft products provide a stable scaffold for revascularization and osteoblast migration. Simultaneously, due to the preserved collagen content, the graft presents high flexibility supporting physiological bone formation and remodelling

7. Osbon DB, Lilly GE, Thompson CW, et al: Bone grafts with surface decalcified allogeneic and particulate autologous bone: Report of cases. J Oral Surg 35:276, 1977

maxgraft® Processed human allograft



maxgraft® is a sterile, high-safety allograft product, derived from human donor bone, processed by the Cells+Tissuebank Austria.



Biopsy of maxgraft® five months after implantation. The allogenic particle (P) can be recognized by the empty cavities of the osteocytes and is strewn with circular resorption lacunae. The particle is embedded into newly formed bone matrix (B)

For experienced oral and maxillofacial surgeons, allograft bone blocks for block augmentation are the only real alternative to harvesting patients' bone. A second surgical site to harvest autologous bone and the associated risk of infection, donor-site morbidity, postoperative pain and loss of bone stability can be avoided. The excellent biological regeneration capability of maxgraft® results in a predictable clinical outcome.

Properties

- Preserved biomechanical properties
- Sterile without antigenic effects
- Storable at room temperature for five years
- Osteoconductive properties supporting natural and controlled tissue remodeling



The trabecular structure of cancellous bone allows optimal graft revascularization, rapid formation of new bone tissue and complete bone remodeling

Indications:

Implantology, Periodontology and Oral and CMF Surgery

Granules

- Localized augmentation of the ridge for future implant placement
- Reconstruction of the ridge for prosthetic therapy
- Filling of osseous defects, such as extraction sockets
- Elevation of maxillary sinus floor
- Repair of intrabony periodontal defects

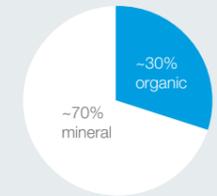
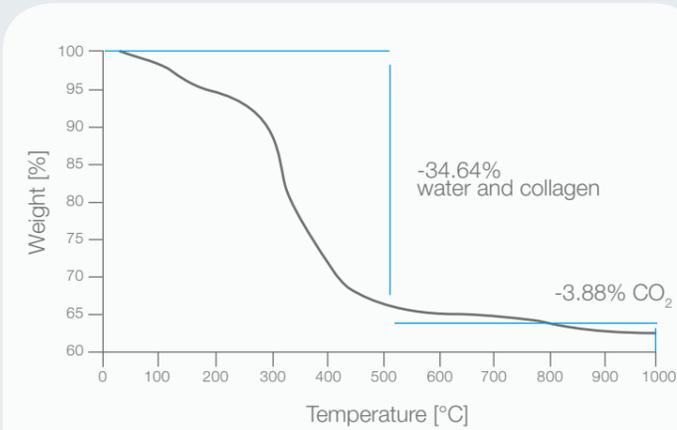
Blocks

- A predictable and highly effective alternative to traditional block grafting
- Ridge augmentation



The macroscopic structure of maxgraft® cancellous granules affirms the physiological constitution of the graft

Structure and tissue composition



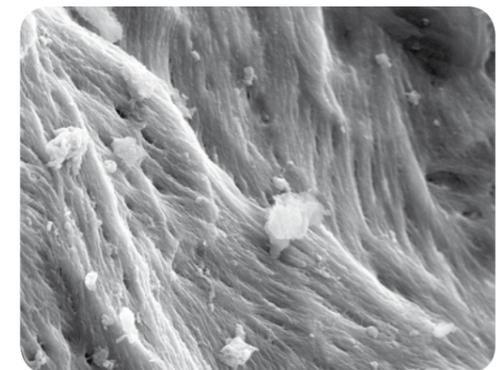
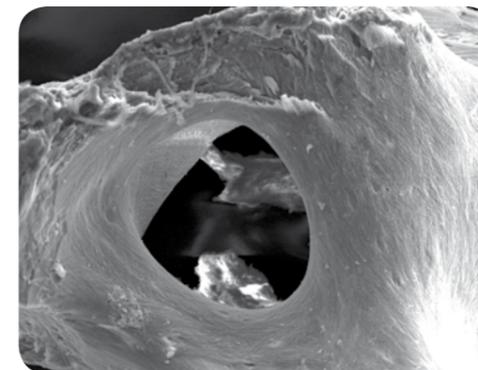
Thermogravimetric curve of maxgraft® showing the staged mass reduction that indicates the chemical composition

Mineralized collagen

The thermogravimetric analysis shows the mass reduction following heating and helps to determine the content of water and organic components like collagen. Heating from room temperature up to 1000°C resulted in a staged mass reduction. The first reduction of 34.64% can be attributed to the vaporization of water and the combustion of collagen, the second (3.88%) to the vaporization of carbon dioxide.

Surface

SEM pictures of maxgraft® illustrate the structure of the processed bone. Processing does not affect structural features and with its interconnecting macroporosity, maxgraft® is natural human bone matrix. Because of the special production process without sintering, maxgraft® retains its collagen matrix. At a higher magnification the structure of the mineralized collagen fibers can be recognized.



SEM pictures of maxgraft® at a 100-fold and 5000-fold magnification, showing the macroporous structure and surface of the mineralized collagen matrix

maxgraft® bonering

Processed allogenic bone ring



maxgraft® bonering is a pre-fabricated cancellous ring of human donor bone, which is placed press-fit into a trephine drill-prepared ring bed. At the same time, an implant is inserted into the ring. The bony integration of both, maxgraft® bonering and the implant, occurs via the surrounding vital bone.

Preparation of ring bed



After determination of the position of the implant by the planator tip and the pilot drill, the ring bed is prepared with the trephine. Subsequently, the planator allows even paving of the local bone for optimal contact with maxgraft® bonering and in addition, removes the cortical layer for improved graft revascularization.

The maxgraft® bonering technique allows bone augmentation and implantation in a one-stage procedure. The technique is applicable for almost all indications, including sinus lift with limited maxillary bone height.



The height of maxgraft® bonering is adjustable to the defect

Indications: Implantology

- Vertical augmentation (in combination with horizontal augmentation)
- Single tooth gap
- Edentulous space
- Sinus lift



The maxgraft® bonering technique enables vertical bone augmentation and direct implantation



Immediate implant insertion through maxgraft® bonering ensures primary stability of implant and graft

Compared to the classical, two-stage augmentation with i.e. bone blocks, this technique reduces the entire treatment period by several months and saves the re-entry.

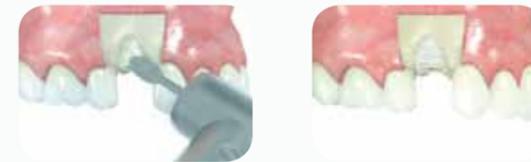
The maxgraft® bonering allows vertical and horizontal augmentation and new bone formation, therefore simplifying the surgical treatment.

Advantages

- Simultaneous implant placement and bone augmentation
- No second surgical procedure
- Significant reduction of treatment time

botiss-dental.com/products/maxgraft-bonering

One-stage bone augmentation and implant placement



Sharp edges should be smoothed to avoid soft tissue perforation and to support wound healing. Moreover, maxgraft® bonering should be covered with a slowly resorbable bone regeneration material (e.g. cerabone®) to fill the residual defect volume and to avoid potential adaption resorption of the graft

Soft tissue management



After covering of the graft with a collagen membrane (Jason® membrane) a tension-free suturing of the operation site must be assured to avoid tissue perforation and graft exposure

maxgraft® bonering surgical kit

With this surgical kit, botiss provides all necessary instruments to apply the maxgraft® bonering technique. The kit includes two convenient sizes of trephines, which precisely fit together with the maxgraft® bonering diameters.

The planators allow paving of the local bone to create a congruent and fresh contact surface of the implant area. The diamond disc and the diamond tulip help to shape the maxgraft® bonering for excellent adjustment to the local bone and for improved soft tissue healing. Altogether, these instruments allow optimal preconditions for the bony ingrowth of maxgraft® bonering.

All instruments are made of high quality surgical steel.

Product Specifications

maxgraft® bonering 3.3
(Height 10 mm, recommended for implant diameters from 3.3 - 3.6 mm)

| Art.-No. | Dimension | Content |
|----------|-------------------------|---------|
| 33160 | cancellous ring, Ø 6 mm | 1 x |
| 33170 | cancellous ring, Ø 7 mm | 1 x |

maxgraft® bonering 4.1
(Height 10 mm, recommended for implant diameters from 4.1 mm)

| Art.-No. | Dimension | Content |
|----------|-------------------------|---------|
| 33174 | cancellous ring, Ø 7 mm | 1 x |

| | | |
|-------|---------------------------------|-------|
| 33000 | maxgraft® bonering surgical kit | 1 set |
| 33010 | bonering fix | 1 x |



trephine 7 mm trephine 6 mm planator 7 mm planator 6 mm diamond disc 10 mm diamond tulip 3 mm



bonering fix

maxgraft® bonebuilder

Customized allogenic bone block



maxgraft® bonebuilder is a customized allogenic bone transplant, which is individually adjusted to the bone defect. With maxgraft® bone-builder, harvesting of autologous bone and manual adjustment of the obtained transplant is no longer required for the treatment of extensive defects. Donor site morbidity, operation time and costs can be significantly reduced.



The CT/DVT-data of the bone defect is transferred into a 3D model

The maxgraft® bonebuilder technology

In-house planning

botiss virtually designs the patient customized allogenic bone transplant based on the CT/DVT-scan of the bone defect. The design of the bone transplant undergoes a final inspection by the clinical user and is, by individual order, released for production. The botiss partner Cells+Tissuebank Austria receives a *.stl milling file and the patient matched allogenic bone transplant is produced under cleanroom conditions. The resulting bone block is ready for insertion into the defect with only minor adjustments.

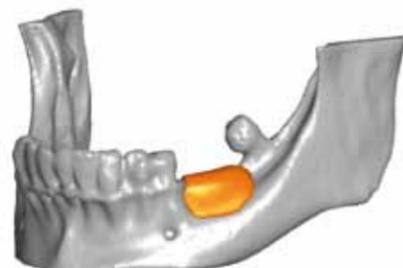
Based on this model botiss designs a virtual block, which matches the surface structure of the defect and allows stable implant insertion after augmentation



After placement, the maxgraft® bonebuilder block is fixed with osteosynthesis screws. Residual defect volume should be filled with bone regeneration material and the augmentation site should be covered with a collagen membrane.

The strong capillary action of the three-dimensional, porous trabecular bone network enables fast and efficient penetration of nutrients and blood, resulting in excellent handling, as well as reliable and predictable outcomes.

The customized maxgraft® bonebuilder block allows precise horizontal and vertical reconstruction of the atrophic ridge



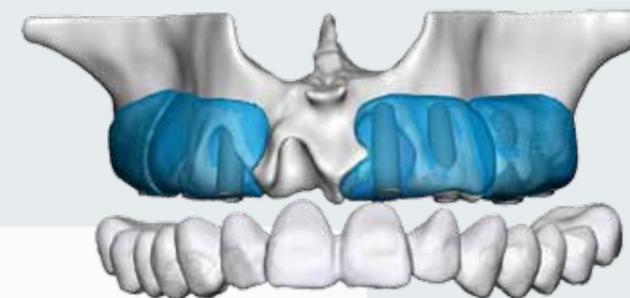
Indications

- Extensive bone defects
- Atrophic maxilla/mandibula
- Horizontal/vertical augmentation

Advantages

- Individualized allogenic bone transplant
- Significantly reduced operation time
- Improved wound healing

The maxgraft® bonebuilder technology



1. Upload of CT/DVT-data on www.botiss-bonebuilder.com

After registration, CT/DVT-data of the patient can be uploaded on the botiss server. All radiological data have to single-frame data images. The only data type suitable for 3D planning is DICOM (*.dcm).

2. Block design

botiss designers create a three-dimensional model of the radiological images and design a virtual bone transplant in consultation with the clinical user.

The maxgraft® bonebuilder technology allows complex reconstruction in cases of extensive jaw atrophy



Each block is designed individually according to the defect and the desired dimension of the augmentation

3. Design quality check

The clinical user receives a 3D PDF file containing the virtually constructed maxgraft® bonebuilder block and has to confirm its design.

4. Individual order

The production of the block starts after the clinical user fills in the patient based order form for the bone block to the attention of botiss biomaterials.

5. Production of the individual bone block

At C+TBA the *.stl data of the design is imported into a milling machine and a block of maximally 23 x 13 x 13 mm is produced.

Product Specifications

maxgraft® bonebuilder

| Art.-No. | Content |
|----------|---|
| PM1a | Individual planning and production of a bone transplant max. dimensions 23 x 13 x 13 mm |
| PM1a 2 | additional block(s) for this patient |

www.botiss-bonebuilder.com

maxgraft[®] cortico

Shell technique with allogenic bone plates

maxgraft[®] cortico is a prefabricated plate made of processed allogenic bone. Similarly to the autogenous bone, it can be used for the shell technique.

maxgraft[®] cortico was developed to avoid the donor-site morbidity and to prevent the time-consuming harvesting and splitting of autologous cortico-cancellous bone blocks.

Preparation of the augmentation area



The proper size of the plate is estimated after the elevation of the mucosal flap or preoperatively using a digital planning software. Using a diamond disc, the plate is then cut extraorally.

Fixation and adaption



The plate is positioned within a certain distance by predrilling through the plate and local bone; fixation is performed with osteosynthesis screws to create a fixed compartment. To prevent the perforation of the soft tissue, the sharp edges has to be removed, e.g., by using a diamond ball.

Properties

- Osteoconductive
- Natural and controlled remodelling
- Conserved biomechanical parameters
- Steril, no antigenic effect
- Five-year shelf life

Indications:

- Vertical augmentation
- Horizontal augmentation
- Complex three-dimensional augmentations
- Single tooth gaps
- Fenestration defects



Augmentation of a frontal mandibular defect

The shell technique with maxgraft[®] cortico



maxgraft[®] cortico

Filling and wound closure



The space between local bone and cortical plate can be filled with a variety of different particulated bone grafting materials. Then, the augmentation area needs to be covered with a barrier membrane (Jason[®] membrane, collprotect[®] membrane) and a tension-free and saliva-proof closure must be applied.



Six months after transplantation, a superficial resorption of the plate can be seen; the stability, however, is maintained

Advantages

- Established augmentation technique with new material
- Significant reduction of operation time
- No donor-site morbidity
- No limitation of augmentation material

Product Specifications

maxgraft[®] cortico

| Art.-No. | Dimension | Content |
|----------|--------------------------------|---------|
| 31251 | cortical strut, 25 x 10 x 1 mm | 1 x |
| 31253 | cortical strut, 25 x 10 x 1 mm | 3 x 1 |

cortico trimmer

| Art.-No. | Content |
|----------|-----------------|
| 34000 | cortico trimmer |



Natural bone regeneration

To facilitate osteogenesis, allogenic particles can be used to fill the defect. The preserved human collagen provides an excellent osteoconductivity and enables a complete remodelling. Mixing with autologous chips or particulated PRF matrices can support the ossification.

Clinical application

Clinical case by Dr. Fernando Rojas-Vizcaya, Castellón, Spain

Socket preservation with maxgraft® granules



Clinical situation in the maxilla before extraction



Situation after tooth extraction and mobilization of mucosal flap



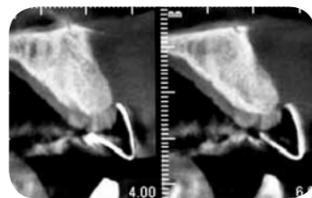
Augmentation of the maxillary ridge and filling of extraction sockets with maxgraft® granules. Placement of mucoderm® to improve soft tissue situation and Jason® membrane to cover surgical site



Mobilization and pre-fixation of the surrounding soft tissue



Tension-free wound closure



Four months post-operative: Bone is at the level of the planned crowns



Clinical situation four months post-operative



Maxillary ridge *in situ* after preparation of mucosal flap



Insertion of four implants



Placement of abutments



Positioning of prosthesis



Closure of mucosal flap



After immediate loading protocol: Prosthesis will guide soft tissue during healing process

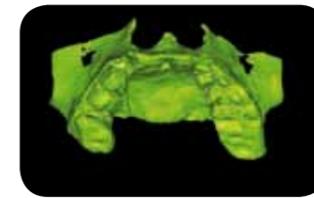
Antibiotics

When performing hard tissue augmentation, the patient should be treated with a sufficient dose of antibiotics to minimize the risk of infection and related possible graft loss. A potential treatment plan could include starting the antibiotics one day prior or at least one hour before surgery by ingestion of a full daily dose. In case of extensive jaw reconstruction a bacteriological screening (saliva sample) should be considered.

Clinical application

Clinical case by Dr. Damir Jelušić, Opatija, Croatia

Ridge augmentation with maxgraft® cancellous blocks



X-ray and CAD/CAM-based 3D image of maxillary ridge before surgery



Manual adjustment of maxgraft® blocks on a CAD/CAM-based model



Clinical situation



Atrophic maxillary ridge after preparation of mucosal flap



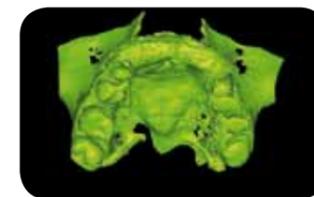
Fixation of the prepared maxgraft® blocks



Filling of residual gaps with cerabone® and covering with Jason® membrane



Tension-free closure of mucosal flap



CAD/CAM-based 3D image three days post-operative



Clinical situation five months post-operative



X-ray five months post-operative



Insertion of three implants and gingiva formers



Six months after re-entry: Patient is ready for final prosthesis

GBR/GTR

Resorbable collagen membranes act as a temporary barrier against ingrowth of fast proliferating fibroblasts and epithelium into the defect, and maintain the space for controlled regeneration of bone. The Jason® membrane is a pericardium membrane providing a long-lasting barrier function for ~three to six months. mucoderm®, a three-dimensional collagen matrix, supports revascularization and fast soft tissue integration and thus, is a valid alternative to patients' own connective tissue. When applying mucoderm® simultaneously with a bone graft material please assure adequate mobilization of the surrounding soft tissue.

Clinical case by Dres. Bernhard Giesenhagen and Orcan Yüksel, Frankfurt, Germany

Part I: Vertical augmentation with maxgraft® bonering



Preparation of the ring bed in an atrophic mandibula (third quadrant)



Vertical augmentation by placing a maxgraft® bonering



Simultaneous horizontal augmentation



Stable implant insertion



Insertion of second maxgraft® bonering and implant



Filling of the residual defect volume with cerabone® and covering the operation site with a Jason® membrane



Tension-free soft tissue management

Vertical augmentation with maxgraft® bonering

For the reconstruction in an atrophic jaw a vertical augmentation of up to 3 mm above local bone level can easily be achieved. If more vertical height is desired, enhancing additives such as bone morphogenic proteins (BMP) or growth factors are in discussion to be beneficial. For vertical and horizontal augmentation of a severely atrophic mandibular, the width of the ridge (in case of parallel-walled ridge) has to be at least 4mm for successful application of maxgraft® bonering.

The maxgraft® bonering allows for direct implant insertion during sinus lift by providing the necessary primary stability. The sinus cavity should be filled with an additional grafting material (e.g. cerabone®, maxresorb® or maxresorb® inject).

Rehydration

The processing of maxgraft® products preserves the natural collagen content of the bone tissue and a residual moisture of ~5%. Thus, the products don't have to be re-hydrated but are ready for instant use. Be aware that excessive hydration can result in the loss of structural integrity!

Part II: Sinus lift with maxgraft® bonering



Preparation of a lateral window for sinus floor elevation in the first quadrant



Mobilization of the Schneiderian membrane



Insertion of the first implant



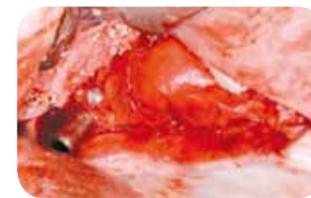
Placement of maxgraft® bonering



Implant insertion in maxgraft® bonering from the crestal side



Filling of the residual sinus cavity with cerabone®



Placement of Jason® membrane



Clinical situation in the second quadrant: Vertical and horizontal defect in the maxillary ridge; sinus cavity is filled with cerabone®



Preparation of the defect with a trephine



Press-fit placement of maxgraft® bonering into the defect



Direct implantation in the cancellous ring



Tension-free suturing after placement of Jason® membrane



X-ray nine months post-operative: Full integration of maxgraft® bonering and implants and proceeding remodeling of the grafts

Clinical application

Clinical case by Dr. Darius Pocebutas, Kaunas, Lithuania

Horizontal augmentation in a single tooth gap with maxgraft® bonering



Clinical situation pre-operative



Pilot drill in the recipient site



Preparation of the ring bed with the trephine



Paving of the local bone using the planator from maxgraft® bonering surgical kit



Measurement of the defect



Adjustment of maxgraft® bonering to desired height



Placement of the ring into the ring bed



Due to its structure the ring is instantly soaked with blood



Implant insertion in maxgraft® bonering; the shape of the ring mimics the anatomic structure of the ridge



Gaps are filled with cerabone® and the augmentation site is covered with a Jason® membrane



Tension-free wound closure

Graft exposure

Wound dehiscence and graft exposure can be complications of block augmentation. After removal of necrotic soft tissue and infected hard tissue (use rotating instruments if necessary)

the augmented area should be rinsed with chlorhexidine. Subsequently, the graft has to be covered again, if necessary, by harvesting a palatal soft tissue transplant.

Clinical application

Clinical case by Dr. Anke Isser, Frankfurt, Germany

Ridge augmentation with maxgraft® bonebuilder



Clinical situation pre-operative



Midcrestal incision line



Lingual mobilization and cortical perforation



Perfect fit of maxgraft® bonebuilder



Fixation of the blocks with screws for osteosynthesis



Contouring with cerabone®



Covering of the block with Jason® membrane



Horizontal mattress suture and tension-free wound closure

Design quality check

The design of maxgraft® bonebuilder has to be checked very carefully before it is released for production. Only the surgeon himself can assess the patients' soft tissue situation and therefore, the required dimensions of the block. The botiss construction team will adjust the design of the block until it perfectly meets the expectations of the clinician.

Clinical application

Clinical case by Dr. Michele Jacotti, Brescia, Italy

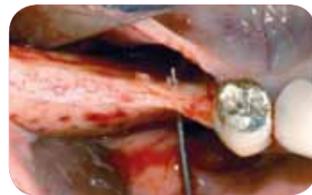
Ridge augmentation with maxgraft® bonebuilder



Virtual planning of the block



Patient matched maxgraft® bonebuilder



Situation after mucosal flap preparation and perforation of the cortical layer



Exact positioning of the maxgraft® bonebuilder block



Fixation of the block with screws for osteosynthesis



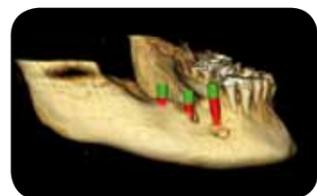
Careful wound closure



Clinical situation at re-entry five months post-operative



Full bony ingrowth of the block



3D implant positioning



Stable implant insertion



Abutment placement after ingrowth of the implants



Final prosthesis

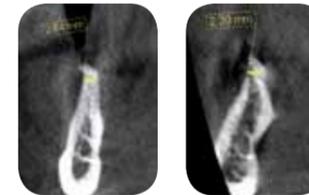
Clinical application

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



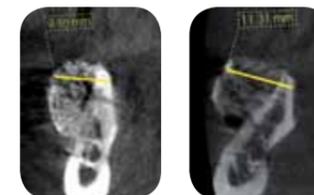
Filling of residual volume with cerabone®



Covering of the augmentation site with collprotect® membrane



Wound closure and suturing



CT scan of region 36, 37 after surgery

Fixation

maxgraft® blocks are fixed with screws for osteosynthesis, preferably with flat-headed screws to avoid perforation of the surrounding soft tissue.

Clinical application

Clinical case Jan Kielhorn, Oehringen, Germany

Frontal defect treated with maxgraft® cortico



Severe atrophy in the esthetic region



Preparation of the defect



maxgraft® cortico in preparation



Fixation with osteosynthesis screws



Augmentation with cerabone®



Covering with Jason® membrane and saliva-proof wound closure

Rehydration

The processing of the C-TBA products preserves the natural collagen and maintains a residual moisture of <5%. According to our clinical users rehydration is not necessary and the products are ready for immediate use.

Clinical case Dr. Krzysztof Chmielewski, Gdansk, Poland

Single tooth restoration with maxgraft® cortico



Single tooth defect with severely resorbed vestibular wall



Fixation of maxgraft® cortico using an osteosynthesis screw



Augmentation with maxgraft®, granules mixed with particulated PRF matrices and fixation of a second maxgraft® cortico



Covering of the augmentation area with Jason® membrane



Covering with a PRF matrix for improved soft tissue healing



Tension-free wound closure



Situation after a healing period of four and a half months



Stable implantation

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Jan Kielhorn

Cortical struts and computer aided bone augmentation



Krzysztof Chmielewski

GBR in my daily practice: tent technique, cortical struts, maxgraft® bonebuilder, xenograft, PRF and more - selection of materials and techniques to achieve best results



Bernhard Giesenhagen

The bone ring technique - new perspectives in augmentation

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session coverage

cerabone®

Peri-implant soft tissue thickening

soft tissue

CLINICAL SUCCESS

with the right

regeneration concept

tissue

Guided bone regeneration

Jason® membrane

Immediate implants

maxgraft® bonebuilder concept

Ridge preservation

Shell technique

360°

INDICATION-MATRIX.COM

Product Specifications



maxgraft®

Product Specifications

maxgraft® cancellous granules

| Art.-No. | Particle Size | Content |
|----------|---------------|------------|
| 30005 | < 2.0 mm | 1 x 0.5 ml |
| 30010 | < 2.0 mm | 1 x 1.0 ml |
| 30020 | < 2.0 mm | 1 x 2.0 ml |
| 30040 | < 2.0 mm | 1 x 4.0 ml |

maxgraft® cortico-cancellous granules

| Art.-No. | Particle Size | Content |
|----------|---------------|------------|
| 31005 | < 2.0 mm | 1 x 0.5 ml |
| 31010 | < 2.0 mm | 1 x 1.0 ml |
| 31020 | < 2.0 mm | 1 x 2.0 ml |
| 31040 | < 2.0 mm | 1 x 4.0 ml |

maxgraft® blocks

| Art.-No. | Dimension | Content |
|----------|---------------------------------|-----------|
| 31111 | uni-cortical 10 x 10 x 10 mm | 1 x block |
| 31112 | uni-cortical 20 x 10 x 10 mm | 1 x block |
| 32111 | cancellous 10 x 10 x 10 mm | 1 x block |
| 32112 | cancellous 20 x 10 x 10 mm | 1 x block |

maxgraft® bonebuilder dummy

| Art.-No. | Content |
|----------|--|
| 32100 | Individual 3D-printed model of the patient's defect and the planned bonebuilder for demonstration purposes made of plastic |



maxgraft® bonebuilder

Product Specifications

| Art.-No. | Content |
|----------|---|
| PMIa | Individual planning and production of a bone transplant max. dimensions 23 x 13 x 13 mm |
| PMIa2 | additional block(s) for the same patient |



maxgraft® bonering



Product Specifications

maxgraft® bonering 3.3
(Height 10 mm,
recommended for implant diameters from 3.3 - 3.6 mm)

| Art.-No. | Dimension | Content |
|----------|-------------------------|---------|
| 33160 | cancellous ring, ø 6 mm | 1 x |
| 33170 | cancellous ring, ø 7 mm | 1 x |

maxgraft® bonering 4.1
(Height 10 mm,
recommended for implant diameters from 4.1 mm)

| Art.-No. | Dimension | Content |
|----------|-------------------------|---------|
| 33174 | cancellous ring, ø 7 mm | 1 x |

maxgraft® bonering surgical kit

Product Specifications

| Art.-No. | Content |
|----------|--|
| 33000 | 1 x trephine 7 mm 1 x trephine 6 mm 1 x planator 7 mm 1 x planator 6 mm 1 x diamond disc 10 mm 1 x diamond tulip 3 mm |



bonering fix

Product Specifications

| Art.-No. | Content |
|----------|--------------|
| 33010 | bonering fix |



maxgraft® cortico

Product Specifications

| Art.-No. | Particle Size | Content |
|----------|----------------|---------|
| 31251 | 25 x 10 x 1 mm | 1 x |
| 31253 | 25 x 10 x 1 mm | 3 x 1 |



cortico trimmer

| Art.-No. | Content |
|----------|-----------------|
| 34000 | cortico trimmer |

bone & tissue
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