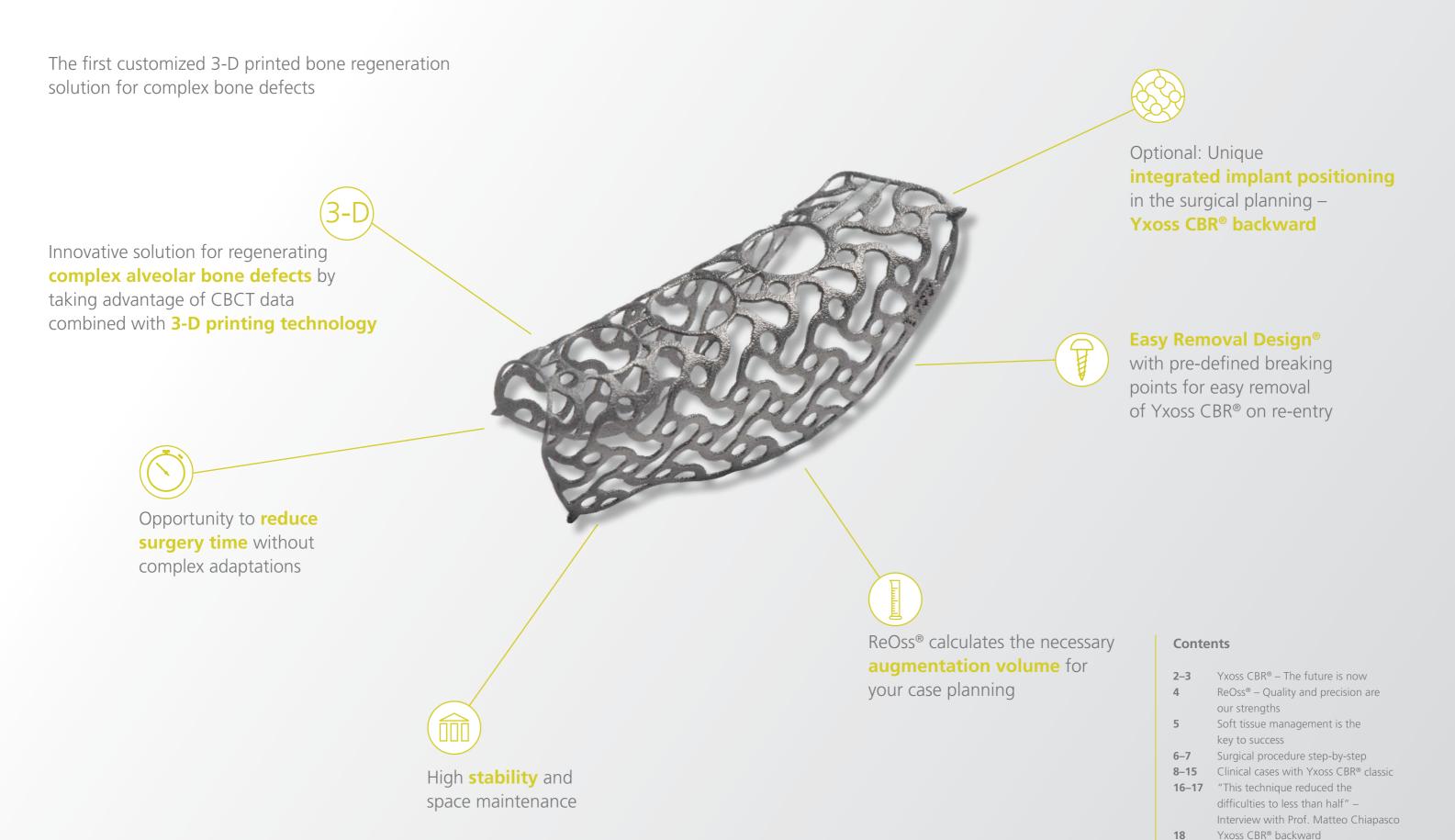
Yxoss CBR®



Customized Bone Regeneration



Yxoss CBR® – The future is now



2 YXOSS CBR® CUSTOMIZED BONE REGENERATION

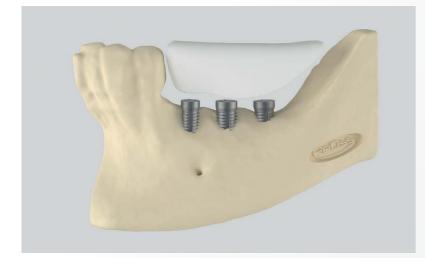
MyReOss ordering process

ReOss® – Quality and precision are our strengths

We make a difference by providing a specified product range based on individual solutions for your patients.

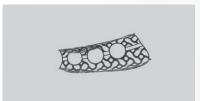






ReOss® uses the most up-to-date CAD/CAM technology available to satisfy patient-specific requirements regarding a planned bone augmentation. In a patented process, a contoured, form-stable scaffold is 3-D printed out of the purest titanium based on CT or CBCT images, allowing for customized bone regeneration (CBR®).

Yxoss CBR® has revolutionized oral bone augmentation by customizing the commonly used "titanium mesh", using a digital workflow to fit the individual anatomy of each patient.





Each titanium scaffold is custom-made for a precision fit that accurately reflects the specific patient data provided. Time-consuming impressions, cutting, shaping and adapting are no longer necessary and sharp edges from cutting conventional meshes are entirely eliminated.

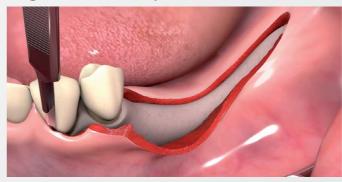


Online 3-D Design Viewer
You can easily review the
customized scaffold design
online via your PC, tablet,
or smart phone. The highresolution 3-D image can be
rotated in any direction,
zoomed for details as well
as commented for change
requests. No need to install
an app.

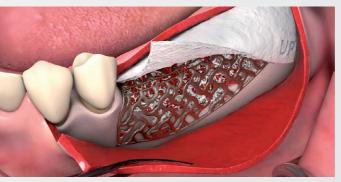
Soft tissue management is a key to success

Options for the flap design

Ridge incision technique¹



- > Crestal incision of the mucosa and the periosteum
- No releasing incision extension 3-4 teeth to the posterior (if possible)
- > Flap design: Full thickness flap

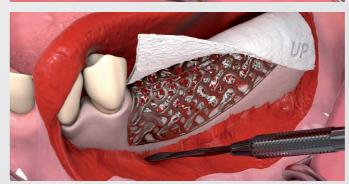


Once Yxoss CBR® is placed and the augmentation is performed according to the principles of guided bone regeneration, the flap can be mobilized by a periosteal releasing incision deep in the vestibular area. This will allow tension-free flap closure.

Poncho-technique¹



- > High vestibular incision of the mucosa, muscle and periosteum
- > Preparation and mobilization of the flap
- > No releasing incision
- > Flap design: Full thickness flap



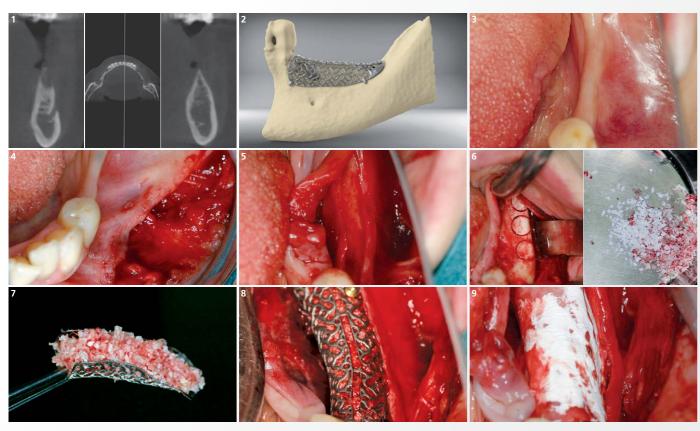
After incision, preparation of a mucoperiosteal flap, debridement of scar tissue, and exposure of the defect is conducted. A passive tension-free fit of the Yxoss CBR® is then ensured.

This poncho technique is preferred in pronounced vertical defects.

1 Sagheb K et al., Int J Implant Dent 2017; 3(1):36. (adapted by Dr. Marcus Seiler MSc MSc).

Surgical procedure step-by-step

The planning of the patient's case takes local and general patient-specific risk factors into consideration according to the principles of backward planning for implant positioning. The horizontal and vertical bony defect can be regenerated with Yxoss CBR® via bone regeneration. The following case¹ highlights step-bystep the important procedures to regenerate the bone (horizontal and vertical) with the 3-D printing technology according to Dr. Marcus Seiler MSc MSc.



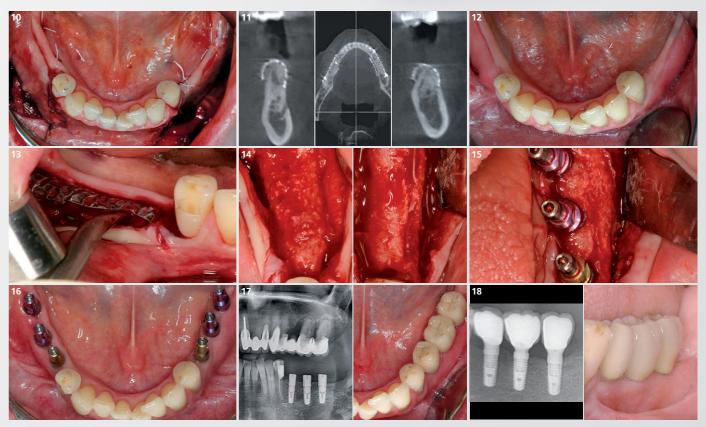
- 1 The basis for planning implant therapy is clinical and radiological diagnosis with a CBCT scan.
- on CBCT data. Adaptations of the exact shape are possible, depending on the surgeon's preference and feedback.
- 2 A precise 3-D planning model will be created based 3 The usual oral surgery and implantology hygiene provisions apply for the use of Yxoss CBR® intraoperatively. The same applies to patient medication.
- dance with the extent, location and with respect to the anatomical structures of the region to be
- periosteal flap, debridement of scar tissue and the exposure of the defect. Sufficient blood supply of the flap is favored by a flap with a wide base.
- 4 The opening incision should be designed in accor- 5 Subsequent steps are the preparation of a muco- 6 Autologous bone can be harvested from the usual intraoral donor sites and can be mixed with bone substitutes (e.g. Geistlich Bio-Oss®).
- 7 The Yxoss CBR® is initially filled with autologous bone and bone substitute material (e.g. Geistlich Bio-Oss®).
- 8 Yxoss CBR® is fixed on the existing residual bone with an osteosynthesis screw. The titanium screw can generally be introduced, depending on the intended position, through any opening of the titanium grid. The regeneration over the titanium frame. edges of Yxoss CBR® rest on the underlying bone tissue
- 9 A resorbable membrane (e.g. Geistlich Bio-Gide®) should be placed over the Yxoss CBR® to prevent ingrowth of soft-tissue and to support soft-tissue

1 Surgery and concept by Dr. Marcus Seiler MSc MSc.





Find more information and videos here! Scan the QR code with your device to get to the website

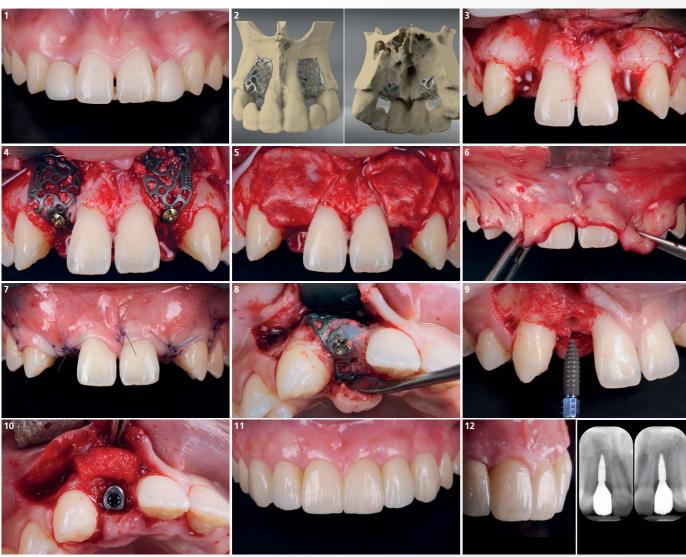


- 10 The wound should be closed completely whenever 11 Before reopening, clinical and radiological possible. The mucoperiosteal flap is positioned tightly but tension-free over Yxoss CBR® with single interrupted and deep mattress sutures. Pressure on the augmented crest has to be avoided. Dentures are not to be applied.
 - diagnosis are to be taken into consideration.
- 12 Reopening of the augmented site approx. 4 to 6 months post surgery and depend on the defect geometry, at latest 9 months after initial surgery.
- 13 After removing the fixation screws, Yxoss CBR® 14 Newly formed vital bone is regenerated up to the 15 Insertion of implants into the augmented alveolar can be easily removed using preset breaking points.
 - contour defined by the shape of the Yxoss CBR®.
- ridge according to the prosthetic position.
- **16** Prosthetic restoration is carried out in accordance **17** Follow-up and radiological evaluation should be with the usual precautions.
- 1 Babich H et al. Cell Biol Toxicol. 1995; 11(2): 79-88. 2 Mariotti AJ, Rumpf DA. J Periodontol 1999; 70(12): 1442-1448. 3 Wilken R et al. SADJ. 2001; 56(10): 455-460.
- 18 Clinical and radiological imaging of longterm performed according to the standardized outcome in this case at 5-year follow-up. recommendations of the respective dental societies

Horizontal/Vertical Defect (Bilateral 1 tooth gap) – Anterior Maxilla

Surgery and concept by Dr. Paolo Casentini (Milan, Italy)





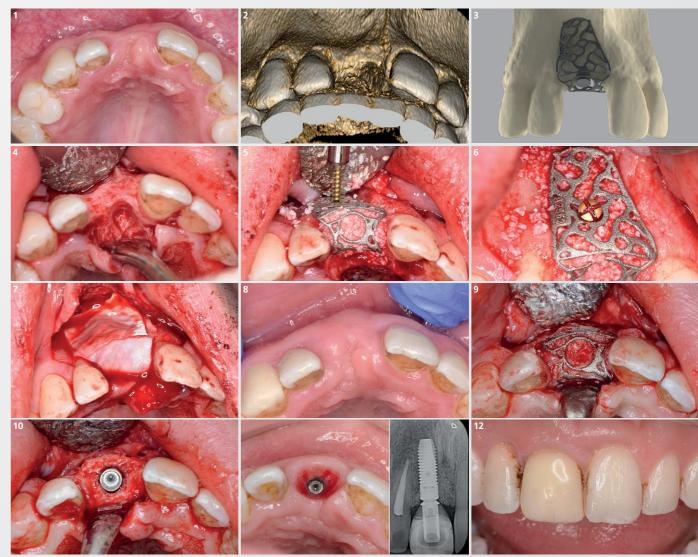
- 1 Initial clinical situation with adhesive Maryland prostheses and vertical / horizontal bone defect.
- 2 Digital 3-D planning of customized bone regeneration with Yxoss CBR®.
- 3 Exposure of bone defects after lifting a full thickness flap.
- 4 Application of the 2 Yxoss CBR® and fixation with 5 Positioning of two Geistlich Bio-Gide® on top osteosynthesis screws. The defects were treated with autologous particulate bone grafting mixed with Geistlich Bio-Oss® in a 50% ratio.
 - of Yxoss CBR® to optimize the barrier effect.
- 6 Flap mobilization is a fundamental element in any technique of bone volume augmentation.

- 7 Flap closure with absorbable sutures 6-0.
- 8 7 months post-surgery, a favorable bone augmentation could be achieved.
- 9 ...followed by implant a prosthetically guided implant placement (Straumann® BLT 2.9 x 10 mm)
- 10 At time of implant placement, Geistlich Fibro-Gide® 11 Final prosthetic rehabilitation demonstrates a was used to augment the volume of the peri-
- successful integration of the restorations into the surrounding tissues.
- 12 Final prosthetic rehabilitation and radiographic follow-up 1 year after implant placement.

Horizontal/Vertical Defect (1 tooth gap) – Anterior Maxilla

Surgery and concept by Dr. Daniel Saund (Birmingham, UK)





- 1 Initial presentation: 21 year old male with labial bony deficiency, thick soft-tissue biotype. History of trauma to tooth 8 which was subsequently extracted.
- 2 CBCT 3D rendered image of graft recipient site demonstrating labial bone deficiency and presence of large nasopalatine foramen inhibiting direct placement of implant.
- 3 Digital 3-D planning of the customized titanium scaffold by ReOss based on diagnostic imaging of the case.

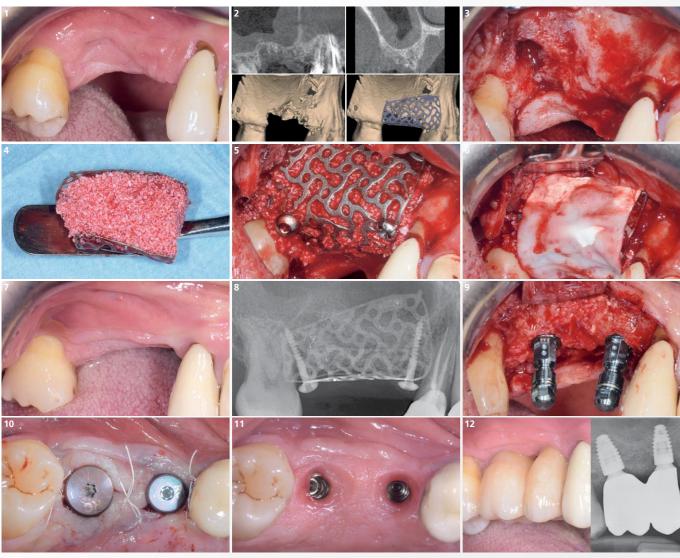
- 4 Full thickness flaps raised, showing labial bony deficiency – further complicated by large nasopalatine foramen. Completed resection of nasopalatine nerve, showing tissue free bony margins to nasopalatine canal.
- a mixture (50/50) of locally harvested autogenous bone and Geistlich Bio-Oss®.
- 5 Before fixation Yxoss CBR® has been loaded with 6 Yxoss CBR® is secured in place with a single
- **7** Coverage of the graft area with a double layer of Geistlich Bio-Gide® followed by tension-free closure of the wound.
- 8 Presentation at 6 month review showing excellent healing and thick biotype has been maintained. Demonstrates the expansion of the ridge.
- 9 Buccal and palatal flaps raised showing Yxoss CBR® lattice in situ before its removal

- 10 Yxoss CBR® removed, showing excellent integration and vascularization of Geistlich Bio-Oss®. Ridge demonstrated excellent width and height allowing the ideal positioning of the implant.
- 11 2 years post-operative view of soft tissue showing healthy gingivae with no evidence of gingival recession. This is reinforced by 2 year postoperative radiograph again confirming excellent maintenance of bone height around implant.
- 12 UR1 provisional crown in place with a view to replacing with a narrower definitive crown to match adjacent UL1 tooth width. Excellent gingival contour and adaptation to provisional restoration. (Kindly restored by K. Fairbrother, Birmingham)

Horizontal/Vertical Defect (2 teeth gap) - Anterior Maxilla

Surgery and concept by Dr. Daniele Cardaropoli (Turin, Italy)





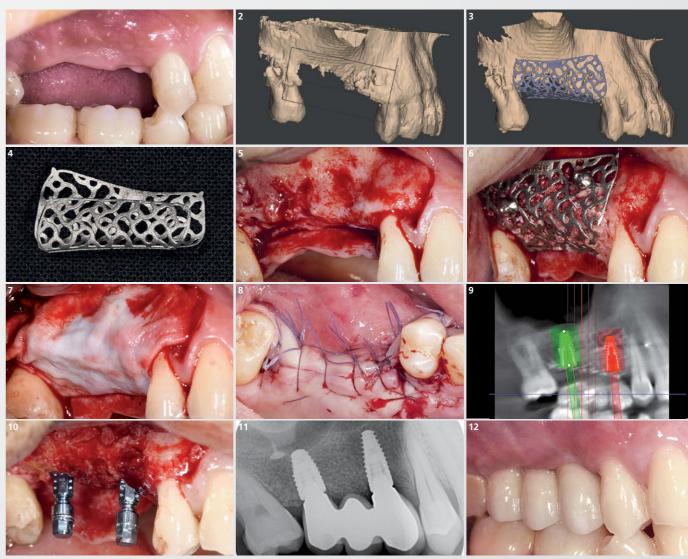
- 1 Initial clinical situation showing an extended horizontal and vertical bone gap at former positions of teeth 3 and 4 which were extracted 8 weeks earlier.
- the corresponding bone defect. 3-D design of Yxoss CBR® derived from the patient's anatomy.
- 2 CBCT showing a deficient vestibular contour and 3 Surgical situation with horizontal and vertical bone defect.
- 4 After testing the adaptation of Yxoss CBR® to the 5 Yxoss CBR® fixed with titanium screws. defect, it is filled with a graft consisting of 30 % autologous particulate bone and 70 % granules of Geistlich Bio-Oss®.
- 6 Adaptation of Geistlich Bio-Gide® over the structure. Complete, tension-free wound closure will follow.

- reopening. No adverse events have occurred.
- 7 Clinical situation after 6 months of healing, before 8 Radiographic situation after 6 months of healing, 9 Insertion of two implants (Straumann® BLT). The resonance frequency measurement shows ISQ values
- 10 Insertion of the healing abutments and adaptation 11 Soft tissue maturation 12 weeks after implant of the flap.
- 12 Clinical situation after prosthetic finalisation, 18 months after surgery. X-ray shows stability of marginal bone levels.

Horizontal/Vertical Defect (3 teeth gap) – Anterior Maxilla

Surgery and concept by Prof. Matteo Chiapasco / Dr. Paolo Casentini (Milan, Italy)





- with horizontal and vertical atrophy. Situation incompatible with ideal and prosthetically guided implant insertion
- 1 Patient with missing teeth 3, 4 and 5 in combination 2 Initial CBCT showing vertical and horizontal bone deficit.
- 3 3-D model obtained from CBCT with the corresponding Yxoss CBR® design.

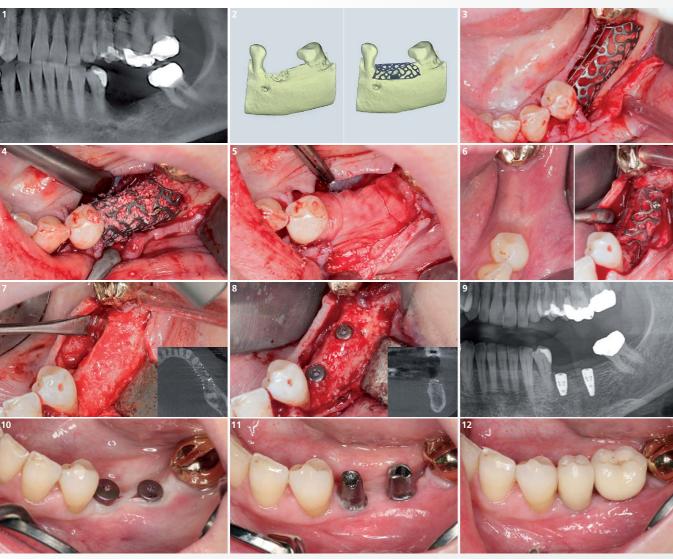
- 4 Final titanium scaffold ready for use.
- 5 Exposure of the bone defect with full thickness flap.
- 6 Fixation of Yxoss CBR® filled with a mix of autologous bone chips and Geistlich Bio-Oss® using two titanium
- 7 Coverage with a Geistlich Bio-Gide® membrane. 8 Tension-free hermetic suture of the flap.
- 9 After 8 months, the adequate rooting of the bone graft is assessed by CBCT and the insertion of the implants is planned in a prosthetically guided manner.

- 10 8 months after the GBR the scaffold is removed and two endosseous implants are inserted.
- 11 Radiography with three elements supported by implants.
- 12 Final prosthetic reconstruction 3 months after implant placement, without the need of a temporary

Vertical Defect (3 teeth gap) – Posterior Mandible

Surgery and concept by Dr. Christian Mertens (Heidelberg, Germany)





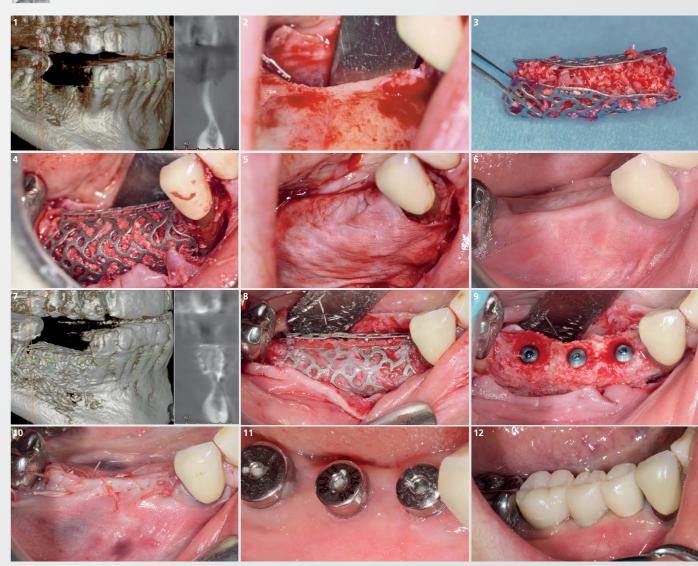
- 1 The preoperative radiograph displays the vertical 2 Yxoss CBR® is planned based on the preoperative bone defect in the left mandible and thus, insufficient CBCT data. vertical bone volume to allow implant placement.
- **3** Opening the defect site using the ridge incision technique. The titanium scaffold fits the bone defect precisely during the augmentation procedure.
- 4 The titanium scaffold is filled with 50% autologous 5 A collagen membrane (Geistlich Bio-Gide®) is used to 6 Stable soft tissue situation after 6 months with no bone and 50% Geistlich Bio-Oss®. Fixation is performed with one titanium screw in vestibulolingual direction.
 - provide an additional barrier for bone regeneration.
- complications during the healing period. After reopening, bone is regenerated to the contour defined by the titanium scaffold.
- 7 The bone is completely regenerated in the correct 8 Two implants were placed with good primary three-dimensional orientation. This is also visible in the respective CBCT. Implant placement is now possible.
 - stability. The vertical bone regeneration is also visible in the CBCT data.
- 9 Postoperative panoramic radiograph after implant

- 10 Clinical situation 3 months post implant insertion. 11 Final prosthetic reconstruction 6 months post implant 12 Final prosthetic reconstruction 16 months post insertion and 16 months post regenerative surgery.
 - regenerative surgery.

Horizontal/Vertical Defect (3 teeth gap) – Posterior Mandible

Surgery and concept by Dr. Philippe Russe (Reims, France)





- 1 CBCT of initial situation showing the mandibular 2 Bony situation after full thickness flap.
- 3 Yxoss CBR®, filled with a mixture (50/50) of autogenous bone and Geistlich Bio-Oss® small granules.

- 4 Yxoss CBR® placed in situ.
- 5 A Geistlich Bio-Gide® collagen membrane is placed 6 Healing at 6 months postoperative: The scaffold is on top, covering the titanium scaffold.
 - visible under the thin lingual gingiva.

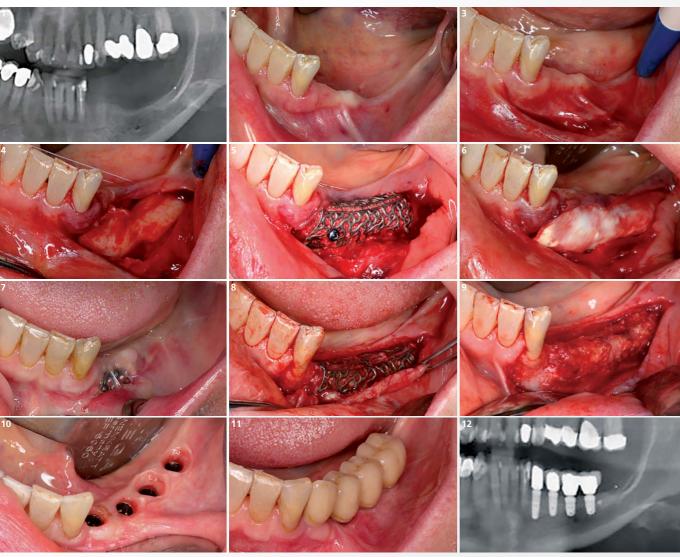
- 7 Control CBCT at 6 months postoperative.
- 8 Separation of the Yxoss CBR® into two parts.
- 9 Implants placed in the bony reconstruction (BEGO Semados® SC).

- 10 Additional GBR with Geistlich Bio-Oss® alone and Geistlich Bio-Gide® and suture with horizontal mattress (3/0) and crestal X sutures (6/0).
 - 11 Attached gingiva created by a partial thickness flap around the healing abutments post uncovering of implants after a healing period of 6 months.
- 12 Provisional bridge at time of ceramic try-in.

Vertical Defect (4 teeth gap) -**Posterior Mandible**

Surgery and concept by Dr. Sarah Krause (Chemnitz, Germany)





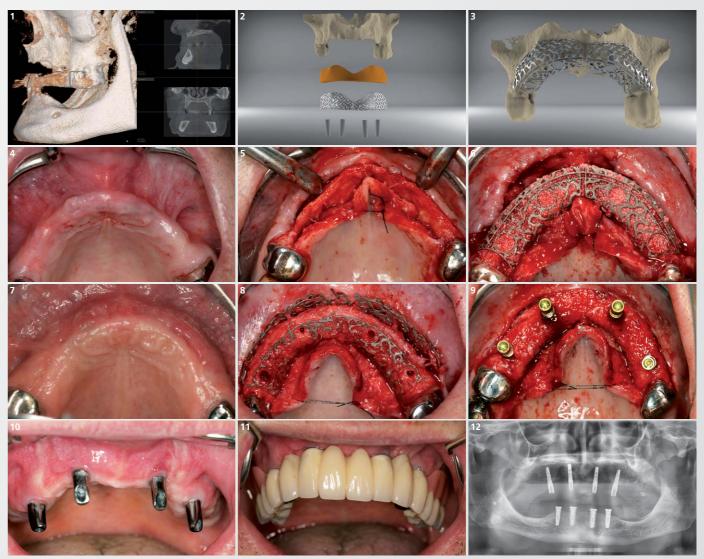
- 1 Radiographic image showing the vertical bone deficit in the left mandible.
- 2 Clinical situation before opening the area.
- 3 Incision for the creation of a poncho flap.

- 4 Starting in the retromolar area the incision is directed toward the distal region of tooth 23.
- 5 Cortical bone is removed with the trephine, crushed 6 Successive application of Geistlich Bio-Gide®. and mixed with Geistlich Bio-Oss® (50:50).
- 7 Dehiscence after 1.5 months. The soft tissue was 8 After 6 months, the ridge incision is applied to de-epithelialized and a free gingival graft was sutured to protect the exposition. Dehiscence may occur but usually heals spontaneously after appropriate cleaning.
 - access the 3-D titanium scaffold.
- 9 Buccal view of the regenerated bone. Even though there was dehiscence, the bone was regenerated satisfactorily.
- healed showing the contour provided by the good soft tissue frenum removal. adaptation of the provisional prosthesis.
- 10 Four implants are inserted and the soft tissue is 11 Clinical situation after the final prosthesis and the 12 Radiographic situation.

Extended Case (8 teeth gap) - Maxilla

Surgery and concept by Dr. Marcus Seiler MSc MSc/Dr. Amely Hartmann (Filderstadt, Germany)





- 5-12; deficit emerging from many years of wearing mucosa-supported dentures.
- 1 Large horizontal and vertical bone defect in region 2 3-D design including 3-D model, grafting volume, 3 3-D Design including 3-D model and Yxoss CBR®. Yxoss CBR® and implants.

- 4 Initial clinical situation before opening of the soft tissue.
- (ridge incision).
- 5 Presentation of bony situs with a full-thickness flap 6 Titanium scaffold filled with 100% Geistlich Bio-Oss® and placed onto bone defect. Fixation performed with 4 mini-screws in the buccal area.
- **7** Soft tissue situation after 6 months of healing.
- 8 Careful separation of Yxoss CBR® into two parts at 9 4 implants placed in positions 5, 7, 10 and 12 to predetermined breaking points (Easy Removal Design®). Pilot drill performed through built-in holes according to backward planning principle.
 - support the prosthesis. Bleeding out of the bone shows a good vascularization.

- 10 Situation 3 months after final prosthodontic treatment.
- 11 Incorporated final prosthetic restoration.
- 12 Panoramic X-ray 6 months after the augmentation. In the meantime, 4 additional implants have been placed in the lower jaw.

"This technique reduced the difficulties to less than half"

Interview with Prof. Matteo Chiapasco (Milan, Italy)

Prof. Chiapasco has used many surgical techniques to gain new bone height and width. Recently, he published his clinical experience with Yxoss CBR® (see summary of results on the right page). What is key to success for him?

Prof. Chiapasco, what convinced you to try Yxoss CBR®?

Prof. Chiapasco: The available titanium meshes can be difficult to manipulate and fixate. I hoped that Yxoss CBR® would simplify the surgical procedure.

Did it?

Yes. And I have also significantly reduced operating times. Moreover the stability and accuracy of the reconstruction are amazing. You can visualize the reconstruction in 3-D before you start surgery and calculate the amount of graft material needed. And by using Yxoss CBR® I avoid more traumatic harvesting and sampling

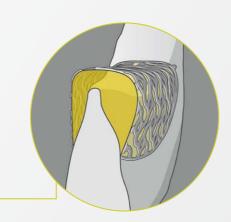
of bone blocks. I only use bone chips mainly harvested from intraoral sites – and Geistlich Bio-Oss®.

How much height and width can you gain with Yxoss CBR®?

Theoretically, there are no significant limits to bone augmentation, neither vertically nor horizontally. In some cases, I gained 10 mm in height. But we can arbitrarily divide bone augmentations into three categories: 1–3 mm, 4–6 mm, and > 6 mm. The bigger, the more difficult. Vertical augmentations can be more demanding than horizontal, especially for less experienced surgeons.

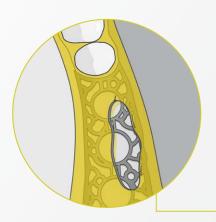
How would you convince a colleague to try Yxoss CBR®?

While it is important to be an expert in GBR, this technique reduces the difficulties to less than half and is predictable, effective, and precise. Try it to believe it.



In major bone augmentation, dehiscences are a frequent problem. How often do you experience such complications when using Yxoss CBR®?

If we included all exposures, the incidence is approximately 20%. But most of them do not compromise the outcome, especially if they occur in later stages of graft inte-



of the grafts happened in less than 5% of

What is key to avoid dehiscences?

Many factors can reduce this risk:1) Working in sterile conditions; 2) Accurate and significant flap release to get a tension-free and hermetic suture; 3) Good quality of soft tissues; 4) No load with removable prostheses on the regenerated areas.

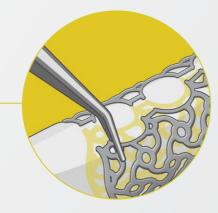
If dehiscences occur, how do you proceed? Will they disturb bone healing?

If the dehiscence occurs immediately after surgery, the risk of relevant loss of the grafting material is higher. The particulated graft is more exposed and is not yet integrated. I do not recommend resuturing the flaps, though. It could increase

gration. Severe early dehiscences with loss the infection risk as the mesh might be covered by a film of bacteria. If signs of infection are evident, in particular suppuration, I recommend removing the mesh, allowing the grafting material to cover with granulation tissue and re-evaluating after a few weeks. Despite this unfavorable event, part of the original graft may

> If the dehiscence occurs later, there is a high chance that granulation tissue has formed below the exposed parts and will protect the graft. In this case, oral hygiene measures such as chlorhexidine mouth rinses and frequent recalls will allow to maintain the majority of the graft.

Antibiotics are helpful in the first week after surgery. But in the early phases the graft is poorly vascularized, and antibiotics hardly reach the target.



Mesh removal can be difficult. What is your experience with Yxoss CBR®?

Mesh removal is one of the most delicate phases of the whole regeneration procedure. During healing, the bone graft can even "submerge the mesh" with new bone formation, thus rendering its removal more complex. Plus, soft tissues overlying the mesh are generally thin and penetrate through the mesh. Extreme accuracy must be ensured to separate soft tissue and the consolidated bone grafts from the mesh.

Do you have advice on how to make mesh removal easier?

Wait at least seven to eight months and.. good and trained hands, and delicate, attentive measures!!!



100% implant survival rate after loading No biological or prosthetic complications

A summary of Chiapasco et al. 2021



41 (53 sites)

Retrospective single-arm study



11 months* after loading



Yxoss CBR® **Geistlich Bio-Oss®** Geistlich Bio-Gide® Autologous bone

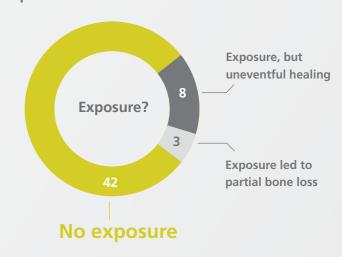
Bone gain



Vertical bone gain \uparrow 4.78 ± 1.88 mm

Horizontal bone gain \rightarrow 6.35 ± 2.10 mm

Exposures



- 1 Chiapasco M. et al: Clin Oral Implants Res 2021: 32(4): 498-510
- * (mean = 10.6 months; range: 2 26; median = 10.6; SD = 6.49)

Yxoss CBR® backward

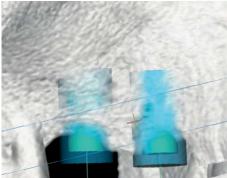
Have you ever customized the regenerative procedure together with a surgery guide for correct implant placement? ReOss offers the option of integrated 3-D implant positioning in the surgical planning called Yxoss CBR® backward.





1. Diagnosis & order:

When placing your order upon diagnostic imaging you can select the option Yxoss CBR® backward which will allow you to use the Yxoss CBR® scaffold as your surgical guide for implant positioning.





2. 3-D planning & design:

You will receive the proposal for the digital 3-D design with the opening provided for future positioning of the implant pilot drill. After sending your design approval to ReOss, you will receive the Yxoss CBR® scaffold for sterilization and implantation.

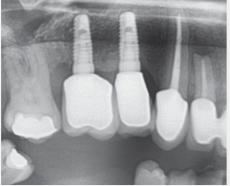




3. Implant placement:

During simultaneous approach or at the time of reopening, Yxoss CBR® backward with its pre-existing openings can serve as your surgical guide for the positioning of the implant pilot drill. Further implant insertion steps can be performed after the removal of the scaffold.





4. Prosthetic outcome:

Once the healing process of bone and mucosa is complete the prosthetic crowns can be placed to finalize the treatment.

How to order

The intuitive online ordering platform MyReOss (www.reoss.us/myreoss) allows you to upload imaging files and to easily monitor all steps of the entire process at any time in your personal account. Moreover, MyReOss offers full transparency concerning pricing and proposals for the amount of regenerative biomaterials needed to augment the defect-specific volume.



For general questions about product and ordering process, please contact your local Geistlich Biomaterials representative:

Foll-free: 855-799-5500
E-mail: yxoss@geistlich-na.com

For specific questions about your order status, case planning, 3-D design, and your customer account, please contact ReOss LLC:

E-mail: contact@reoss.us

Yxoss CBR®



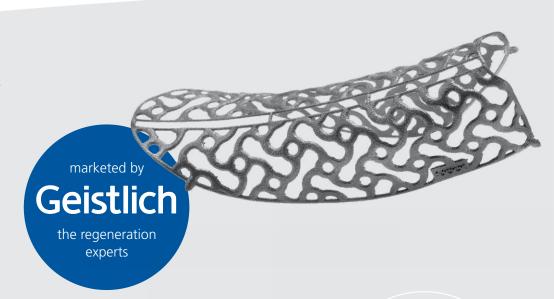
Easy ordering at www.reoss.us

Geistlich Pharma North America, Inc.

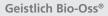
Princeton, NJ 08540 Customer Care Toll-free: 855-799-5500 yxoss@geistlich-na.com dental.geistlich-na.com

Manufacturer of Yxoss CBR®

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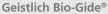






Stable scaffold for new bone.^{1,2,3,4} The slow resorption of Geistlich Bio-Oss® increases the stability of the augmentation material⁵ – the best prerequisite for long-term implant survival rates.⁶





Stabilizes the grafted area and protects bone particles from dislocation for optimal bone regeneration. The natural collagen structure allows homogeneous vascularization, supports tissue integration and wound stabilization. The combination of flexibility, good adhesion, and tear resistance contribute to easy handling, in turn saving time, and simplifying the surgical procedure.

- 1 Orsini G et al., J Biomed Mater Res, B: Appl Biomater 74B, 2005; 448–57.
- 2 Piattelli M et al., Int J Oral Maxillofac Implants 1999; 14: 835-40.
- **3** Sartori S, et al., Clin Implants Res 2003; 14: 369–72.
- 4 Traini T et al., J Periodontol. 2007 May; 78(5): 955–961.
- **5** Orsini G et al., Oral Diseases. 2007; 19: 357–368.
- 6 Jung R et al., Clin Oral Implants Res. 2013 Oct; 24(10): 1065–73.
- 7 Perelman-Karmon M et al., Int J Periodontics Restorative Dent. 2012 Aug; 32(4): 459-65.
- 8 Rothamel D et al., Clin. Oral Implants Res. 2005; 16(3): 369-378.
- 9 Data on File. Geistlich Pharma AG, Wolhusen, Switzerland.







For more information, please visit:

www.reoss.us dental.geistlich-na.com

CAUTION: Federal law restricts these devices to sale by or on the order of a dentist or physician. For more information on contraindications, precautions, and directions for use, please refer to the Instructions for Use at: dental.geistlich-na.com/ifu