



Customized Bone Regeneration



# Yxoss CBR®

Customized Bone Regeneration



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# Yxoss CBR<sup>®</sup> – the future is now

The first customized 3-D printed bone regeneration solution for complex bone defects

3-D

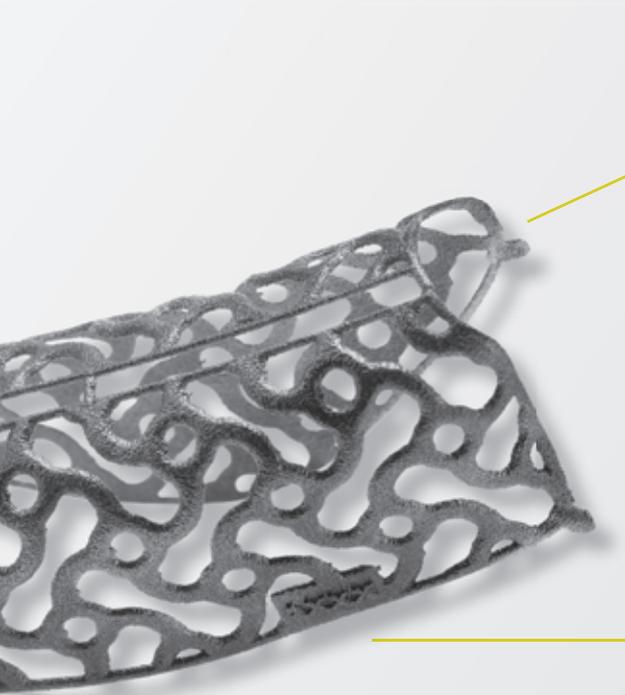
Innovative solution for regenerating **complex alveolar bone defects** by taking advantage of CBCT data combined with **3-D printing technology**



Opportunity to reduce surgery **time** without complex adaptations



High **stability** and space maintenance



Optional: Unique **integrated implant positioning** in the surgical planning – **Yxoss CBR® Backward**



**Easy Removal Design®** with pre-defined breaking points for easy removal of Yxoss CBR® on re-entry



ReOss® calculates the necessary **augmentation volume** for your case planning

- ① You define the % of autologous bone mixture with the Biomaterial
- ② You include the inner diameter of the hollow trephine



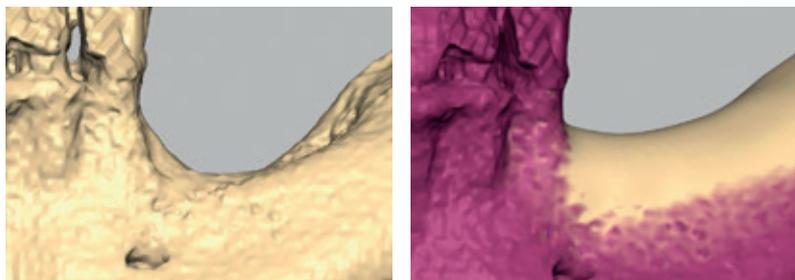
Click “calculate” and receive:

- › The depth of the trephine penetration
- › The volume of bone substitute required (e.g. Geistlich Bio-Oss®)

| Bone substitute material                                    |                              |
|---|------------------------------|
| Calculation   |                              |
| Calculation of additionally needed bone substitute material |                              |
| Proportion autogenous material (%)                          | 50 ①                         |
| Inner diameter of hollow trephine (mm)                      | 8 ②                          |
| → Calculate   |                              |
| Requires bone substitute material                           |                              |
| Augmentation volume:  | 1.200 mm <sup>3</sup>        |
| Proportion autogenous material:                             | 60 % (+600 mm <sup>3</sup> ) |
| Inner diameter of hollow trephine:                          | 8 mm                         |
| Calculated drill depth:                                     | 12 mm                        |
| Requires bone substitute material:                          | 600 mm <sup>3</sup>          |
| Geistlich Biomaterials                                      |                              |
| Recommended shopping list for                               |                              |

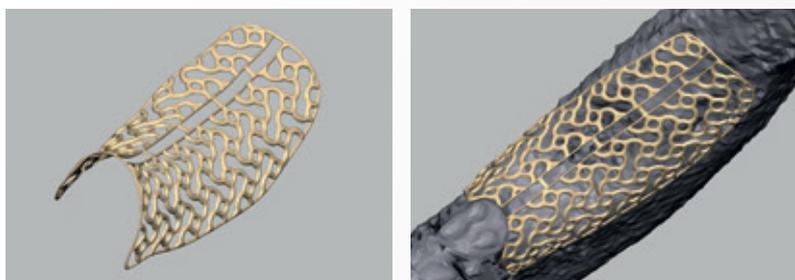
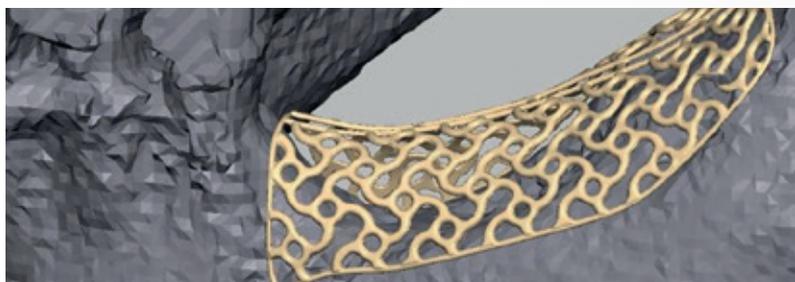
# ReOss® – Quality and precision are our strengths

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

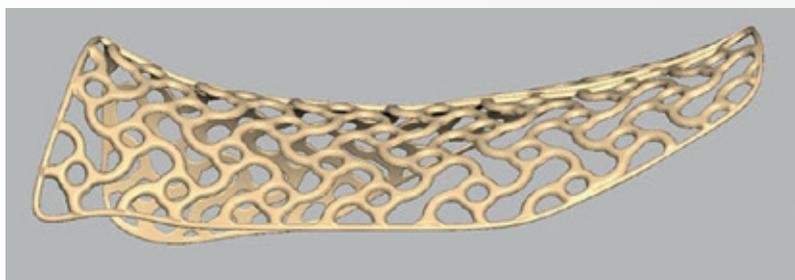


ReOss® uses the most up-to-date CAD/CAM technology available to satisfy patient-specific requirements regarding a planned bone augmentation. In a patented process, a contoured, form-stable scaffold is 3-D printed out of the purest titanium based on CT- or CBCT-images, allowing for customized bone regeneration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



## Download and Try-it!

Step 1: Scan the QR code with your mobile device and install the “3-D PDF Reader” app (Apple Store). Android users: search “3-D PDF Reader” app by Tech Soft 3-D in Google Play.



## Download Yxoss CBR® – 3-D PDF

Step 2: Scan the QR code with your mobile device, download and open the file in the “3-D PDF Reader” app. You can also open your next case’s files using the 3-D PDF reader.

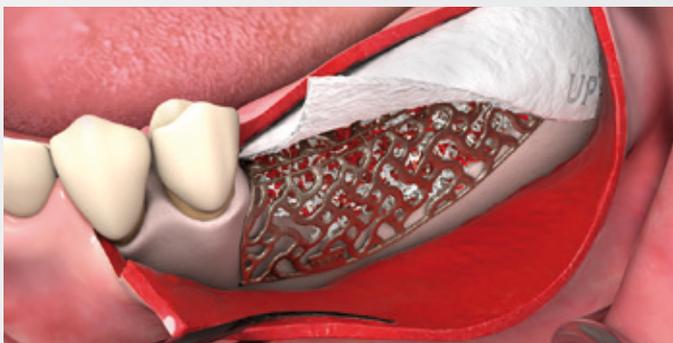
# Soft tissue management is the key to success

## Options for the flap design

### Ridge incision technique<sup>1</sup>

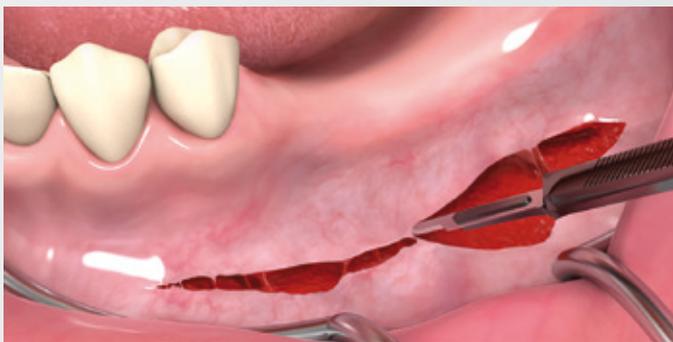


- › Crestal incision of the mucosa and the periosteum
- › No releasing incision – extension 3-4 teeth to the posterior (if possible)
- › Flap design: Full thickness flap



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-technique<sup>1</sup>



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

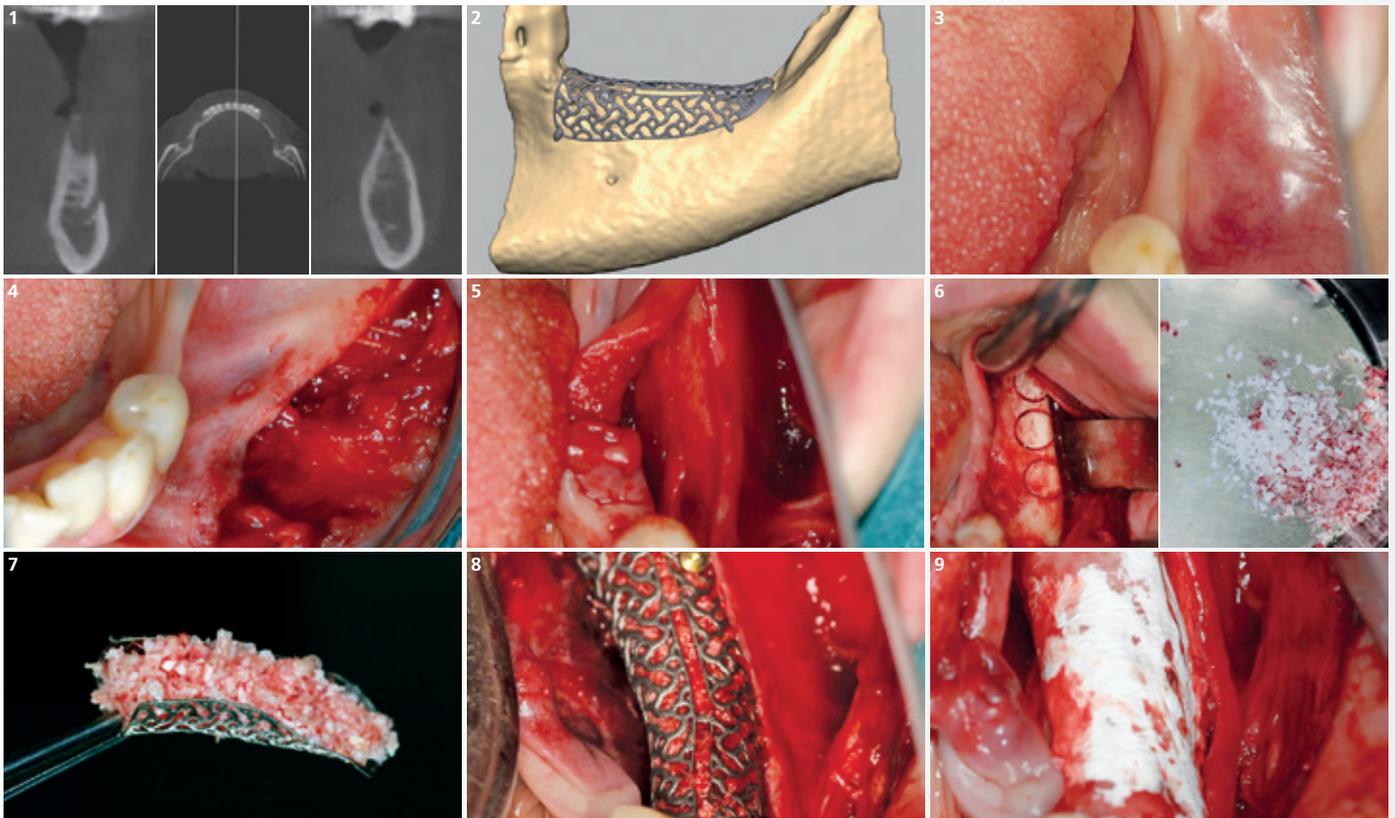


This poncho technique is preferred in pronounced vertical defects. After incision, preparation of a mucoperiosteal flap, debridement of scar tissue, and exposure of the defect is conducted. A passive tension-free fit of the Yxoss CBR® is then ensured.

<sup>1</sup> 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 case<sup>1</sup> highlights step-by-step the important procedures to regenerate the bone (horizontal and vertical) with the 3-D printing technology according to Dr. Marcus Seiler MSc MSc.



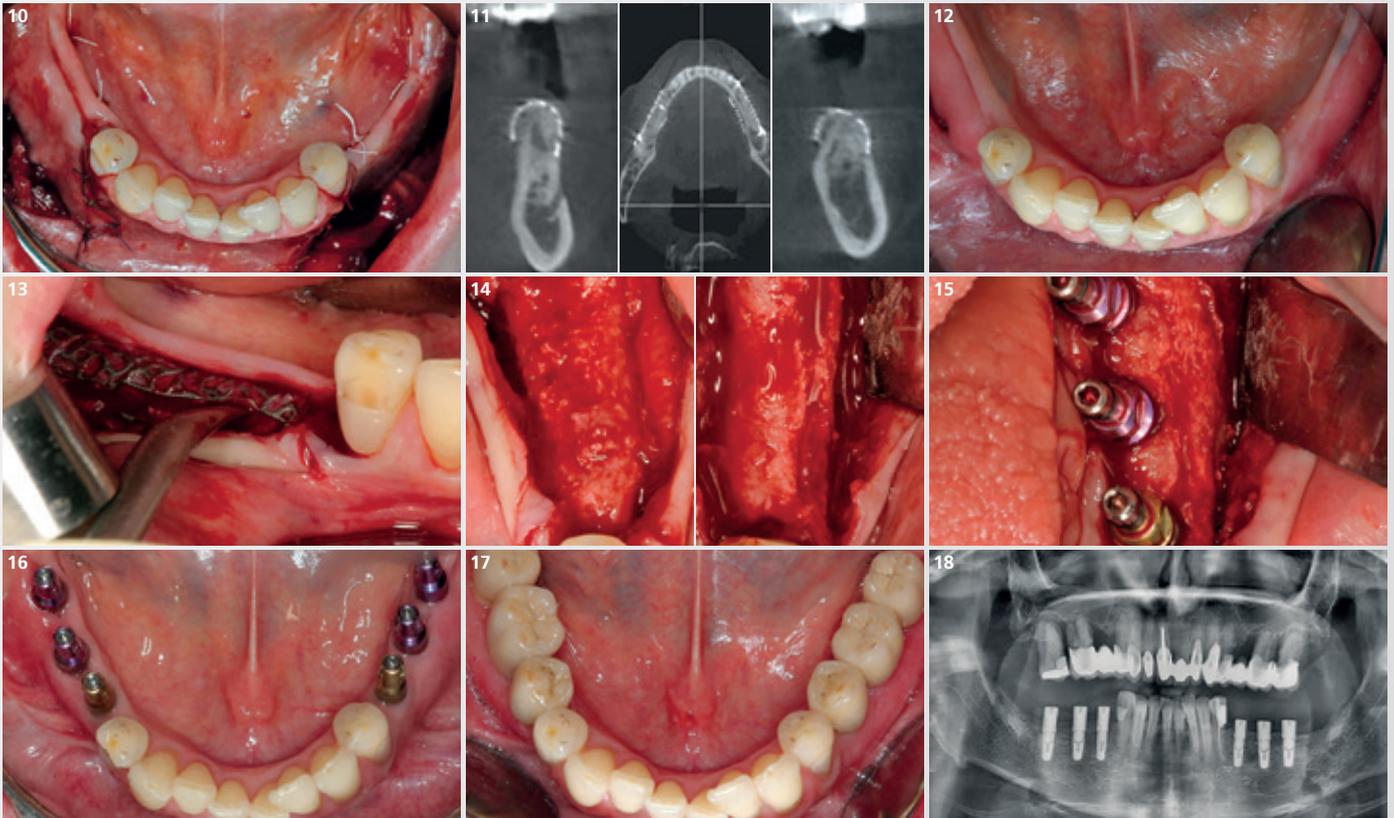
- 1 The basis for planning implant therapy is clinical and radiological diagnosis with a CBCT scan.
- 2 A precise three-dimensional planning model will be created based on CBCT data. Adaptations of the exact shape are possible, depending on the surgeons preference and feedback.
- 3 The usual oral surgery and implantology hygiene provisions apply for the use of Yxoss CBR® intra-operatively. The same applies to patient medication.
- 4 The opening incision should be designed in accordance with the extent, location and with respect to the anatomical structures of the region to be augmented.
- 5 Subsequent steps are the preparation of a mucoperiosteal 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.
- 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 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 regeneration over the titanium frame.

<sup>1</sup> Surgery and concept by Dr. Marcus Seiler MSc MSc.



**Find a surgical video here!**

Scan the QR code with your device to access the surgical videos



**10** Soft-tissue management is critical for the success of the therapy. During wound closure, the mucoperiosteal flap is positioned tightly but tension-free over Yxoss CBR® with single-interrupted and deep mattress sutures.

**11** Before reopening, clinical and radiological 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® can be easily removed using preset breaking points.

**14** Newly formed vital bone is regenerated up to the contour defined by the shape of the Yxoss CBR®.

**15** Insertion of implants into the augmented alveolar ridge according to the prosthetic position.

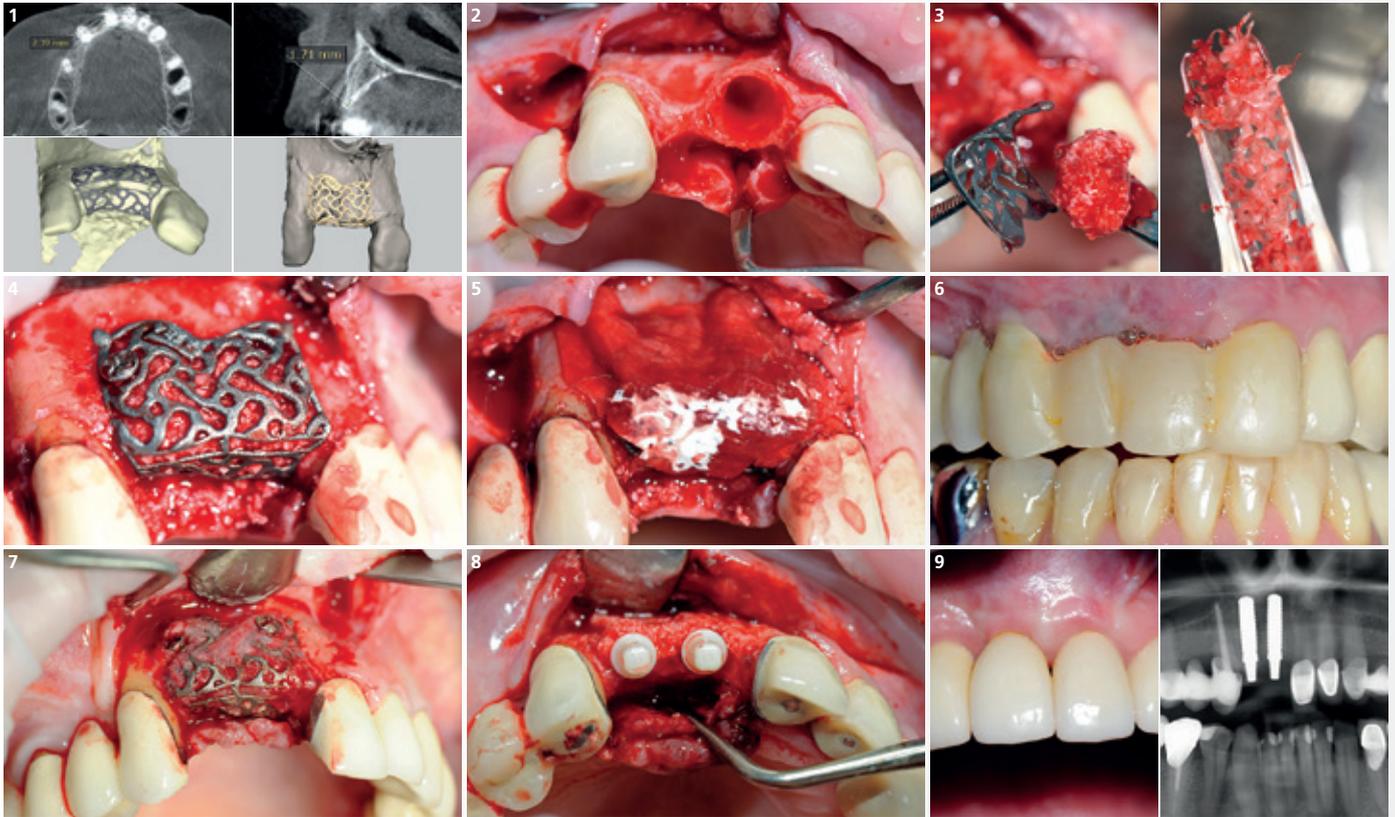
**16** Prosthetic restoration is carried out in accordance with the usual precautions.

**17** Follow-up should be performed according to the standardized recommendations of the respective dental societies.

**18** Radiological evaluation should be performed according to the standardized recommendations of the respective dental societies.

# Horizontal Defect (2 teeth gap) Maxilla

Surgery and concept by Dr. Frank Liebaug



**1** CBCT scan showing the bucal deficit contour with the corresponding bone defect. At this point, the Yxoss CBR® can be modified by the customer.

**2** Surgical situation with horizontal and minor vertical bone deficit.

**3** Filling of the 3-D titanium scaffold with a mixture of autologous bone chips and Geistlich Bio-Oss® large granules.

**4** An osteosynthesis screw is used to fix Yxoss CBR®.

**5** Geistlich Bio-Gide® is adapted over the scaffold and the mucoperiosteal flap is prepared so as to allow tension-free wound closure.

**6** Temporary prostheses is applied so as to avoid any mechanical forces on the augmented site. This step may support the patient's chewing and speaking functions.

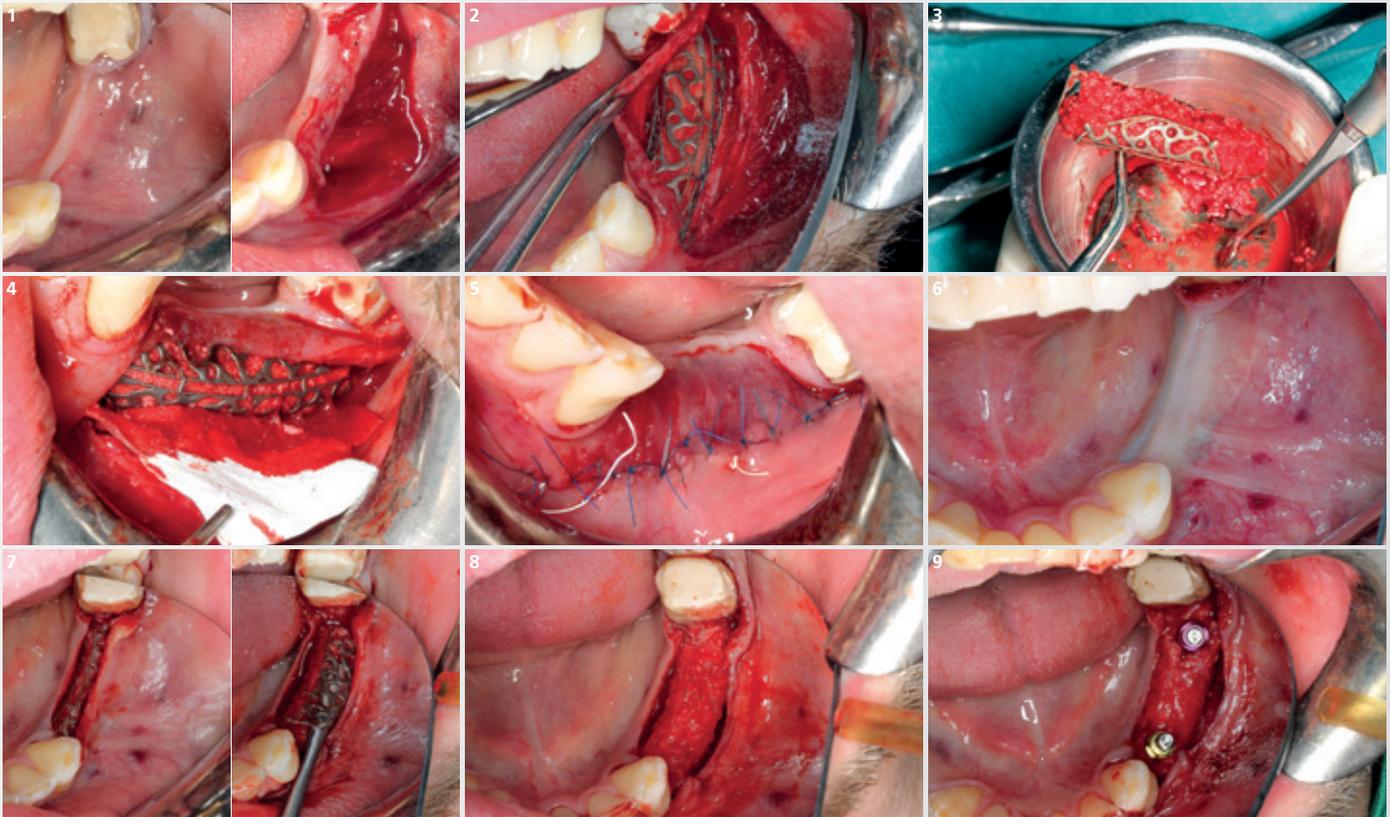
**7** Reopening situation 6 months after augmentation surgery. A raspatorium is used to breakage at the pre-defined breaking points in order to remove Yxoss CBR® easily.

**8** Two full ceramic implants (Vita Clinical, Germany) were inserted, followed by the application of a temporary prosthesis for improving the soft tissue contour.

**9** Final prosthetic restoration with individual layered ceramic. Panoramic X-ray 6 months after the augmentation.

# Horizontal Defect (3 teeth gap) Mandible

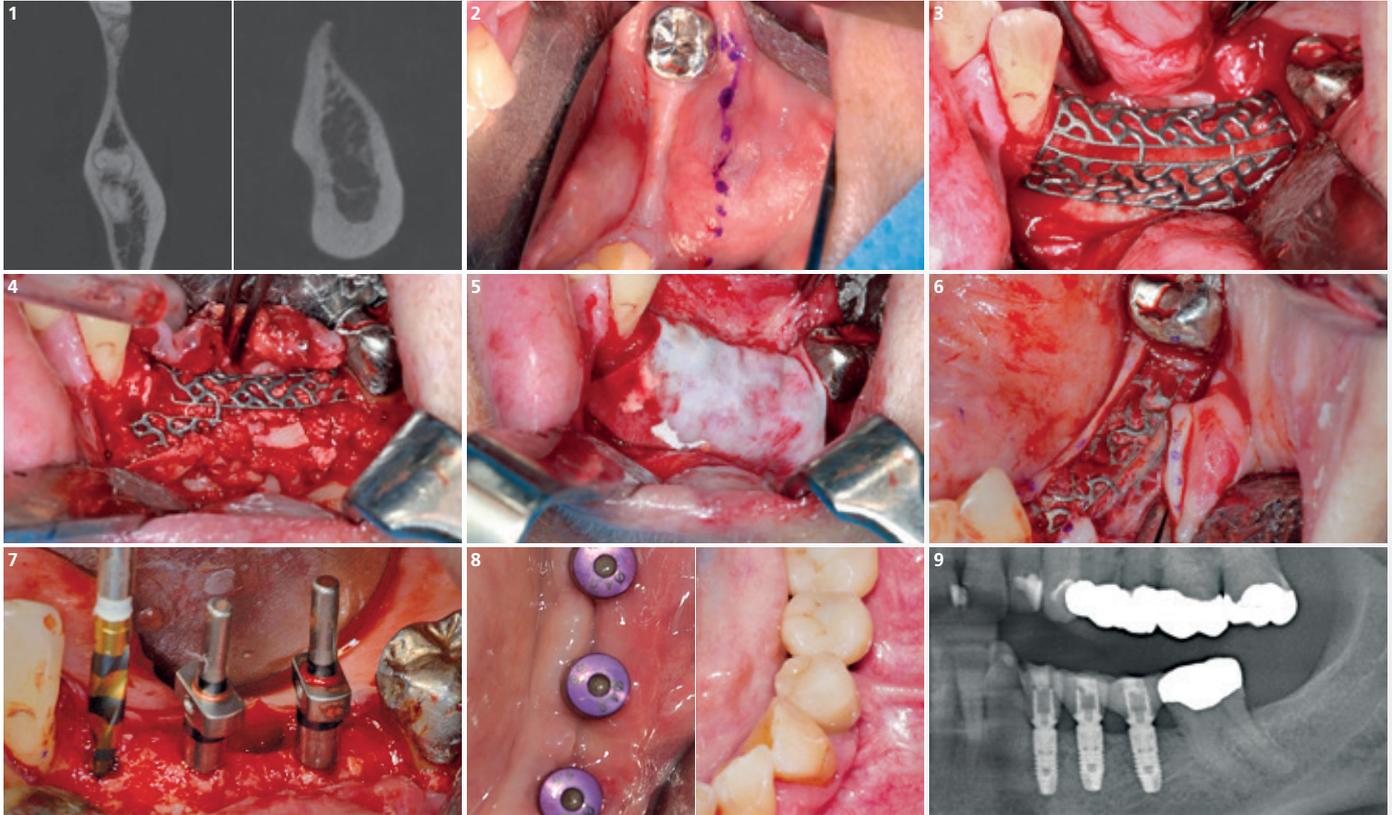
Surgery and concept by Dr. Thomas Barth/Dr. Stefan Ulrici



- 1 Clinical situation showing the horizontal deficit. A poncho flap design is chosen to access the defect area.
- 2 After exposure of the defect site, Yxoss CBR® is being tested for its fit to the morphology of the defect.
- 3 Autologous bone from the intraoral donor site is harvested and mixed 50:50 with Geistlich Bio-Oss®.
- 4 Geistlich Bio-Gide® is placed over Yxoss CBR® to prevent the ingrowth of soft tissue into the bone and to support soft-tissue regeneration over the titanium scaffold.
- 5 The mucoperiosteal flap is positioned tightly over Yxoss CBR® and is sutured with deep mattress and single interrupted sutures.
- 6 Clinical occlusal view after 6 months. No complications in the healing phase.
- 7 Breaking of Yxoss CBR® along the predefined breaking points in at the mid-crestal line with a raspatorium.
- 8 Reopening after 6 months shows vital regenerated bone.
- 9 Insertion of two implants into the regenerated bone.

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

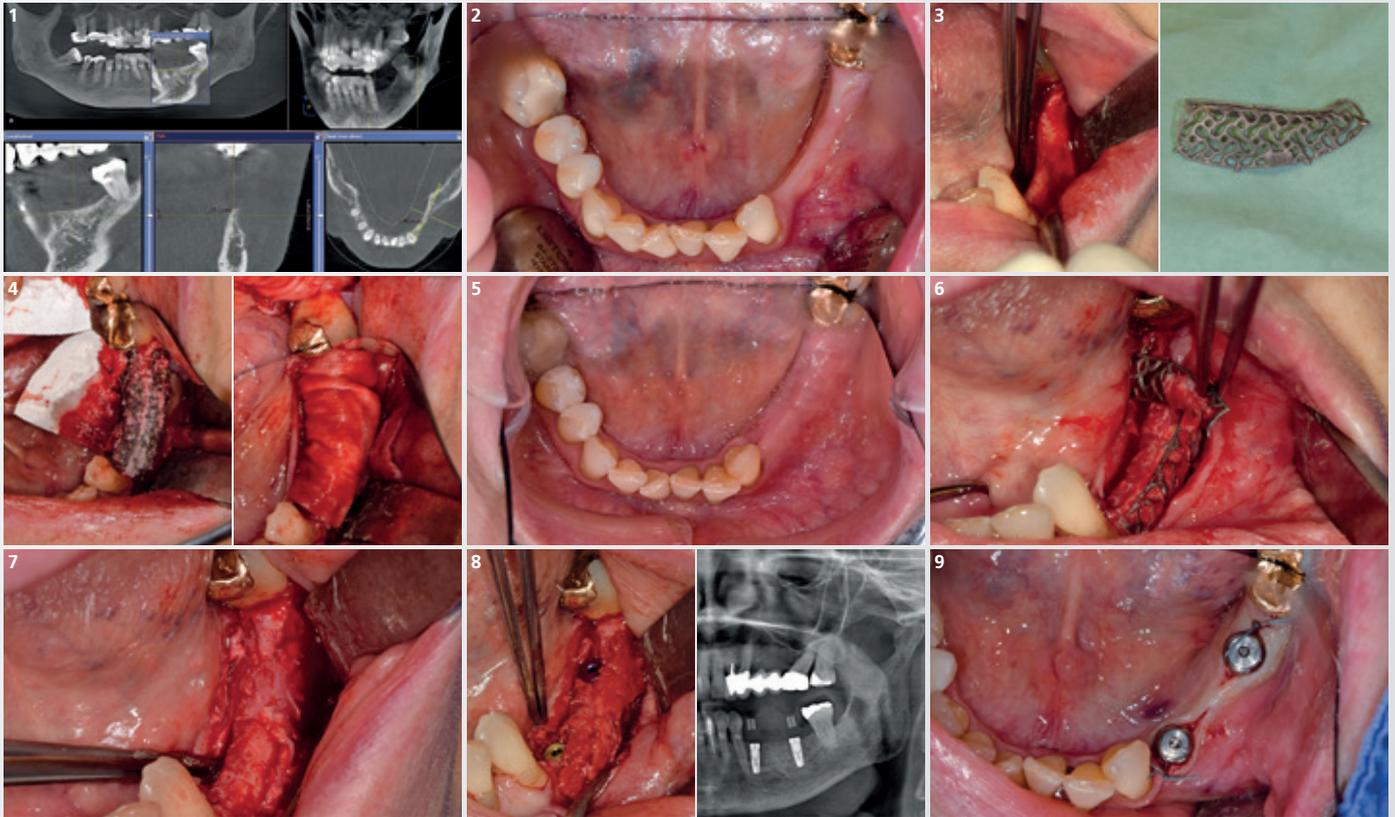
Surgery and concept by Dr. Dr. Keyvan Sagheb/Dr. Dr. Eik Schiegnitz



- 1 Preoperative CBCT of the patient with horizontal and vertical deficiency in the left mandible.
- 2 Preoperative clinical picture with marked incision line for a future poncho flap. The incision is made deep in the vestibular area in order to position the subsequent suture at a distance from the 3-D titanium scaffold. This cutting technique is performed in vertical defects and may help to avoid dehiscence.
- 3 Evaluation of the fit of Yxoss CBR® to the defect site.
- 4 Autologous bone is mixed 50:50 with Geistlich Bio-Oss® to fill the 3-D titanium scaffold. It is usually enough to stabilize using one or two screws.
- 5 Covering the 3-D titanium scaffold with a Geistlich Bio-Gide® membrane reliably supports hard tissue regeneration and protects the grafted area from the ingrowth of soft tissue.
- 6 Reentry 6 months after augmentation. Thanks to the Easy Removal Design®, Yxoss CBR® can be easily removed after breakage in the crestal area.
- 7 Implant placement in prosthetically correct position and according to 3-D planning software.
- 8 Clinical picture after soft tissue healing (left). Clinical situation after implant placement with final prosthetic restoration (right).
- 9 Radiography after prosthetic restoration.

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

Surgery and concept by Dr. Alexander Volkmann



1 CBCT showing the horizontal and minor vertical buccal bone defect.

2 Clinical situation before the augmentation.

3 After opening the flap with a ridge incision, Yxoss CBR® is tested and the flap is appropriately mobilized in order to ensure complete soft tissue closure after the augmentation procedure.

4 Autologous bone is removed with a Safescraper® (Zimmer Biomet, Germany) and mixed 30:70 with Geistlich Bio-Oss®. Yxoss CBR® is fixed with 2 screws (1.7mm diameter) and entirely covered by a Geistlich Bio-Gide® membrane.

5 Clinical picture showing the extent of horizontal augmentation as compared to the initial situation.

6 The 3-D titanium scaffold is removed after using the pre-defined breaking points.

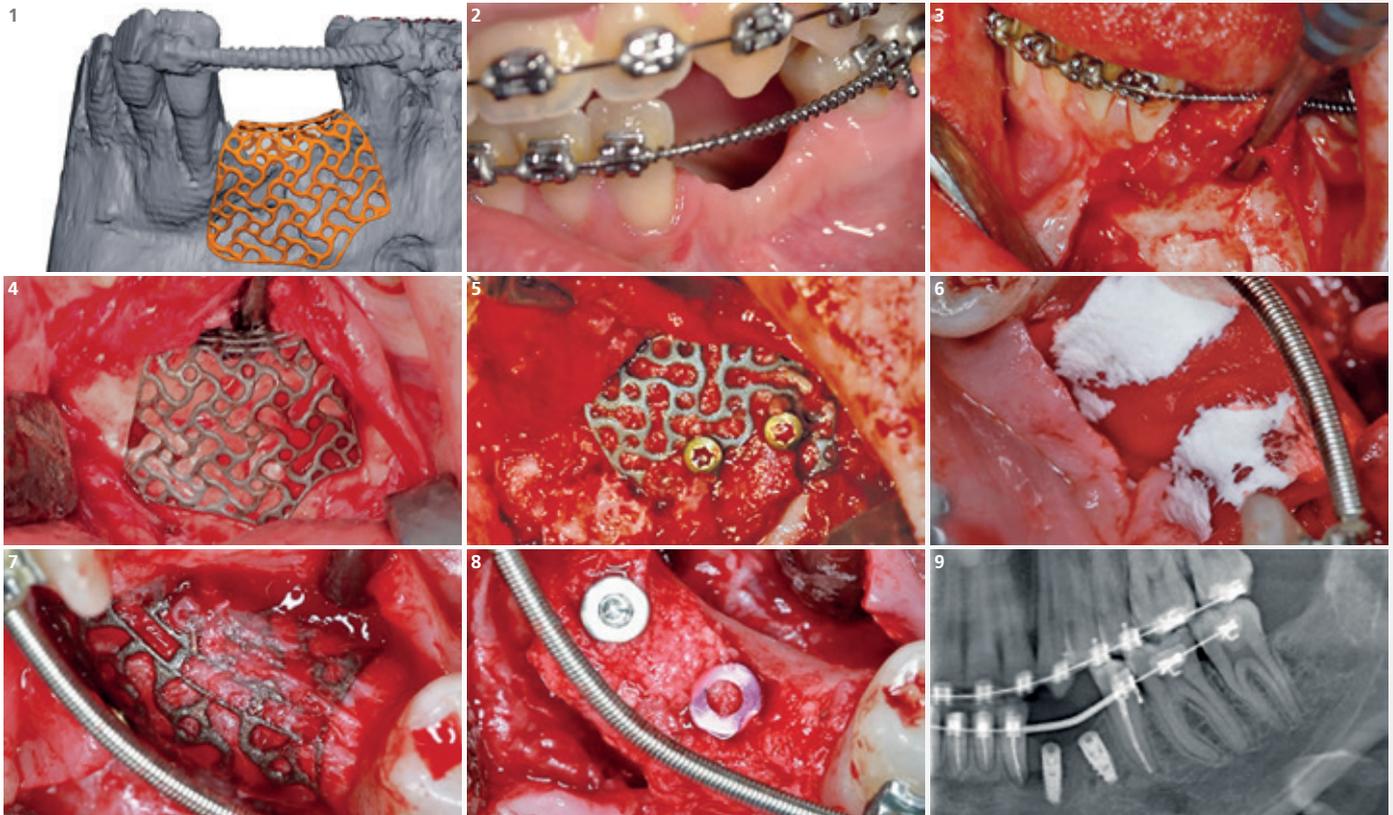
7 Regenerated alveolar crest after removal of Yxoss CBR®.

8 The implants were inserted (34 and 36) and secondary augmentation was performed with autologous bone chips harvested at the implant sites during the implant. Radiographic image after implant placement.

9 An additional orthodontic treatment was performed and the healing abutment was placed for soft tissue modelling after 3 months. Surgery treatment time: 7 months in total.

# Horizontal/Vertical Defect (2 teeth gap) – Mandible

Surgery and concept by Prof. Dr. Winfried Wagner/Dr. Dr. Keyvan Sagheb



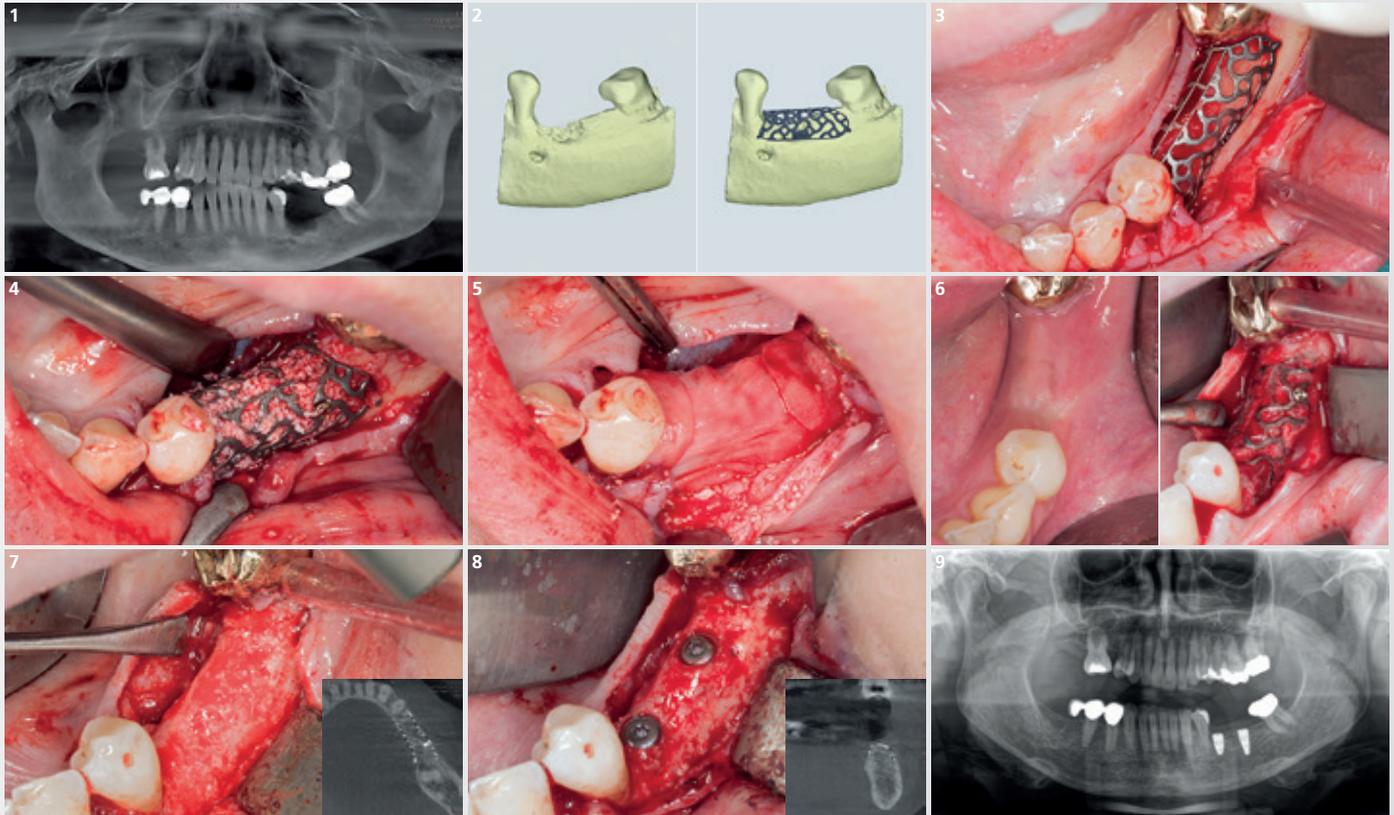
- 1 3-D virtual model: The Yxoss CBR® design can be precisely defined, avoiding interference with special anatomic conditions (e.g. mental foramen). The 3-D printed model also reproduces the orthodontic component.
- 2 Clinical situation before the regenerative procedure confirming not only the vertical but also the horizontal bone deficit.
- 3 Surgical approach with poncho incision flap. Thus, the incisions are appropriately distanced from the occlusal area and the augmented site.
- 4 Try-in of Yxoss CBR® confirms exactly the design of the 3-D-printed scaffold.
- 5 Bone harvesting with the Safescraper® (Zimmer Biomet, Germany) method and mixed 50:50 with Geistlich Bio-Oss®. Fixation with 2 osteosynthesis screws.
- 6 Geistlich Bio-Gide® is used to reduce the risk of dehiscence in comparison to the other membranes.<sup>1,2</sup>
- 7 Reentry after 6 months showing the regenerated alveolar ridge.
- 8 Insertion and positioning of the implants.
- 9 Radiographic image after implant placement.

<sup>1</sup> Becker J, et al. Clin Oral Implants Res. 2009;20(7):742-749.

<sup>2</sup> Annen BM, et al. Eu J Oral Implantol. 2011;4(2):87-100.

# Vertical Defect (3 teeth gap) Mandible

Surgery and concept by PD Dr. Christian Mertens



1 The preoperative radiograph displays the vertical bone defect in the left mandible and thus, insufficient vertical bone volume to allow implant placement.

2 Yxoss CBR® is planned based on the preoperative CBCT data.

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% autogenous bone and 50% Geistlich Bio-Oss®. Fixation is performed with one titanium screw in vestibulolingual direction.

5 A collagen membrane (Geistlich Bio-Gide®) is used to provide an additional barrier for bone regeneration.

6 Stable soft tissue situation after 6 months with no complications during the healing period. After reopening, bone is regenerated to the contour defined by the titanium scaffold.

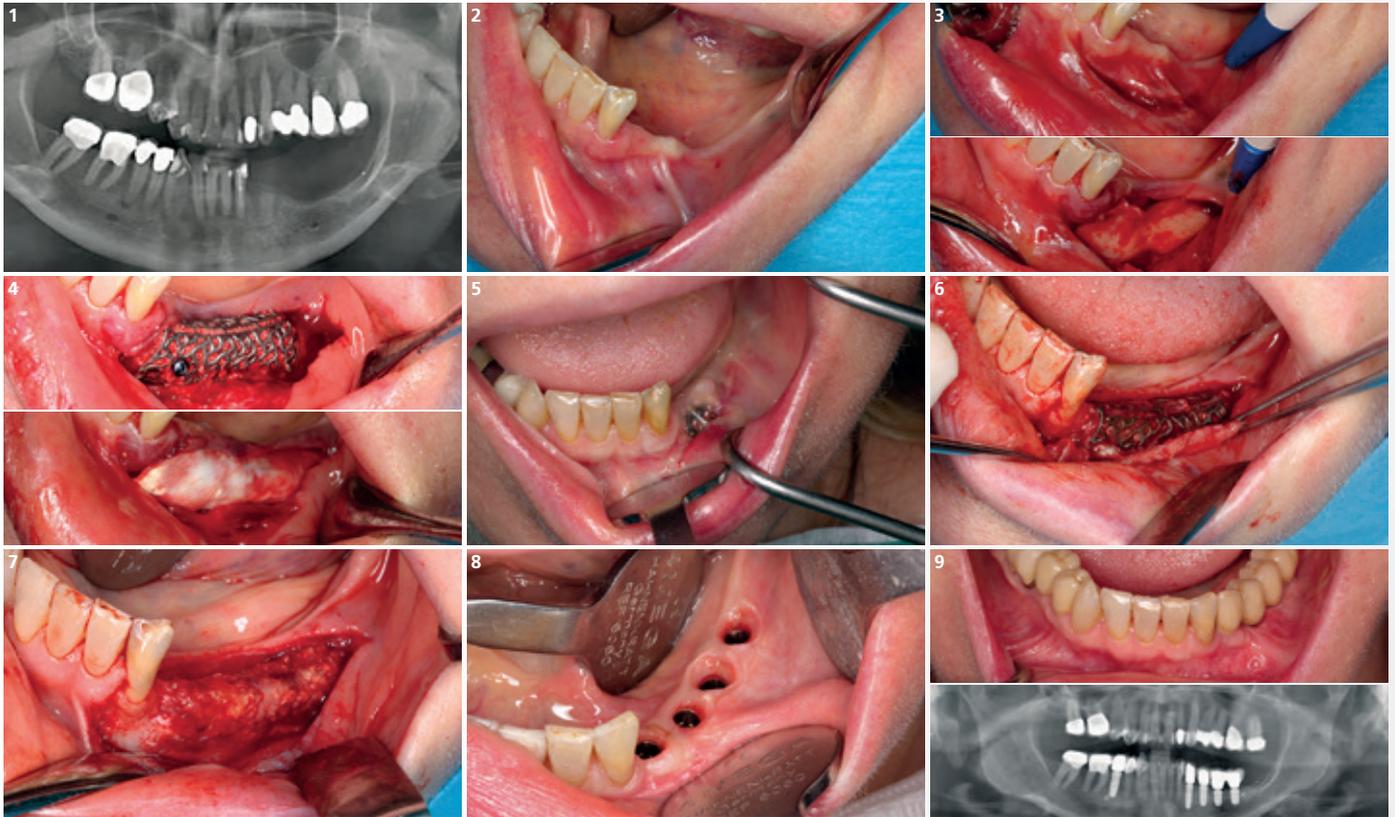
7 The bone is completely regenerated in the correct three-dimensional orientation. This is also visible in the respective CBCT. Implant placement is now possible.

8 Two implants were placed with good primary stability. The vertical bone regeneration is also visible in the CBCT data.

9 Postoperative panoramic radiograph after implant placement.

# Vertical Defect – Posterior Mandible

Surgery and concept by Dr. Sarah Krause



**1** Radiographic image showing the vertical bone deficit in the left mandible.

**2** Clinical situation before opening the area.

**3** The poncho flap design is applied starting in the retromolar area and directed toward the distal region of tooth 32.

**4** Cortical bone is removed with the trephine, crushed and mixed with Geistlich Bio-Oss® (50:50), followed by the application of Geistlich Bio-Gide®.

**5** Dehiscence after 1.5 month. The soft tissue was de-epithelialized and a free gingival graft was sutured to protect the exposition. Dehiscence may occur but usually heals spontaneously after appropriate cleaning. If considered necessary, additional measures may be taken as in this case.

**6** After 6 months, the ridge incision is applied to access the 3-D titanium scaffold.

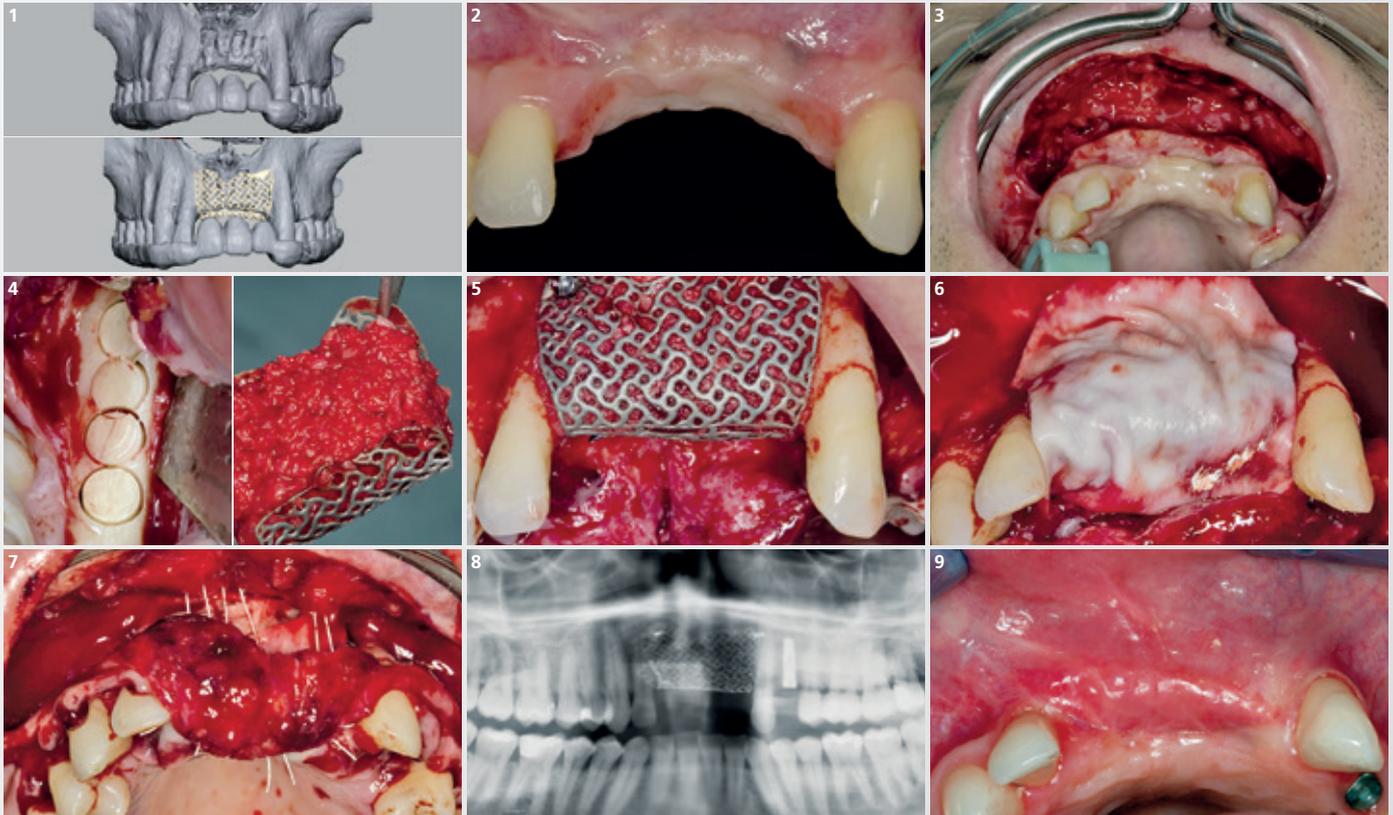
**7** Buccal view of the regenerated bone. Even though there was dehiscence, the bone was regenerated satisfactorily.

**8** Four implants are inserted and the soft tissue is healed showing the contour provided by the good adaptation of the provisional prosthesis.

**9** Clinical and radiographic situation after the final prosthesis and the soft tissue frenum removal.

# Vertical Defect – Esthetic Area

Surgery and concept by Dr. Karl-Ludwig Ackermann



1 3-D model simulation of the bone situation and with and without Yxoss CBR® in place.

2 Initial situation with unfavorable vertical defect.

3 Surgical approach with a poncho flap; the incision is distant from the ridge.

4 Autologous bone is removed from the retromolar area with a trephine and mixed 50:50 with Geistlich Bio-Oss®.

5 Fixation of Yxoss CBR® with 2 mini-screws is sufficient to stabilize the regenerative procedure.

6 Covering with a Geistlich Bio-Gide®.

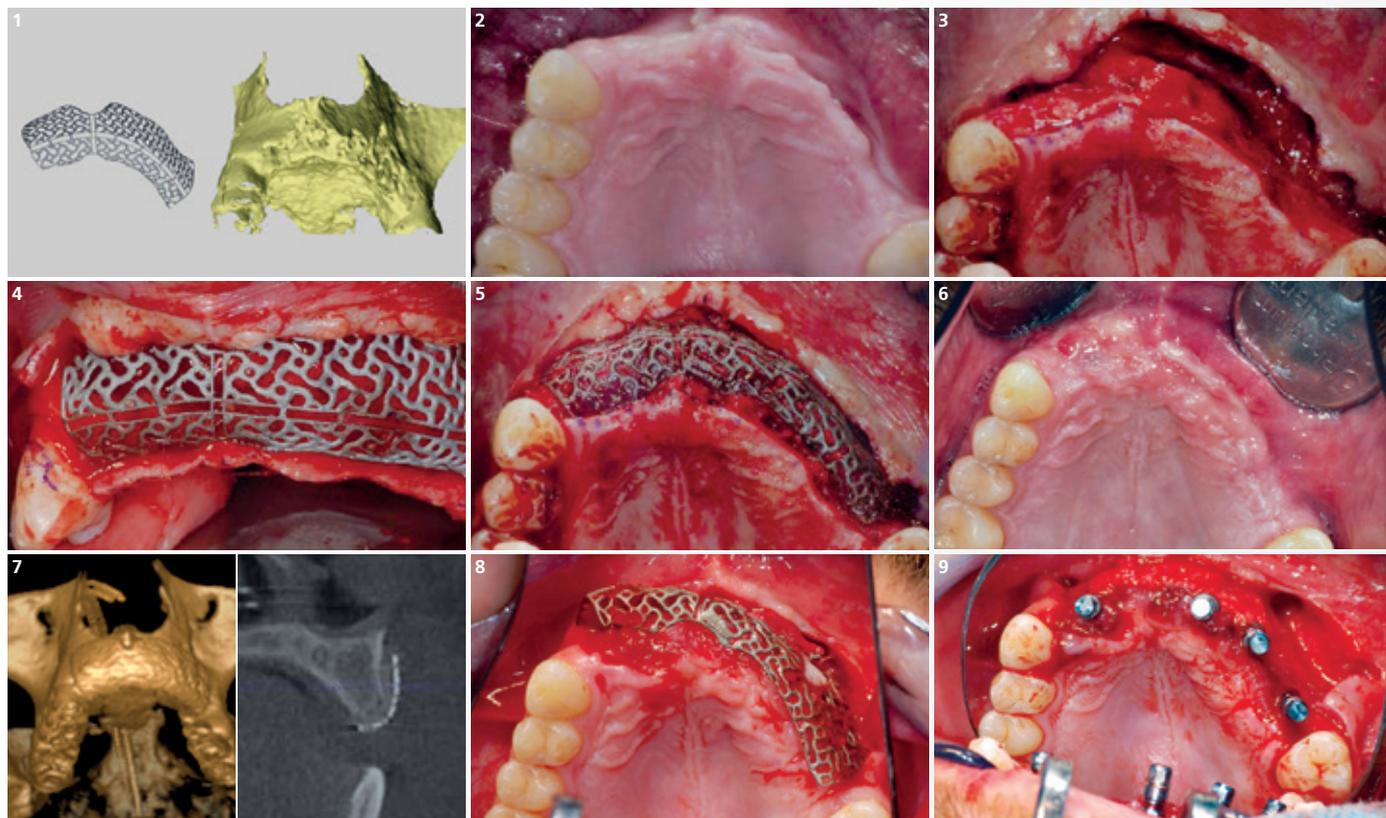
7 Two-layered wound closure to avoid flap tension over the regenerative procedure.

8 Radiographic image after positioning of Yxoss CBR®.

9 Clinical situation five months after augmentation.

# Extended case – Anterior Maxilla

Surgery and concept by Prof. Dr. Winfried Wagner/Dr. Dr. Keyvan Sagheb



1 Large horizontal and vertical bone defect in region 12–25.

2 Initial clinical situation before opening of the soft tissue.

3 Surgical approach through a crestal incision to access the bone defect.

4 Try-in of Yxoss CBR® – buccal view.

5 Yxoss CBR® is filled with a 50:50 mixture of autologous bone and Geistlich Bio-Oss®, followed by autologous platelet-rich-fibrin (PRF) to further promote soft tissue healing.

6 Situation three weeks after the regenerative procedure.

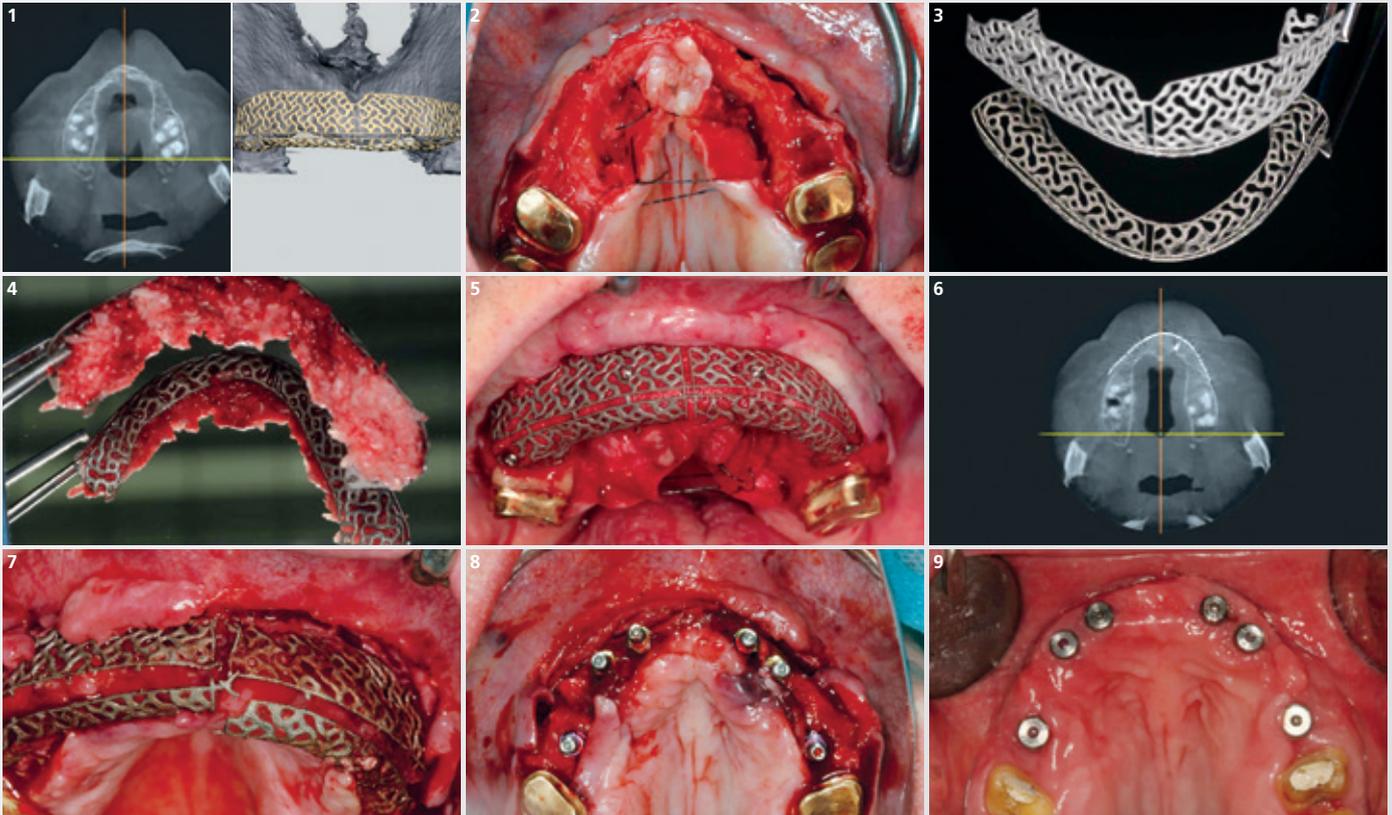
7 5 months after augmentation, the 3-D virtual model is generated with CBCT data to verify the bone regeneration.

8 Careful removal of Yxoss CBR® along the breaking points.

9 The four implants are placed in positions 12, 22, 23 and 25.

# Full-arch – Maxilla

Surgery and concept by Dr. Marcus Seiler MSc MSc



1 Horizontal deficit emerging from many years of wearing mucosa-supported full dentures.

2 Presentation of the bony situs with a full-thickness flap (ridge incision).

3 Yxoss CBR® with several incorporated predetermined breaking points.

4 After retromolar bone harvesting, autologous bone chips are mixed 50:50 with Geistlich Bio-Oss®.

5 The fixation of Yxoss CBR® is performed with 4 mini-screws in the buccal and occlusal area.

6 CBCT image shows the bone contour formation after 6 months.

7 Separation of Yxoss CBR® in two parts at the predetermined breaking points (Easy Removal Design®).

8 The six implants are placed to support the prosthesis.

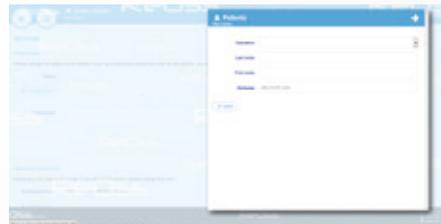
9 Exposed implants after soft tissue healing and before prosthodontic treatment.

# How to order

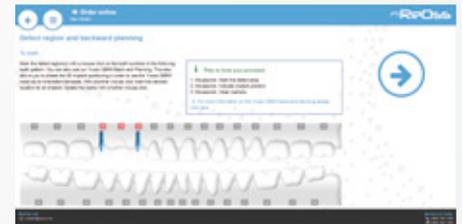
ReOss® GmbH offers an intuitive online ordering platform ([www.reoss.eu/myreoss](http://www.reoss.eu/myreoss)) for uploading of the CT/CBCT data and where the entire process can be monitored, from ordering to manufacturing status and delivery. Moreover, MyReOss offers full transparency concerning pricing and proposals for the amount of regenerative biomaterials needed to augment the defect-specific volume.



**1 Start with ReOss®:**  
Registration and ordering



**2 Fill out the order form:**  
Information about the planned surgery



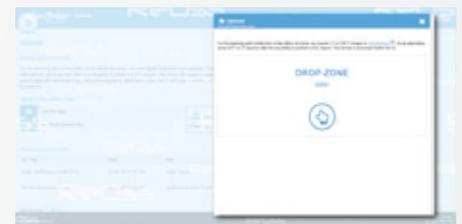
**3 Odontogram:**  
Choose the augmentation area and optionally Yxoss Backward® for guided implant positioning



**4 Order at a fixed price:**  
Immediate offer, no hidden costs



**5 Convenient payment:**  
By credit card or bank transfer

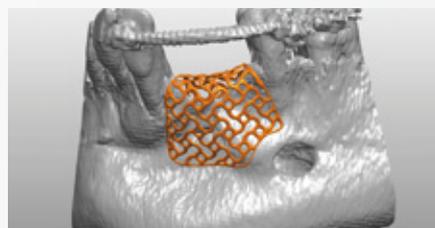


**6 Data Transfer:**  
Easy and safe transmission of 3-D-data (CT/CBCT or DVT) in DICOM format

For questions about the ordering process please contact your local Geistlich representative:  
[www.geistlich-pharma.com/mycontact](http://www.geistlich-pharma.com/mycontact)

For questions about your case planning, 3-D design and your customer account:

ReOss® GmbH  
Talstrasse 23  
D-70794 Filderstadt  
eMail: [contact@reoss.eu](mailto:contact@reoss.eu)  
Tel. +49 711 489 660 60  
Fax: +49 711 489 660 66



**7 3-D display technology:**  
You will receive a 3-D design for evaluation and ordering before the product is manufactured



**8 Easy overview of ordering process and status:**  
Every step during ordering, review of the design, payment, manufacturing and delivery can be monitored

You can find all information on your cases and the respective design and production steps easily and at any time in your personal „MyReOss“ account.

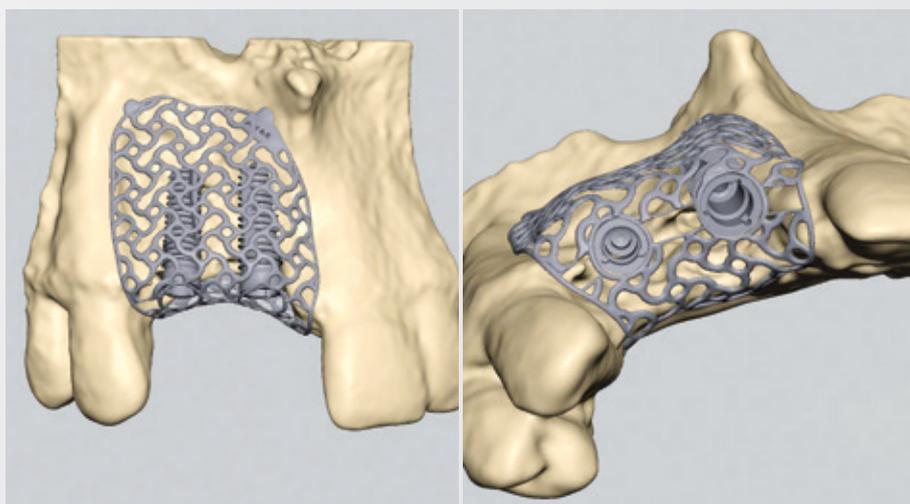
Or simply send your CD-ROM with the DICOM data with CT or CBCT images to ReOss will take care of setting up your personal account and the first data upload.

# Yxoss CBR® Backward

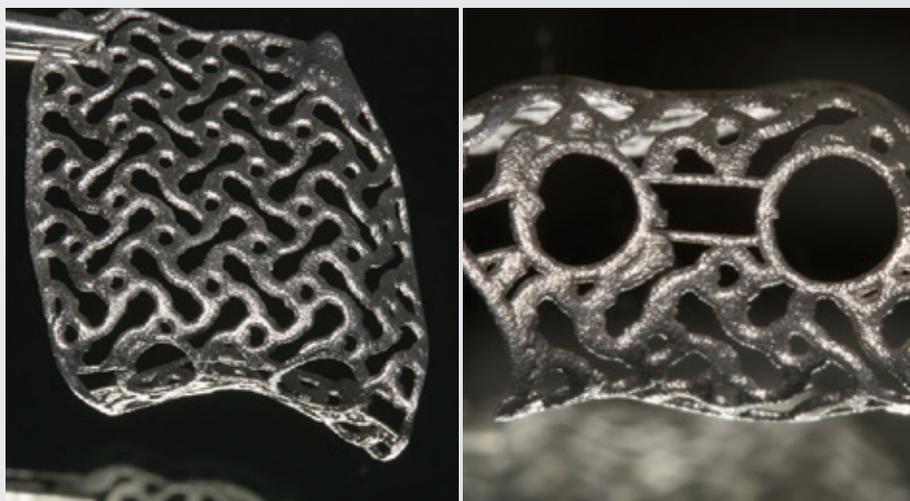
Have you ever customized the regenerative procedure together with a surgery guide for the correct three-dimensional implant positioning? Now, this is possible with Yxoss CBR® Backward.



ReOss® offers the option of integrated implant positioning in the surgical planning. By ordering 3-D designs for Yxoss CBR® you can also order the 3-D implant positioning for using the Yxoss CBR® scaffold as a surgical guide for implant placement.



You will receive the digital 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 Yxoss CBR® scaffold for sterilization and implantation.



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 insertions steps can be performed after the removal of the scaffold.

# Yxoss CBR®

Easy ordering at  
www.reoss.eu

## ReOss® GmbH

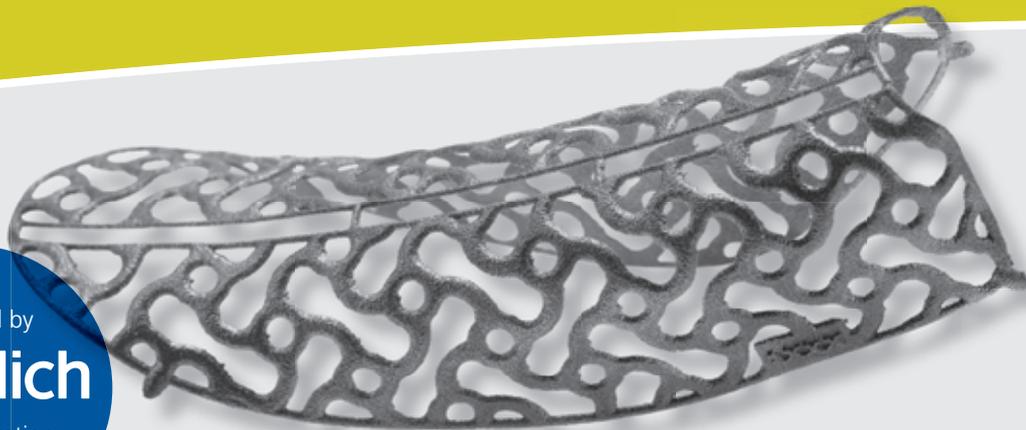
Talstrasse 23 · D-70794 Filderstadt

eMail: contact@reoss.eu

www.reoss.eu

Tel. +49 711 489 660 60

Fax: +49 711 489 660 66



marketed by  
**Geistlich**  
the regeneration  
experts



### Geistlich Bio-Oss®

Stable scaffold for new bone formation, integration into the natural bone remodelling<sup>1,2,3,4</sup> and slow resorption of Geistlich Bio-Oss®<sup>5</sup> – the best prerequisite for a long-term implant survival rate<sup>6</sup>



### Geistlich Bio-Gide®

The carefully preserved native bilayer structure effectively protects the graft from soft tissue ingrowth<sup>7</sup> and mechanical dislocation<sup>8</sup>. It reduces the risk of dehiscence<sup>7,8</sup> – in order to support reliable hard tissue regeneration<sup>9</sup>



## REFERENCES

- 1 Orsini G et al., J Biomed Mater Res, B: Appl Biomater 74B, 2005; 448–57.
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