Oral and Maxillofacial Surgery
Innovative Treatment Concepts
CLINICAL CASES

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9. Prof. Dr. D. Buser et al. – Onlay grafting for horizontal augmentation
10. Prof. Dr. C. Maiorana et al. – Onlay grafting for horizontal augmentation
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Artwork by Bettina Vogelsanger

Please find additional online information here: www.geistlich-pharma.com/oms
The art of major bone augmentation

Meet the challenge with Geistlich biomaterials

STIMULATE NEW BONE FORMATION
Due to its osteoinductive potential, autologous bone is the gold standard for major bone augmentations. It stimulates new bone formation in large-scale defects perfectly. But human bone grafts are subject to a certain amount of resorption, which may affect the long-term clinical success of the therapy.

“Human bone grafts are subject to unwanted resorption. Therefore, we always combine Geistlich biomaterials with autologous bone for larger augmentations.”

PROF. DR. ISTVAN URBAN

PROTECT AGAINST BONE RESORPTION
Geistlich biomaterials complement human bone. Thanks to its high resorption stability and osteoconductivity¹⁸–²⁰, Geistlich Bio-Oss® protects human bone grafts against degradation²¹. Geistlich Bio-Gide® native collagen membrane provides a barrier function long enough to protect the newly forming bone from soft-tissue ingrowth and provides support for wound healing.¹⁴, ²²–²⁴

AUTOLOGOUS BLOCK + GEISTLICH BIO-OSS® + GEISTLICH BIO-GIDE®
93%

AUTOLOGOUS BLOCK + GEISTLICH BIO-OSS®
91%

AUTOLOGOUS BLOCK + BONE CHIPS
82%

Ridge width maintenance

BIOMATERIALS CREATE MORE ROOM FOR SUCCESS

> Less invasive surgery – fewer complications – lower morbidity – higher patient satisfaction

> Less bone resorption – stable clinical outcome

> Predictable bone gain – long-term implant survival

References:
19 Mordenfeld A et al.: Clin Oral Implants Res. 2010 Sep;21(9):961–70. (Clinical study)
Geistlich biomaterials are among the most frequently used and most documented biomaterials in regenerative oral surgery. More than 200 studies on larger bone augmentation have been published with Geistlich biomaterials.

“Geistlich biomaterials have demonstrated their superiority for many years. No other products are as evidence-based.”

PROF. DR. DANIEL BUSER

The expanding number of scientific publications is based on our long-term collaboration with outstanding researchers from more than 100 universities and appropriate treatment concepts are validated by leading clinicians around the world. New products are investigated rigorously before being released to the market and existing products are evaluated with regard to their long-term clinical success. Thus Geistlich biomaterials have earned the trust of clinicians world-wide and have opened the way for more predictable treatment concepts also in complex situations.

References:
26 Data on file, Geistlich Pharma AG, Wolhusen. (Non-Clinical)
34 US market report suite for dental bone graft substitutes and other biomaterials, iDATA USDBGS19_MS, Published in January 2019 by iData Research Inc., 2019. (Market Research)
35 Europe market report suite for dental bone graft substitutes and other biomaterials, iDATA EUDBGS19_MS, Published in July 2019 by iData Research Inc., 2019. (Market Research)
36 Hürzeler M et al., Deutsche Zahnärztliche Zeitschrift. 1996; 51. (Clinical study)
The regenerative capacity of autologous bone combined with Geistlich biomaterials makes all the difference.
Unsurpassed quality standards

Responsibility for every step

A PIONEER IN THE FIELD OF BIOMATERIALS
Geistlich Bio-Oss® and Geistlich Bio-Gide® have been recognized as pioneering products of oral bone regeneration since their development. With the collagen matrices Geistlich Mucograft® and Geistlich Fibro-Gide®, Geistlich Biomaterials has revolutionized the market of soft-tissue regeneration.

“We have a thorough knowledge of our products and take responsibility for every single step by developing them ourselves, testing them ourselves and producing them ourselves.”
DR. TERANCE HART, DIRECTOR RESEARCH, GEISTLICH PHARMA

STRONG COMMITMENT TO SCIENCE
The overall goal of Geistlich Pharma is to give back patients some quality of life. Dr. Peter Geistlich founded the Osteology Foundation and the Osteo Science Foundation to advance global research and clinical practice in oral and maxillofacial tissue regeneration.

Geistlich Pharma also takes its social responsibility seriously. The company supports the humanitarian organisation Doctors of the World in the field of plastic surgery for children with cleft lips and palates.

“The regenerative capacity of autologous bone is unmatched. With our developments, we intend to optimally complement nature.”
DR. MICHAEL BUFLER, DIRECTOR MATERIAL RESEARCH & TECHNOLOGIES

DEVELOPING PRODUCT RESPONSIBILITY

Geistlich Biomaterials has built up in-depth knowledge on the preparation and refinement of bone tissue and collagen over more than 160 years.

The company collaborates with more than 100 universities and private practitioners to develop and clinically test its products.

New products are launched only once the researchers and clinical partners are 100% certain of their quality and clinical performance.

Geistlich Biomaterials manages everything – from the initial idea until it is in your hands – always to the highest Swiss quality standards.

Oral and maxillofacial surgeons worldwide use Geistlich biomaterials in their innovative, well-documented treatment concepts.

References:
39 Data on File. Geistlich Pharma AG, Wolhusen, Switzerland. (Pre-clinical study)
40 China market report suite for dental bone graft substitutes and other biomaterials, iDATA.CHDBGS18_MS, Published in November 2018 by iData Research Inc., 2018. (Market research)
41 Australia market report suite for dental bone graft substitutes and other biomaterials, iDATA.AUDBGS18_MS, Published in November 2018 by iData Research Inc., 2018. (Market research)
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43 South Korea market report suite for dental bone graft substitutes and other biomaterials, iDATA.SKDBGS18_MS, Published in November 2018 by iData Research Inc., 2018. (Market Research)
44 Japan market report suite for dental bone graft substitutes and other biomaterials, iDATA.JPDBGS18_MS, Published in November 2018 by iData Research Inc., 2018. (Market Research)
Block grafting and contour augmentation

Dr. Juan José Aranda | Spain

Clinical challenge:
› Insufficient alveolar ridge width for implant placement
› Autologous bone blocks are subject to resorption

Aim / Approach:
› Autologous bone block grafting and a GBR approach for horizontal augmentation of the alveolar ridge for implant placement
› Reduction of autologous block resorption and complication rate during healing

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Regenerative Geistlich biomaterials: Geistlich Bio-Oss® | Geistlich Bio-Gide®

1 CT-scan images of the posterior atrophied mandible.
2 Intrasurgical view of the recipient area. Note the severe horizontal ridge resorption.
3 The donor site is filled with Geistlich Bio-Oss®. A single flap was elevated to include the receptor and donor areas.
4 The autologous bone block from the symphysis is fixed with one screw in the correct position at the recipient site.

5 Geistlich Bio-Oss® covers the autologous bone block and is used in the adjacent area in order to achieve an accurate contour of the alveolar ridge. Moreover, this avoids potential complications during the healing process and the collapse of the membrane.
6 Two layers of Geistlich Bio-Gide®, fixed with tacks, cover the augmented area. This provides protection against potential soft tissue fenestration and also any resorption of the grafts.
7 Re-entry after 6 months, demonstrating optimal bone regeneration.
8 Panoramic X-ray long-term follow-up 6 years after implant placement showing a stable bony situation.

Conclusion:
Within the available treatment modalities for the regeneration of posterior mandibular areas, grafting autologous bone blocks from the mandibular symphysis for ridge augmentation is a popular procedure, as this surgical technique offers easy access and enough graft material for horizontal augmentation. Geistlich Bio-Oss® and Geistlich Bio-Gide® support the surgeon to obtain optimal results, avoiding potential soft and hard tissue complications during the healing process in both the donor and receptor areas.
Combined block grafting and guided bone regeneration

Prof. Dr. Daniel Buser, Prof. Dr. Thomas von Arx | Switzerland

Clinical challenge:
› Insufficient alveolar ridge width for implant placement
› Autologous bone blocks are subject to resorption

Aim / Approach:
› Autologous bone block grafting and a GBR approach for horizontal augmentation of alveolar ridge for implant placement
› Minimizing autologous bone block resorption and improving predictability

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Regenerative Geistlich biomaterials: Geistlich Bio-Oss® | Geistlich Bio-Gide®

1 Thin ridge situation in the posterior mandible.
2 The autologous bone block from the retromolar area is fixed with a titanium screw.
3 The autologous bone block and the adjacent area is covered with Geistlich Bio-Oss®.
4 A double-layer of the collagen membrane Geistlich Bio-Gide® is applied.
5 Primary wound closure is accomplished with single interrupted sutures.
6 Optimal bony support for implant placement after approx. 6 months.
7 Stable bony situation 18 months postoperatively.
8 Stable peri-implant bone level 11 years postoperatively. The CBCT on the right shows a thick facial bone wall at the distal implant at this time point.

Conclusion:
The technique is appropriate for patients with severe horizontal bone atrophy and provides successful ridge augmentation with high predictability. Covering the autologous block graft with Geistlich Bio-Oss® and Geistlich Bio-Gide® significantly reduces autologous bone block resorption. The resorbable membrane, Geistlich Bio-Gide® is easy to handle and simplifies the surgical method. The stability of the membrane can be further improved using the double-layer technique.
Contouring of autologous bone blocks

Prof. Dr. Carlo Maiorana, Dr. Mario Beretta | Italy

**Clinical challenge:**
- Atrophied alveolar ridge has insufficient width for implant placement
- Autologous bone blocks are subject to resorption

**Aim / Approach:**
- Autologous bone block grafting and contouring with Geistlich Bio-Oss® for horizontal augmentation of the alveolar ridge for implant placement
- Reduction of autologous bone block resorption

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**Regenerative Geistlich biomaterials:** Geistlich Bio-Oss®, Geistlich Bio-Gide®

**Conclusion:**
Stable horizontal alveolar ridge augmentation can be achieved in partially edentulous areas by contouring the autologous bone block with Geistlich Bio-Oss®, thus compensating for the process of autologous bone resorption that inevitably occurs. Coverage of the site with Geistlich Bio-Gide® further contributes to uneventful healing and reduction of graft resorption. This approach aids to obtain predictable and successful long-term result.
Horizontal augmentation using Geistlich Bio-Gide® and particulate bone graft

**Clinical challenge:**
› Insufficient alveolar ridge width for implant placement
› Donor site morbidity after autologous bone block harvesting and resorption of autologous bone

**Aim / Approach:**
› Horizontal alveolar ridge augmentation with Geistlich Bio-Oss® and Geistlich Bio-Gide®
› Minimizing autologous bone harvesting and resorption protection

**Defect** | **Region** | **Autologous bone** | **Additional means**
---|---|---|---
● horizontal | ● anterior | ● maxilla | ● particulate | ● tenting screws
○ vertical | ○ posterior | ○ mandible | ○ block

**Regenerative Geistlich biomaterials:** Geistlich Bio-Oss® | Geistlich Bio-Gide®

1 **3D reconstruction from CBCT images showing horizontal maxillary atrophy at the two-teeth-gap.**
2 **Intraoperative view of the atrophied anterior maxillary site.** Tenting screws are placed to support the collagen membrane.
3 **Application of a mixture (1:1) of autologous bone chips from the retromolar area and Geistlich Bio-Oss®.**
4 **Coverage with a double layer of collagen membrane Geistlich Bio-Gide®.**

5 **Tension-free, primary wound closure by mattress and single interrupted sutures.**
6 **Situation at re-opening after 6 months showing vital bone and reconstructed ridge contour.**
7 **Guided implant placement in regenerated bone with stent (additional implant placement at position 22).**
8 **Final prosthetic restoration.**

**Conclusion:**
Using this approach, horizontal ridge augmentation can be achieved with just particulate bone (Geistlich Bio-Oss® and autologous bone chips) and Geistlich Bio-Gide® in combination with supporting tenting screws. This procedure avoids harvesting of an autologous bone block and the related morbidity of the donor site. Moreover, Geistlich Bio-Oss® counteracts resorption and the collagen membrane not only stabilizes the graft, but also minimizes the risk of soft tissue dehiscences.
Crest splitting

Dr. Gerhard Ighaut | Germany

Clinical challenge:
› Insufficient alveolar ridge width for implant placement
› Autologous bone is subject to resorption and may lead to loss of volume

Aim / Approach:
› Crest splitting procedure in combination with Geistlich Bio-Oss® and Geistlich Bio-Gide® for horizontal augmentation
› Preservation of the alveolar ridge volume

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Regenerative Geistlich biomaterials: Geistlich Bio-Oss® | Geistlich Bio-Gide®

Conclusion:
The crest splitting technique allows the placement of implants in anatomic situations with insufficient ridge thickness, by moving the external cortical plate in a buccal direction. This technique allows immediate implant placement, despite the need for considerable ridge augmentation. The gap resulting from crest splitting is filled with autologous particulate bone and Geistlich Bio-Oss®, which allows predictable bone volume preservation. Due to the good adhesion of Geistlich Bio-Gide® to the defect, the particulate bone graft is kept in place during the regeneration process.
**Sausage technique and gain of vestibular depth**

Prof. Dr. Istvan Urban | Hungary / USA

**Clinical challenge:**
- Insufficient alveolar ridge width for implant placement
- Avoiding patient morbidity after harvesting larger quantities of autologous bone
- Insufficient vestibular depth and keratinized tissue after wound closure

**Aim / Approach:**
- Extensive horizontal alveolar ridge augmentation with Geistlich Bio-Oss® and Geistlich Bio-Gide®
- Gain of vestibular depth and keratinized tissue by use of Geistlich Mucograft®

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**Regenerative Geistlich biomaterials:** Geistlich Bio-Oss® | Geistlich Bio-Gide® | Geistlich Mucograft®

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1. Preoperative view of the atrophied ridge.
2. Application of a mixture (1:1) of autologous bone and Geistlich Bio-Oss®.
3. Geistlich Bio-Gide® is tightly fixed and pinned, thus immobilizing the particulate graft. The sausage-like augmentation allows extended horizontal augmentation.
4. Primary wound closure is obtained with a combination of mattress and single interrupted sutures.
5. Sufficient amount of augmented bone for implant placement 8 months after augmentation. Implants are placed in a submerged procedure.
6. Insufficient vestibular depth and keratinized tissue after alveolar ridge augmentation.
7. Application of a keratinized strip towards the vestibulum and Geistlich Mucograft® over the augmented area where it is left exposed for healing.
8. Situation before reopening for abutment connection after 3 months showing increased vestibular depth and more keratinized tissue.

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**Conclusion:**
The sausage technique combined with the keratinized strip technique is an innovative approach to horizontally augment the alveolar ridge and to compensate for the lack of vestibular depth and keratinized tissue after primary wound closure. This procedure avoids harvesting of an autologous bone block and the related morbidity of the donor site. The technique requires no dimensionally-stable element for bone augmentation and uses the unique property of Geistlich Mucograft®, the surface of which may be left exposed for soft tissue regeneration.
Block grafting and contouring with simultaneous sinus lifting

Prof. Dr. Matteo Chiapasco | Italy

Clinical challenge:
› Insufficient alveolar ridge height and width for implant placement
› Autologous bone is subject to resorption and may lead to loss of volume

Aim / Approach:
› Autologous block transplantation in combination with sinus lift procedures with Geistlich Bio-Oss® and Geistlich Bio-Gide®
› Alveolar ridge volume preservation

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Regenerative Geistlich biomaterials: Geistlich Bio-Oss® | Geistlich Bio-Gide®

1 Preoperative radiograph showing a partially edentulous maxilla on both sides with associated vertical atrophy, more severe on the left side.
2 Sinus grafting with a mixture of Geistlich Bio-Oss® and autologous bone and vertical onlay grafting with an autologous bone block. Coverage of the block graft and in the area of the lateral fenestration with Geistlich Bio-Oss®.
3 The lateral window and the autologous bone block are covered with Geistlich Bio-Gide®.
4 Radiographic control after surgery (sinus grafting with simultaneous implant placement on the right side).
5 Clinical situation after completion of prosthetic restoration (left side).
6 Radiographic control 3 years after surgery.
7 Long-term radiographic control 7 years after surgery shows stable situation of the augmented site.
8 Clinical picture 7 years post surgery showing stable and excellent esthetic outcome.

Conclusion:
An autologous block graft combined with sinus elevation compensates for the severe vertical atrophy. Using a mixture of autologous bone and Geistlich Bio-Oss® counteracts bone resorption and preserves the augmented volume in the long-term. The collagen membrane Geistlich Bio-Gide® is placed over the entire augmented site to protect it and to favor an optimal esthetic outcome.
Vertical augmentation with form-stable membrane and particulate bone graft

Clinical challenge:
› Insufficient alveolar ridge height for implant placement
› Loss of augmented ridge volume and patient morbidity after using large amounts of autologous bone

Aim / Approach:
› Vertical ridge augmentation by use of a form-stable titanium-reinforced barrier membrane
› Alveolar ridge volume preservation using a mixture of Geistlich Bio-Oss® and autologous particulate bone

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Regenerative Geistlich biomaterials: Geistlich Bio-Oss®

Conclusion:
Successful vertical ridge augmentation can be achieved in the lower jaw by applying a mixture of particulate autologous bone and Geistlich Bio-Oss® covered by a form-stable barrier membrane. Geistlich Bio-Oss® only undergoes minimal resorption which is advantageous for the long-term stability of regenerated bone while reducing the amount of autologous bone harvesting necessary. Covering the non-resorbable Ti-reinforced barrier membrane with a Geistlich Bio-Gide® may reduce the risk of complications.
Fence technique for 3-dimensional alveolar ridge augmentation

Dr. Mauro Merli | Italy

Clinical challenge:
› Severely atrophied alveolar ridge with insufficient bone volume for implant placement
› High complication rates and patient discomfort associated with large augmentations when using autologous bone grafts

Aim / Approach:
› 3-dimensional augmentation of alveolar ridge by the fence technique for implant placement
› At the same time reducing complication rates and patient discomfort

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Regenerative Geistlich biomaterials: Geistlich Bio-Oss® | Geistlich Bio-Gide®

Conclusion:
The innovative fence technique is relatively simple and can provide excellent results. The osteosynthesis plate, as a rigid element, stabilizes the collagen membrane and keeps the space for the particulate grafting material. The use of Geistlich Bio-Oss® reduces the amount of required autologous bone, the extent of resorption, and patient morbidity. In addition, the collagen membrane Geistlich Bio-Gide® allows vascularization of the graft and minimizes postoperative complications.
Interpositional grafting with Geistlich Bio-Oss® Block

Dr. Pietro Felice, Prof. Dr. Luigi Checchi, Prof. Dr. Claudio Marchetti | Italy

Clinical challenge:
› Insufficient alveolar ridge height for implant placement and proximity to the alveolar nerve
› Autologous bone harvesting is associated with patient discomfort

Aim / Approach:
› Interpositional grafting with Geistlich Bio-Oss® Block for vertical augmentation
› Alveolar ridge volume preservation and minimizing patient morbidity

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Regenerative Geistlich biomaterials: Geistlich Bio-Oss® Block | Geistlich Bio-Gide®

1 Exposure of the alveolar ridge and buccal bone.
2 Horizontal and vertical osteotomies of the distracted segment.
3 The upward lift of the transported segment, achieving a height gain of 7 mm.
4 Geistlich Bio-Oss® Block is trimmed in a dry state with a piezo surgical device to the required dimension and shaped to completely fit into the recipient site.
5 The coronally shifted segment is fixed with miniplates and miniscrews and thus immobilizes also the biomaterial block.
6 A resorbable bilayer collagen membrane Geistlich Bio-Gide® is used to cover the grafted area.
7 Intra-operative situation following implants insertion 4 months after interpositional grafting.
8 Periapical X-ray evaluation immediately after implant insertion.

Conclusion:
The sandwich osteotomy procedure (interpositional grafting) in the posterior mandible yields an optimal vertical gain and provides an adequate amount of bone for implant placement in patients with a minimum of 5 mm of bone above the mandibular canal. Using Geistlich Bio-Oss® Block for interposition avoids a second intervention for harvesting an autologous bone block. Thus, the surgery is simplified and reduces patient discomfort. Geistlich Bio-Gide® enhances wound healing and reduces the risk of complications.
Clinical challenge:
› Functional and esthetic impairments
› Insufficient amount of bone for implant placement due to extreme mandibular and maxillary ridge atrophy
› Harvesting of large amount of autologous bone increases the risk of patient morbidity

Aim / Approach:
› Extensive horizontal and vertical ridge augmentation by interpositional bone grafting after maxillary and mandibular osteotomies
› Use of Geistlich Bio-Oss® to reduce the amount of autologous bone harvesting and the associated donor site morbidity
› Application of Geistlich Bio-Gide® for graft containment and minimizing complication during wound healing

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Regenerative Geistlich biomaterials: Geistlich Bio-Oss® | Geistlich Bio-Gide®

Conclusion:
Interpositional bone graft procedures after maxillary and mandibular osteotomies provide several advantages to edentulous patients with severe bone loss: (i) sagittal and vertical movement of the ridges with compensation of the bone loss, (ii) conservation of the attached mucosal tissues on top of the ridge, (iii) less resorption than with onlay grafts, (iv) good wound healing of the bony defect. The use of Geistlich biomaterials contributes to reduced patient morbidity, uneventful healing, and stable bone augmentation over the long-term.
Interpositional grafting in Le Fort I osteotomies using Geistlich Bio-Oss® Collagen

PD Dr. Dr. Dennis Rohner | Switzerland

Clinical challenge:
› Skeletal prognathism with malocclusion
› Maxillary advancement with risk of insufficient bony union and relapse of the advanced segment

Aim / Approach:
› Correction of skeletal discrepancy performing Le Fort I osteotomy
› Osteoplasty within maxillary gaps using Geistlich Bio-Oss® Collagen for interpositional grafting

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Regenerative Geistlich biomaterials: Geistlich Bio-Oss® Collagen

Conclusion:
Successful outcome and long-term stability in orthognathic surgery is dependent on sufficient bony union of the segments after maxillary or mandibular osteotomies. Interpositional grafts are often mandatory. Due to its properties, Geistlich Bio-Oss® Collagen is easy to place and handle within the gap and supports bony union. This application might help to reduce relapse rates in extended maxillary advancements and thus contribute to a stable functional outcome.
Solving Complexity is Your Art
**Recommended indication-specific material combinations**

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<td>regeneration</td>
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### **GEISTLICH BIO-ÖSS®**

- **Geistlich Bio-Oss®**
  - Granules 0.25–1 mm
  - 0.5 g – 1.0 cm³
  - [Image](image1)
  - [Image](image2)
  - [Image](image3)

- **Geistlich Bio-Oss®**
  - Granules 0.25–1 mm
  - 2.0 g – 4.0 cm³
  - [Image](image4)
  - [Image](image5)
  - [Image](image6)

- **Geistlich Bio-Oss®**
  - Granules 1–2 mm
  - 0.5 g–1.5 cm³/2.0 g–6.0 cm³
  - [Image](image7)
  - [Image](image8)
  - [Image](image9)

- **Geistlich Bio-Oss Pen®**
  - Granules 0.25–1 mm
  - 0.5 g – 1.0 cm³
  - [Image](image10)
  - [Image](image11)

- **Geistlich Bio-Oss® Block**
  - Spongious Block
  - 1×1×2 cm (~2 cm³)
  - [Image](image12)

- **Geistlich Bio-Oss® Collagen**
  - 250 mg – 0.4–0.6 cm³
  - 500 mg – 0.9–1.1 cm³
  - [Image](image13)

### **GEISTLICH BIO-GIDE®**

- **Geistlich Bio-Gide®**
  - 25 × 25 mm
  - [Image](image14)
  - [Image](image15)
  - [Image](image16)
  - [Image](image17)
  - [Image](image18)

- **Geistlich Bio-Gide®**
  - 30 × 40 mm
  - [Image](image19)
  - [Image](image20)
  - [Image](image21)
  - [Image](image22)

### **GEISTLICH MUCOGRAFT®**

- **Geistlich Mucograft®**
  - 15 × 20 mm
  - [Image](image23)
  - [Image](image24)
  - [Image](image25)

  - 20 × 30 mm
  - [Image](image26)
### Geistlich Bio-Oss®

**Small granules (0.25–1 mm) | Quantities: 0.25 g, 0.5 g, 1.0 g, 2.0 g**

The small Geistlich Bio-Oss® particles allow close contact with the surrounding bone wall. They are recommended for smaller 1–2 socket defects and for contouring autologous block grafts.

### Geistlich Bio-Oss®

**Large granules (1–2 mm) | Quantities: 0.5 g, 1.0 g, 2.0 g**

The large Geistlich Bio-Oss® granules have more space between the particles than the small granules. Particularly in large defects, this enables improved regeneration over large distances and provides enough space for the ingrowing bone.

### Geistlich Bio-Oss Pen®

**Small granules (0.25–1 mm) | Quantities: 0.25 g = 0.5 cm³, 0.5 g = 1.0 cm³**

**Large granules (1–2 mm) Quantities: 0.5 g = 1.5 cm³**

Geistlich Bio-Oss® granules are available in an applicator. It allows the bone substitute material to be applied faster and more precisely to the surgical site. The Geistlich Bio-Oss Pen® is available containing both the small granules and the large granules.

### Geistlich Bio-Oss® Collagen

Geistlich Bio-Oss® (small granules) + 10 % collagen (porcine)

Sizes: 50 mg (2.5 x 5.0 x 7.5 mm), 100 mg (5.0 x 5.0 x 7.0 mm), 250 mg (7.0 x 7.0 x 7.0 mm), 500 mg (10.0 x 10.0 x 7.0 mm)

Geistlich Bio-Oss® Collagen is indicated for use in periodontal defects and extraction sockets. The 250 mg and 500 mg quantities are suitable for the treatment of larger size defects. Through the addition of collagen, Geistlich Bio-Oss® Collagen can be tailored to the morphology of the defect and is particularly easy to apply.
**Geistlich Bio-Oss® Block**

Spongious bone block substitute | Size: 1 × 1 × 2 cm

Geistlich Bio-Oss® Block is a spongious bone block with essentially the same material properties as Geistlich Bio-Oss® granules. Due to its brittle properties it is recommended to use the block only for interpositional grafting of the alveolar ridge.

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**Geistlich Bio-Gide®**

Bilayer collagen membrane | Sizes: 25 × 25 mm, 30 × 40 mm

Geistlich Bio-Gide® 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.

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**Geistlich Combi-Kit Collagen**

Geistlich Bio-Oss® Collagen 100 mg + Geistlich Bio-Gide® 16 × 22 mm

When used in combination, the system has optimized properties for ridge preservation and minor augmentation according to the GBR principle.

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**Geistlich Mucograft®**

Collagen matrix | Size: 15 × 20 mm, 20 × 30 mm

Geistlich Mucograft® is a collagen matrix designed specifically for soft-tissue regeneration in the oral cavity. It is indicated for gaining keratinised tissue and for recession coverage. Geistlich Mucograft® provides an alternative to autologous soft-tissue grafts.

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*Product availability may vary from country to country*
More details about our distribution partners:
www.geistlich-biomaterials.com

Manufacturer
Geistlich Pharma AG
Business Unit Biomaterials
Bahnhofstrasse 40
6110 Wolhusen, Switzerland
Phone +41 41 492 55 55
Fax +41 41 492 56 39
www.geistlich-biomaterials.com

Affiliate Australia and New Zealand
Geistlich Pharma Australia Pty Ltd.
The Zenith – Tower A
Level 21, Suite 21.01
821 Pacific Highway
NSW 2067 Chatswood, Australia
Phone +61 1800 776 326
Fax +61 1800 709 698
info@geistlich.com.au
www.geistlich.com.au

Affiliate Great Britain and Ireland
Geistlich Sons Limited
1st Floor, Thorley House
Bailey Lane
Manchester Airport
Manchester M90 4AB, Great Britain
Phone +44 161 490 2038
Fax +44 161 498 6988
info@geistlich.co.uk
www.geistlich.co.uk

Affiliate North America
Geistlich Pharma North America Inc.
202 Carnegie Center
Princeton, NJ 08540 USA
Phone +1 855 799 3500
info@geistlich-na.com
www.geistlich-na.com

Distribution Canada
HANSAmed Ltd.
2830 Argentia Road
Unit 5–8
L5N 8G4 Mississauga, Canada
Phone +1 800 363 2876
Fax +1 800 863 3213
orders@hansamed.net
www.hansamed.net

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