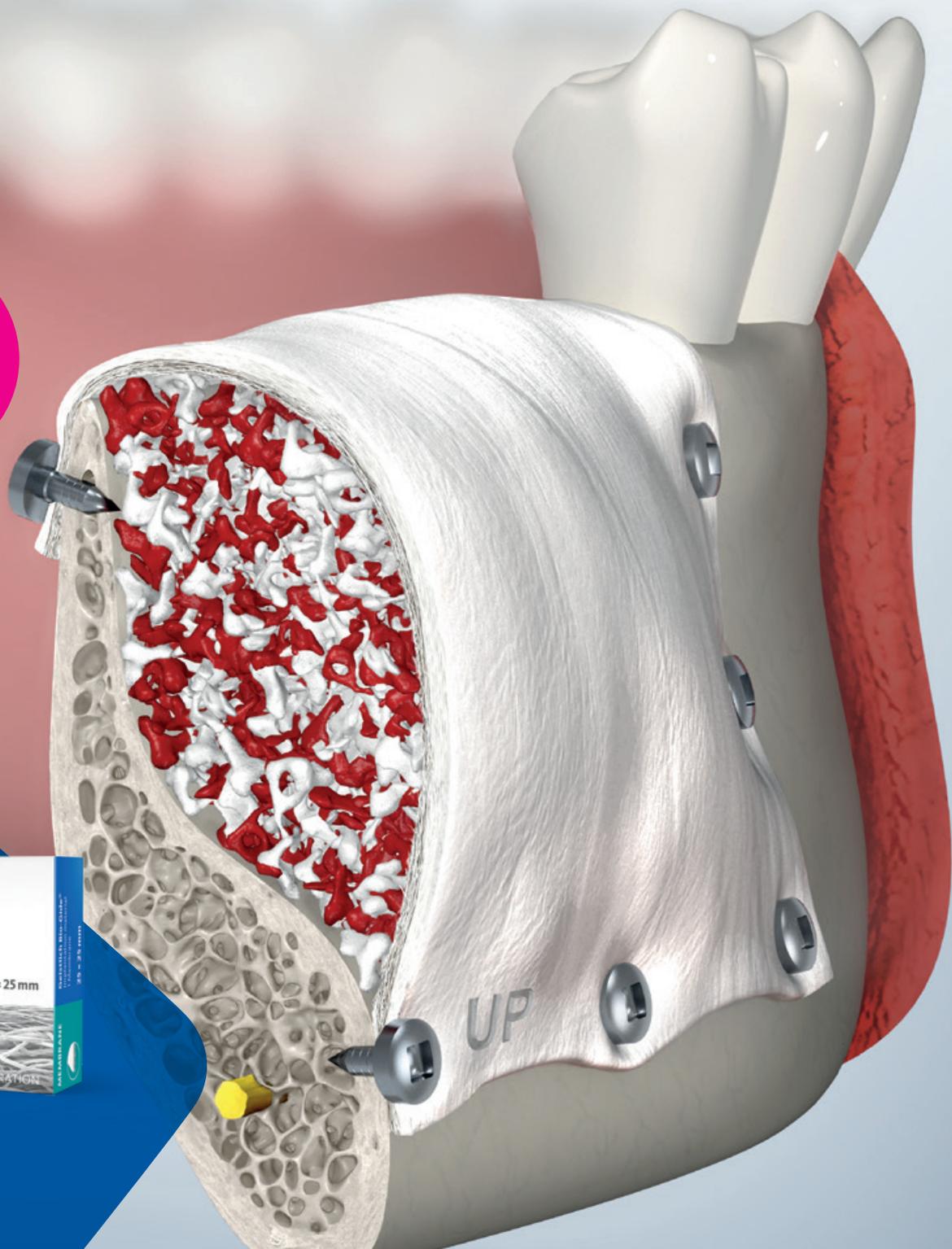


LEADING REGENERATION

Geistlich  
Biomaterials

# Geistlich Bio-Gide® in the Sausage Technique™

Easy to pin –  
if you  
choose to!





**Prof. Francis Hughes,**  
London (United Kingdom)

## Not all membranes are the same: take a closer look

**Prof Hughes and co-workers investigated the interaction of collagen membranes with bone forming cells.**

### **Can you give us a little bit background on your current role and research interests?**

Our current work is about the control of bone forming cells; both what makes them make bone but particularly how the soft-tissues interact with the hard-tissue to prevent the formation.

### **What did the data show?**

Osteopontin was particularly interesting. The actual data showing the up-regulation of osteopontin on the Geistlich Bio-Gide® membrane is very impressive.

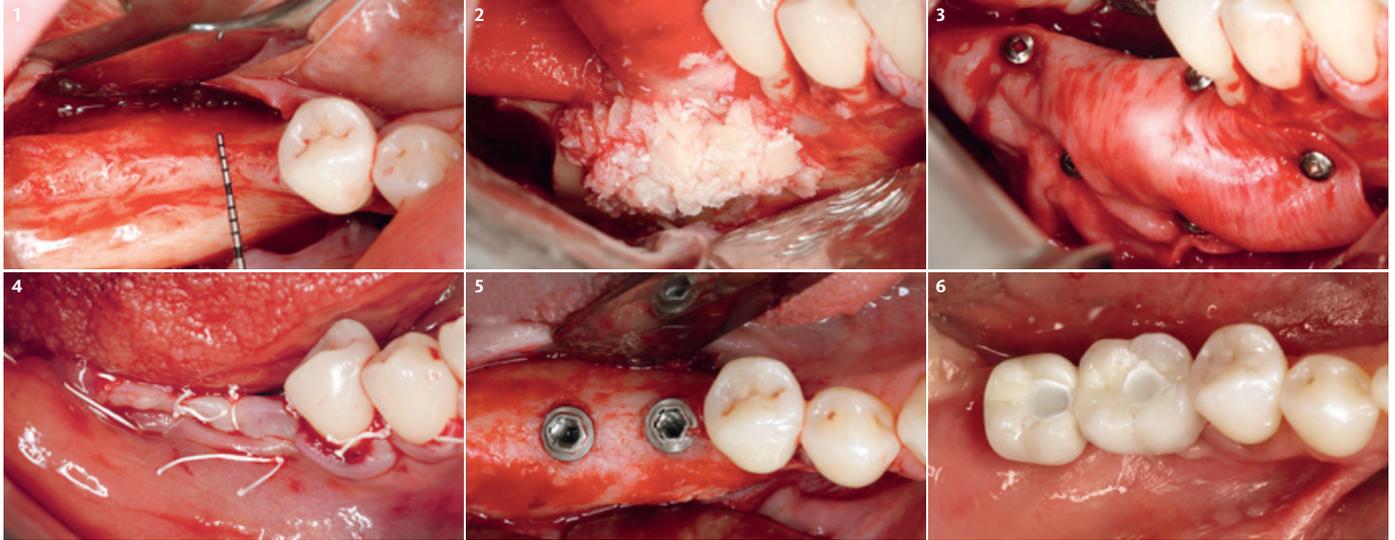


View online:  
Complete lecture on **“NEW APPROACHES IN BONE AND TISSUE REGENERATION”**  
by Prof. Francis Hughes

# Your surgical expertise



Clinical case by Prof. Istvan Urban | Budapest (Hungary)



**1** Occlusal view of severely atrophied posterior mandibular ridge. Full thickness flap is opened using a mid-crestal incision plus two divergent vertical incisions.

**2** Buccal view after application of 1:1 mixture of autogenous particulated bone and Geistlich Bio-Oss® granules. The Geistlich Bio-Gide® membrane is secured on the crest before the application of the graft.

**3** Buccal view of a single Geistlich Bio-Gide® membrane, which is fixed with titanium pins. The fixed membrane immobilizes the bone graft creating the sausage skin effect.

**4** A periosteal releasing incision connects the two vertical incisions achieving enough flap elasticity. The flap is then sutured in two layers using horizontal mattress sutures and single interrupted sutures.

**5** Occlusal view of the regenerated ridge at re-entry after 7 months. Two implants were placed with good primary stability. Note the excellent incorporation of the Geistlich Bio-Oss® with the autograft.

**6** Final outcome 2 years after implant loading.  
Ask your local Geistlich contact person for the detailed Indication Sheet.

Please note: The use of pins is part of the displayed surgical technique. In the great majority of surgical procedures fixing Geistlich Bio-Gide® with pins is not needed. Pins used: Meisinger

## Key to success – Our expert membrane

Combining winning factors available is the key to success. Your surgical expertise is supported by the material excellence provided by Geistlich Bio-Gide®:

The carefully preserved native bilayer structure of Geistlich Bio-Gide® supports reliable bone regeneration.<sup>1</sup> Due to its good adhesive properties Geistlich Bio-Gide® does not need additional fixing in most applications.<sup>2</sup>

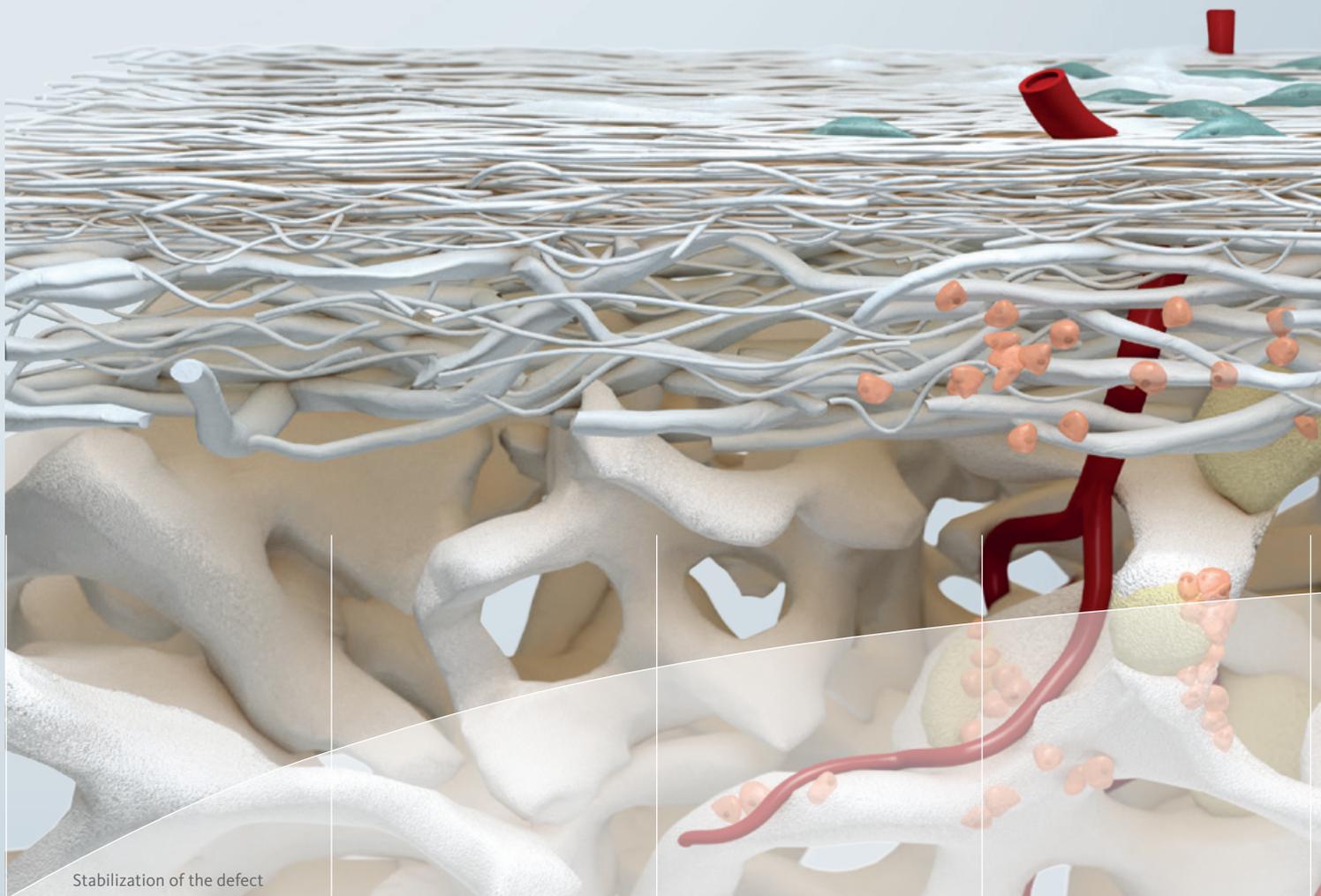
Its flexibility enables the surgeon to create a mechanically stable augmentation area.<sup>3</sup> The good liquid uptake of Geistlich Bio-Gide® ensures that growth factors and nutrients from the blood are taken up.<sup>4</sup> The membrane effectively protects the graft by protects the grafted area from both, ingrowth of soft-tissue<sup>5</sup> and mechanical dislocation.<sup>6</sup> Geistlich Bio-Gide®'s outstanding biofunctionality<sup>7,8</sup> ensures high therapy safety even in case of dehiscence.<sup>5,9</sup>

Native bilayer structure <sup>11</sup>	non-native		native
Suture pull-out <sup>2</sup>	10N*		10N*
Elongation <sup>2</sup>	0%		60%
Liquid uptake <sup>4</sup>	0 wet(mg)/dry(mg)		7 wet(mg)/dry(mg)
Fibroblast proliferation <sup>12</sup>	0 cells/mm <sup>2</sup>		70 cells/mm <sup>2</sup>
Osteoblast proliferation <sup>12</sup>	0 cells/mm <sup>2</sup>		100 cells/mm <sup>2</sup>

\* In vitro tests in pig mucosa document a mean breaking force of 10N.<sup>16</sup>

Level of achievement of Geistlich Bio-Gide®  
||| difference to given max

# Handing over to nature



Stabilization of the defect

## 0 days

### Grafting – strong foundation

The bony defect is grafted with Geistlich Bio-Oss® and covered with Geistlich Bio-Gide®. Bleeding ends and hemostasis is initiated.

The unique bilayer structure of Geistlich Bio-Gide® comprises a smooth and a rough, open-pored layer. Due to its porous structure and high hydrophilicity Geistlich Bio-Gide® takes up the blood quickly including growth factors and nutrients.<sup>4</sup>

## 1 day

### Coagulum – first stabilization

Via coagulation the blood clots. A fibrin network forms within 24 hours to stop blood from running. It is essential that the coagulum remains stable.<sup>13</sup> This enables the structure of the regenerating tissue to adapt to the surrounding tissue.

Geistlich Bio-Gide® stabilizes the grafted area, protecting bone particles from dislocation.<sup>6</sup> At the same time Geistlich Bio-Gide® separates soft- and hard-tissue.<sup>5</sup> Geistlich Bio-Gide® protects the blood clot.<sup>13</sup>

## 2–7 days

### Proliferation – re-integration

Early proliferative phase is characterized by the formation of blood vessels to ensure oxygen supply. During approximately seven days the coagulum is replaced by granulation tissue.<sup>14</sup> Epithelial proliferation begins from the margins of the wound. Granulation and connective tissue are present after 7 days<sup>14</sup> and the formation of osteoid matrix is underway.

New blood vessel formation occurs not only adjacent to the bone defect but also directly underneath Geistlich Bio-Gide® due to its early and complete vascularization.<sup>13</sup>

## 1–2 weeks

### Remodelling – active osteoblasts

Remodeling phase starts after 1–2 weeks centripetal from the residual walls along the vascular structures.<sup>14</sup> Osteoblasts continue to deposit osteoid matrix and start mineralization.

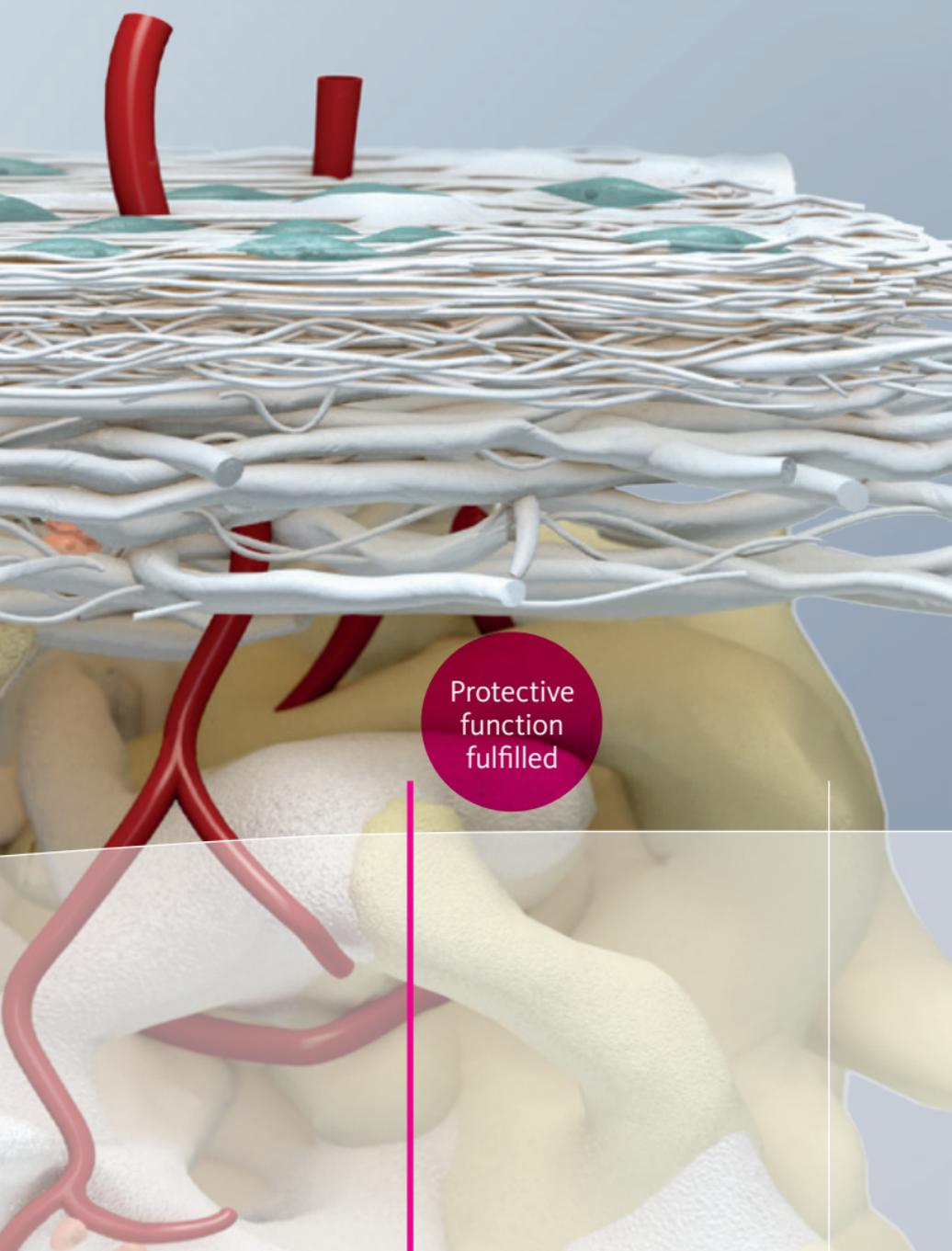
The rough membrane layer, facing the bony part of the defect, enables osteoblast growth.<sup>12</sup>



Gain a more detailed insight into guided bone regeneration in the movie

“Cell to cell communication: Guided Bone Regeneration”

<https://www.youtube.com/watch?v=kTmP6hFOBuU>



Protective  
function  
fulfilled

#### 4–12 weeks

##### **Corticalization – stable scaffold**

Bone formed from woven fibres occupies almost the whole defect volume prior to corticalization. After 2–3 months the tissue has been gradually replaced by lamellar bone and bone marrow.<sup>14</sup> The structure is fairly stable although the bone is not yet mature.

The protective function of the Geistlich Bio-Gide® membrane is fulfilled. It assisted the natural healing process long enough: The regenerating areas are pre-determined for their desired function and will develop accordingly.

#### Until 6 months

##### **Maturation – final stability**

Maturation of the bony trabeculae continues until they are adapted to the structure of the surrounding tissue.<sup>14</sup> Additionally the new bone as well as residual graft particles are subjected to continuous remodeling processes.

##### **Temporary barrier instead of unnecessary blockade**

Once the protective function of Geistlich Bio-Gide® has been fulfilled the membrane resorbs. The natural complex structures of the soft-tissue, with all the intrinsic components such as the periosteum are formed.<sup>15</sup>



More details about our distribution partners:  
www.geistlich-biomaterials.com

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

**Affiliate Australia and New Zealand**  
Geistlich Pharma Australia and New Zealand  
The Zenith – Tower A,  
Level 19, Suite 19.01  
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 toll-free +1 855 799 5500  
info@geistlich-na.com  
www.geistlich-na.com

**Distribution Canada**  
HANSamed Ltd.  
2830 Argentinia Road  
Unit 5-8  
L5N 8G4 Mississauga, Canada  
Phone +1 800 363 2876  
Fax +1 800 863 3213  
orders@hansamed.net  
www.hansamed.net

## Geistlich Bio-Oss®

Small granules (0.25–1 mm) | Quantities:  
0.25 g, 0.5 g, 1.0 g, 2.0 g (1 g ~ 2.05 cm<sup>3</sup>)

Large granules (1–2 mm) | Quantities:  
0.5 g, 1.0 g, 2.0 g (1 g ~ 3.13 cm<sup>3</sup>)



## Geistlich Bio-Gide®

Sizes: 25 × 25 mm, 30 × 40 mm



## Geistlich Bio-Gide® Compressed

Sizes: 13 × 25 mm, 20 × 30 mm



## Geistlich Bio-Gide® Shape

Size: 14 × 24 mm



## Geistlich Bio-Gide® Perio

Size: 16 × 22 mm



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