Geistlich
Surgery

Orthoss®

The Surgeon's Choice for Bone Regeneration

swiss made

Orthoss® has a unique pore structure very similar to human bone, which provides the ideal conditions for bone regeneration.

The success of any regenerative orthopedic surgery depends largely on the quality and characteristics of the bone substitute used.

For human bone to regenerate successfully, the bone substitute material should provide several conditions:

- A stable scaffold
- Rapid uptake of fluids
- A network of interconnected pores
- Suitable space for colonization.

Backed by nearly 25 years of clinical experience, Orthoss® offers the osteoconductive properties of human bone but is readily available for off-the-shelf use in convenient granule or block formats in a variety of sizes.[1, 2]

Orthoss® is used as an alternative to autologous bone in filling smaller bone voids. For the treatment of large defects, Orthoss® is well suited as a volume extender for composite bone grafting using either 25% autologous bone or bone marrow aspirate.[3, 4]

To see how Orthoss® provides all the conditions for successful bone regeneration, turn the page.

About Geistlich Surgery

Geistlich Surgery produces innovative bio-derived matrix products for bone and cartilage, including Orthoss®, Orthoss® Collagen, and Chondro-Gide®. Our products leverage the body's own healing potential to regenerate bone and cartilage. Our focus is on helping people maintain and regain their quality of life.

Geistlich Surgery is a business unit of Geistlich Pharma AG, which is headquartered in Switzerland.

Entirely family owned since 1851, the company develops, produces, and markets medical devices for regenerative medicine and pharmaceuticals.

Orthoss® granules

Orthoss® Block

Ask your Orthoss® representative for more information on choosing the best delivery format for your needs.

As Close to Human Bone as Possible

Orthoss® is a bio-derived bone substitute made from highly purified bovine bone mineral. It is produced in Switzerland, following a rigorous quality assurance system to ensure its safety and quality.

This illustration shows how Orthoss® works to leverage the body's own natural healing potential to regenerate human bone.

To learn more about Orthoss® and bone regeneration, visit **www.geistlich-surgery.com.**

1. Similarity to Bone

Orthoss® is very similar to human bone. Like human bone, it is highly porous and has a unique pore structure consisting of both nanopores and macropores.

2. Nanopores

The presence and interconnectivity of a large number of nanopores (10-20 nm) causes the high capillarity of Orthoss® and contributes to its high wettability.[3] Embedded in the walls of the macropores, they enable Orthoss® to spontaneously take up and retain a large volume of blood and other fluids.

3. Macropores

Macropores (100-300 µm) enable the movement and adhesion of bone-building cells throughout the Orthoss® scaffolding. They provide the space for blood vessels to grow into and for communities of cells to grow.[3]

4. Interconnectivity

Orthoss® provides a network of interconnected pores, which act as conduits for all the necessary elements for bone regrowth, such as blood.[3] This network enables the rapid absorption of blood, promotes revitalization through new blood vessels, and enables the guided growth of new bone.

5. Colonization

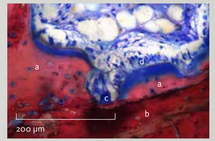
Immediately after the surgery, cells enter the interconnected network of pores, where they can attach, proliferate, and differentiate.[6]

6. Integration

After surgery, Orthoss® behaves very similarly to human bone as it becomes incorporated into the surrounding bone.[7] Its exceptional osseointegration is due to its unique bimodal pore structure of nano- and macropores, which promotes healing by fostering the formation of new blood vessels and new bone tissue.

7. Remodelling

In the following months and years, the balance between the rate of resorption of the bone graft material and the rate of bone tissue formation is key.[8] Orthoss® resorbs slowly, providing a stable scaffolding that preserves the volume of the repaired area while the new bone tissue grows. The Orthoss® scaffolding stays in place until the new bone is ready to take its place. The outcome is a long-lasting repair that remains stable and strong over the long term.



New bone formation and remodeling with Orthoss®.

a) New bone
b) Orthoss®
c) Osteoclast
d) Osteoblasts

All Bone Substitutes are Not Equal

To repair bone defects, human bone grafts are still widely considered the gold standard. But with both autografts and allografts, there are several known risks and disadvantages. These include the risk of disease transmission, donor site pain, and the limited availability or quality of material.[9,10]

To ensure the quality and safety of a procedure, a bone substitute may be preferable.

The table below compares Orthoss® with the other main types of bone substitutes currently used.

	Nanopores and Capillarity	Macropore Interconnectivity and Surface Area	Penetration of New Bone throughout Scaffold
Orthoss®	Capillarity similar to human bone.	Interconnectivity and surface area similar to human bone.	Complete penetration due to interconnectivity and volume-preserving scaffold.
Partially Purified Natural Bone	Partially blocked by organic material.	Pores partially blocked by organic material. Considerably smaller surface area (50x smaller) compared to human bone.	Limited due to organic residues in structure.
Sintered Natural Bone	No nanopores.	Pores partially blocked by sintering process. >100x smaller surface area in comparison to human bone.	Almost absent due to low interconnectivity.
Synthetic β-TCP	No nanopores.	Low interconnectivity and 50x smaller surface area compared to human bone.	Limited due to low interconnectivity. Rapid dissolution of scaffold.
Synthetic Hydroxyapatite	No nanopores.	Almost absent due to low interconnectivity. >100x smaller surface area compared to human bone.	Limited due to low interconnectivity.

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