Hard Tissue regeneration

BIOHORIZONS® biologics

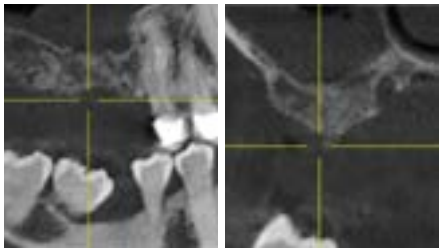
CeraOss® HYA – The innovative 2-in-1 combination of bovine bone and hyaluronic acid

biohorizons camlog

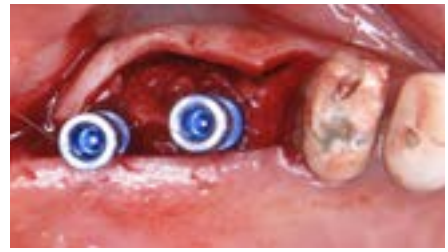
Clinical Cases

Implant placement with simultaneous bone augmentation

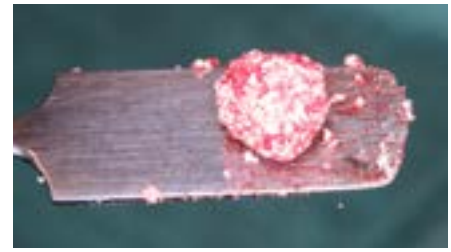
Eleni Kapogianni, Berlin (Germany)



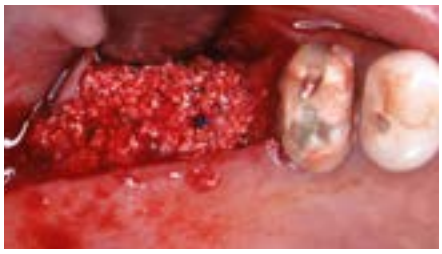
Preoperative situation: Cone beam computed tomography (CBCT) revealed vertical and horizontal bone losses in regions 16 and 17.



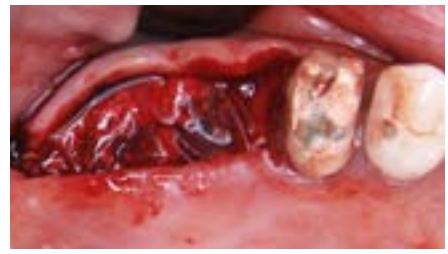
The soft tissue flap was raised and two CONELOG® PROGRESSIVE-LINE implants were placed.



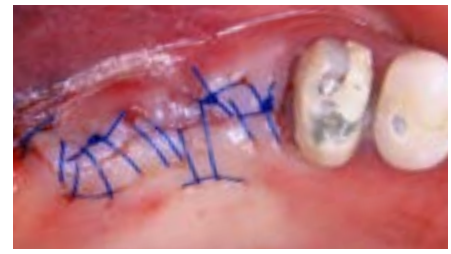
CeraOss HYA was combined with autologous bone chips to form a bone graft with advantageous consistency and sticky texture.



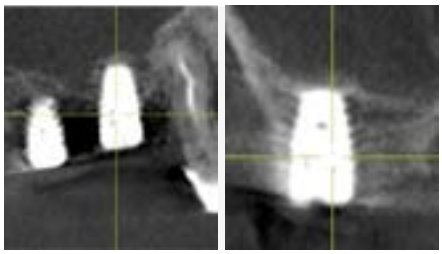
The bone graft was used to fill the volume around the implants for simultaneous guided bone regeneration.



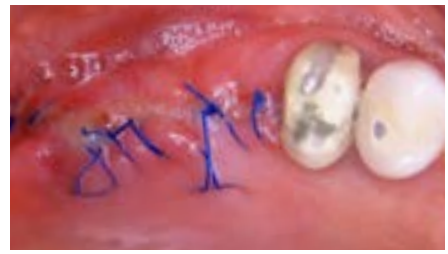
Resorbable collagen membrane (Argonaut™) was applied to stabilize the graft and to prevent the ingrowth of the connective tissue into the defect site.



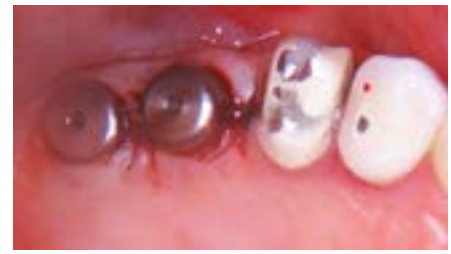
Tension-free wound closure was achieved by horizontal mattress sutures and single button sutures.



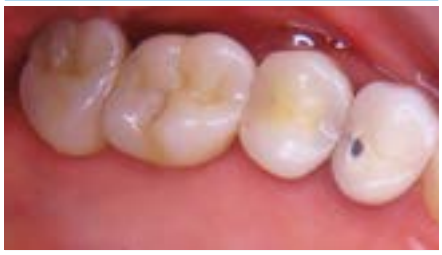
Optimal implant position was confirmed by CBCT control.



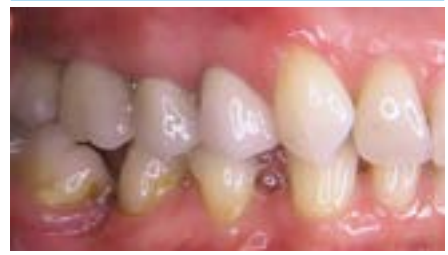
Clinical examination showed complication-free wound healing at one-week post-operation.



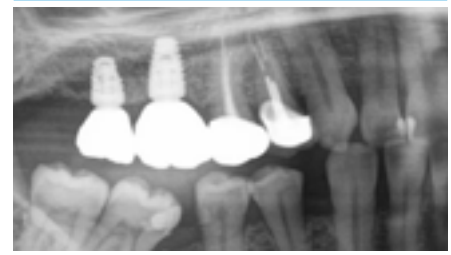
After six months, the implants were exposed to insert the healing abutments.



The final crowns were placed one month later.



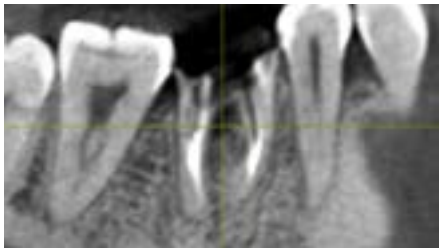
Aesthetic results with healthy soft tissue conditions were achieved.



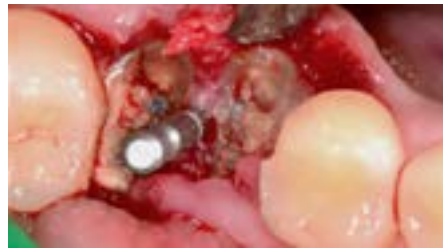
Radiological control showed stable bone levels around the implant shoulders after seven months.

Restoration of peri-implant bone level after tooth extraction

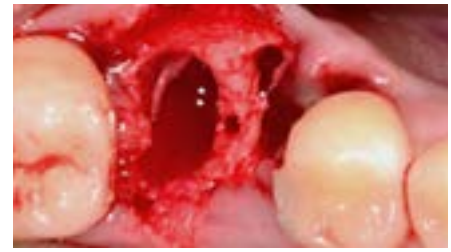
Dr. Rafael Block Veras, Baden-Baden / Bühl (Germany)



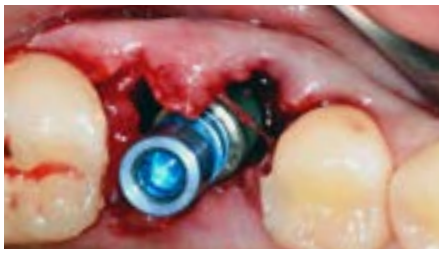
Preoperative situation: Cone beam computed tomography showed lesions and extensive bone resorption around tooth #46.



Tooth extraction was decided due to the progressive furcation defect and the aborted dental crown.

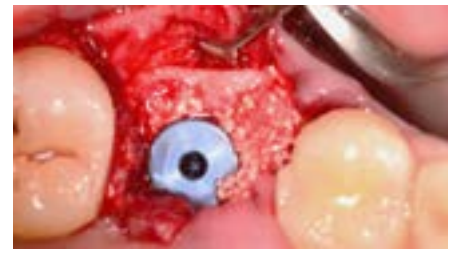


Occlusal view of the bone defect after tooth extraction.

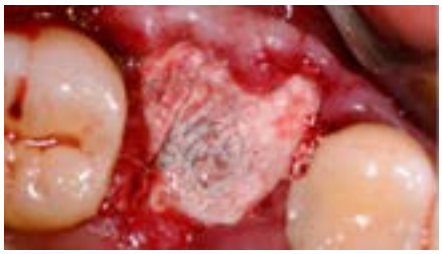


Immediate implant placement was performed upon consultation with the patient.

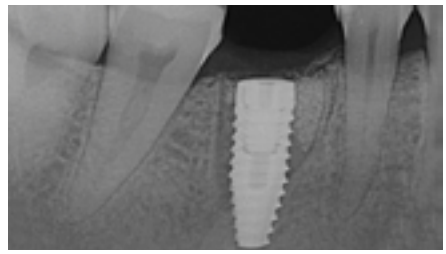
CeraOss HYA was hydrated to form a "sticky bone" with ideal handling properties and was further mixed with autologous bone.



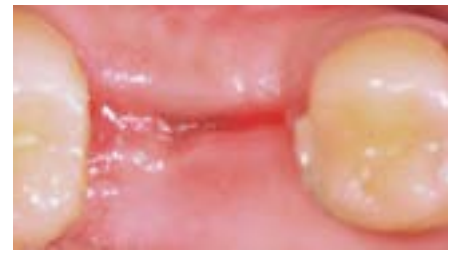
The bone graft was used to fill the void volume around the implant shoulder.



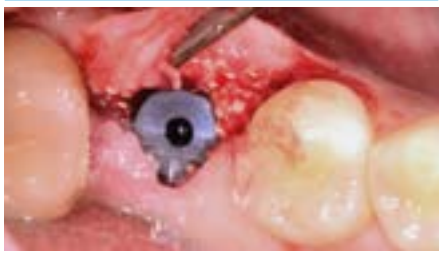
The augmentation site was covered with a resorbable collagen membrane (Argonaut™) to stabilize the graft material and prevent the ingrowth of the connective tissue.



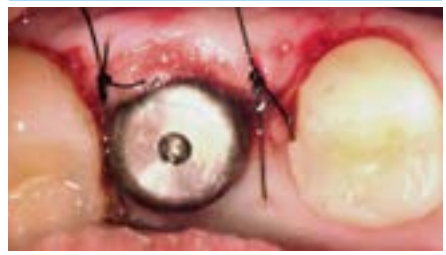
Post-operative radiological inspection confirmed the correct position of the implant.



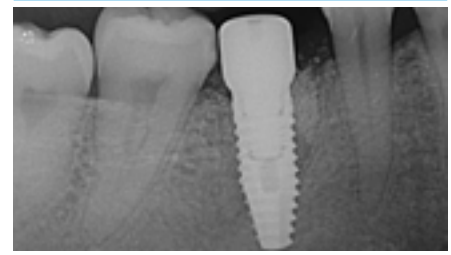
The healing process progressed without complications and healthy soft tissue was observed after four weeks.



The implant was exposed eight weeks post-operation to place the healing abutment. Graft particles were visible since the osseointegration of bovine bone needs about six months to complete.



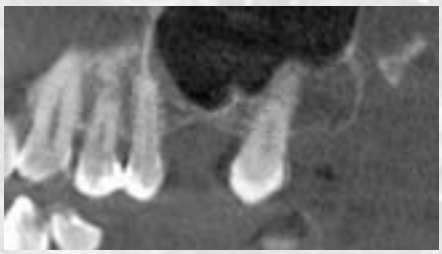
Favorable soft tissue healing was observed one week later.



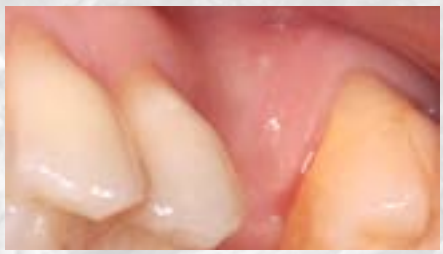
Radiological control showed stable bone conditions around the implant shoulder.

One-stage sinus lift with simultaneous lateral augmentation

Prof. Dr. Dr. Daniel Rothamel, Mönchengladbach (Germany)

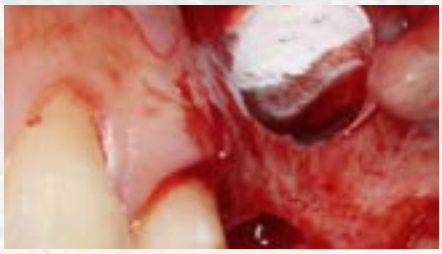


Preoperative situation: Cone beam computed tomography revealed a reduced bone height in the region of the missing tooth #26.



The buccal view of the upper jaw shows the lateral defect in the alveolar process.

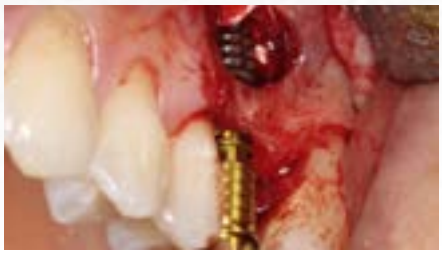
The lateral window approach was applied to access the maxillary sinus.



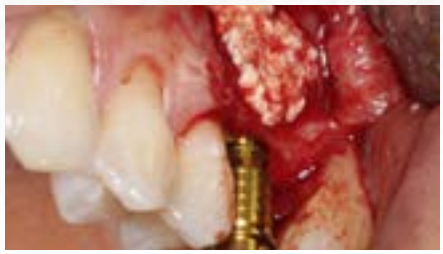
The Schneider membrane was carefully elevated and a collagen membrane (Argonaut™) was placed underneath to prevent its perforation.

Upon addition of a saline solution and mixing, CeraOss HYA forms a sticky bone inside the original blister.

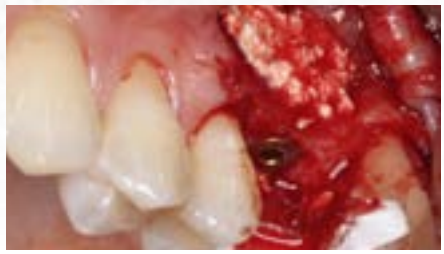
The consistency of the sticky bone facilitates its application and helps accelerate the surgical procedure.



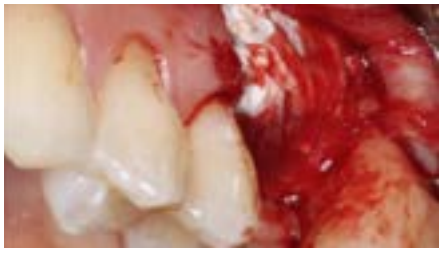
A first layer of the bone substitute material was introduced into the maxillary sinus then the implant (CAMLOG® PROGRESSIVE-LINE) was placed.



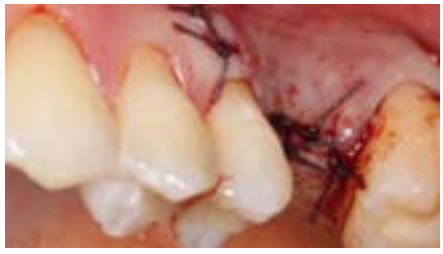
After implant placement, CeraOss HYA was introduced into the sinus cavity via the lateral window. The lateral defect was also augmented with CeraOss HYA.



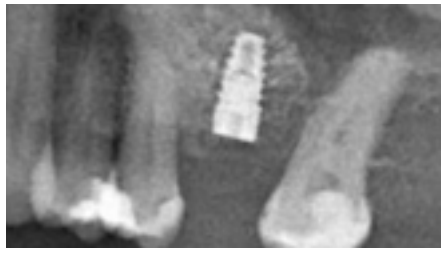
A resorbable collagen membrane (Argonaut) was placed to cover the surgical site.



A view of the clinical situation after covering the surgical site with Argonaut.



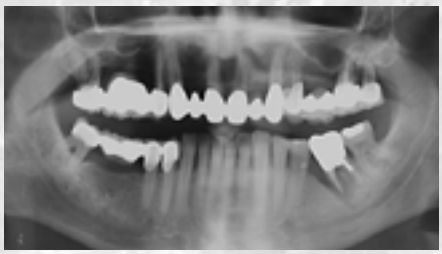
Tension-free primary closure of the periosteal flap was achieved by suturing.



Post-surgery radiographic control confirmed the correct position of the implant.

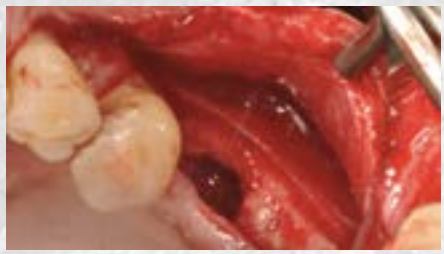
Horizontal and vertical bone augmentation in the posterior mandible

Dr. Marius Steigmann, Neckargemünd (Germany)

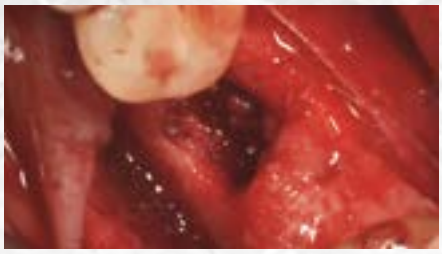


Preoperative situation: Cone beam computed tomography revealed unrestorable tooth #36.

The bone defect resulting from the tooth extraction was first designed as a 3D model.

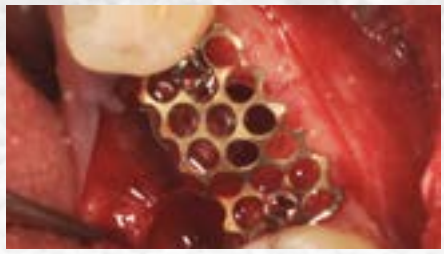


A large bone defect was visualized upon elevation of the periosteal flap.

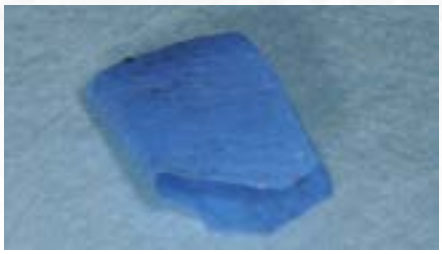


Occlusal view of the bone defect after tooth extraction and periosteal flap elevation.

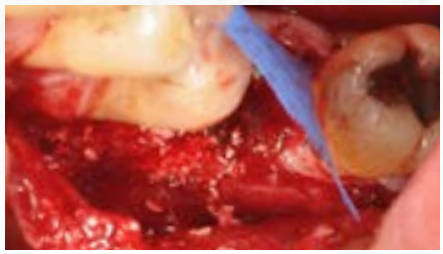
CeraOss HYA was hydrated with saline solution to form the sticky bone.



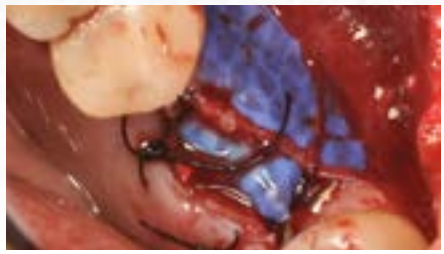
The bone graft was first applied to fill the defect then a titanium mesh was positioned over the augmentation site and fixed with osteosynthesis screws.



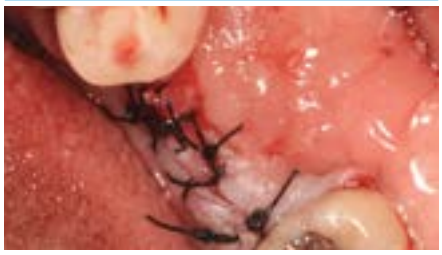
A synthetic and non-resorbable membrane (PermaPro™) was cut to the shape of the defect before application.



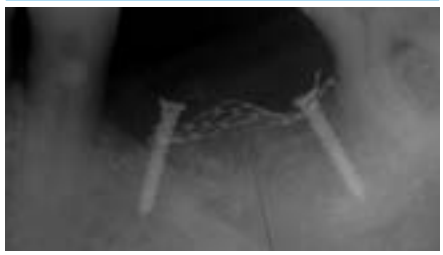
The membrane was first placed in the soft tissue pocket ...



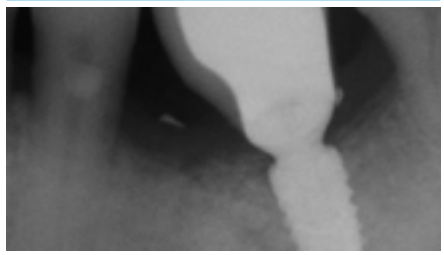
... then passed over the titanium grid and further stabilized by periosteal sutures.



Primary wound closure was achieved by tension-free sutures.



Post-surgery radiographic control showed stable fixation of the augmentation site.



The titanium mesh and the membrane were removed six months later and the implant was inserted. The implant was finally restored after a healing period of an additional six months.

CeraOss HYA – "Sticky Bone" out of the blister

CeraOss HYA is a grafting material that combines the benefits of using natural cancellous bovine bone (CeraOss) with the advantageous liquid binding capabilities of hyaluronic acid. While bone particles provide an osteoconductive scaffold and ensure permanent volume stability, on the other hand, sodium hyaluronate forms a viscous solution after hydration, which leads to the particles being bound into a connected mass with a malleable consistency. This improves handling and facilitates the application of the material to the bone defect. CeraOss HYA therefore provides an ideal synergy between user friendliness and long-term graft stability.

Product features*

- **Simplified grafting procedures**
  Upon hydration with saline solution or blood, CeraOss HYA forms a malleable mixture with a sticky consistency that facilitates the usability of the bone graft and expedites the surgical procedure. [1, 2]

- **Human-like bone structure**
  The bone particles have a porosity of ~65–80% and feature a three-dimensional network of macropores (favoring the ingrowth of blood vessels and bone-forming cells) and micropores (facilitate fluids uptake by the capillary effect). Further, the rough surface of the bone particles facilitates the adhesion of osteoblasts and signaling proteins and contributes to osseous integration of the bone particles. [3, 4]

- **Enhanced angiogenesis**
  Chorioallantoic membrane assay revealed that sodium hyaluronate promotes vascularization of bone grafts *in vivo*. [5]

- **Increased cell activity**
  Improved viability, proliferation, and migratory activity were observed when human osteoblasts were cultured in vitro with CeraOss HYA in comparison to a similar bone substitute material without hyaluronate. [6]

- **Support of bone regeneration**
  Hyaluronic acid supported the formation of mineralized and non-mineralized bone matrix. [8]

- **Permanent volume stability**
  The bone particles only exhibit superficial resorption thus providing permanent structural support that is particularly valuable in the aesthetic region or to preserve the ridge contour. [9, 10] Mixing CeraOss HYA with auto- or allografts prevents accelerated resorption and ensures long term volume stability. [11]

- **Safe**
  Potential infectious agents such as bacteria, viruses and prions are removed from the bovine bone by a process that include a high temperature treatment step (>1200 °C). [12] On the other hand, sodium hyaluronate is produced biotechnologically by fermentation excluding adverse reactions against animal-derived materials.

- **Biocompatible and non-immunogenic**
  In vivo analysis demonstrated that the inflammation and immune response to hyaluronate-containing grafts were comparable at all time points to the control group (a similar bone graft without added hyaluronate). [13]

- **Resorbable biopolymer**
  Sodium hyaluronate resorbs naturally by enzymatic degradation, as confirmed by histological evaluation two weeks post implantation. [13]

- **Efficient in peri-implantitis therapy**
  A randomized controlled clinical study has shown a statistically significant vertical bone gain at the mesial, distal, and oral implant sites when peri-implantitis bone defects were augmented with hyaluronate-containing bone grafts. Improved implant stability, manifested by greater ISQ values, were observed at 3- and 6-months post-operative. [14]

Quick Guide
"Hydration of CeraOss HYA":
www.biohorizonscamlog.com/ceraoss-hya

* Studies conducted using cerabone® and cerabone® plus, botiss bone substitutes that are identical to CeraOss and CeraOss HYA, respectively.

CeraOss HYA – Benefits in bone regeneration

- Stimulates the formation of blood vessels in vivo [5] and improves the biological activity of osteoblasts in vitro. [6, 7]
- Improves bone regeneration. [14]
- Increases implant stability. [14]

Randomized controlled clinical study on peri-implantitis reconstructive surgery

The efficiency of CeraOss HYA in peri-implantitis reconstructive surgery was demonstrated in a randomized controlled clinical trial. At six months post-operative, patients treated with CeraOss HYA showed a significantly higher vertical bone gain at mesial, distal and oral implant sites compared to those treated with CeraOss (*p < 0.05) (Fig. 1). [14]

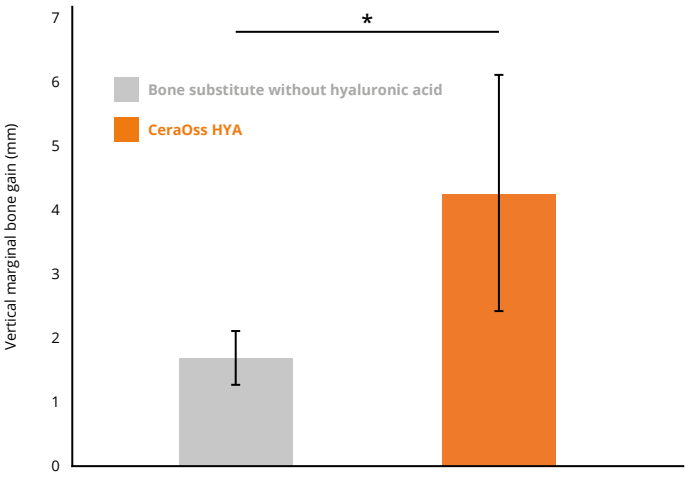


Figure 1: 6-months post-operative vertical bone gain at oral implant sites

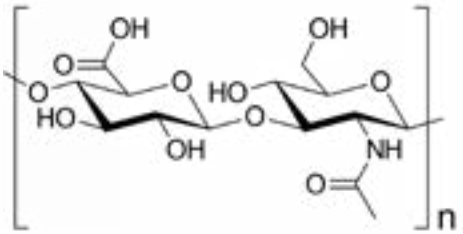
Hyaluronic acid at a glance

Exceptional hydrating properties

Sodium hyaluronate is the conjugate base of hyaluronic acid, an anionic, non-sulfated glycosaminoglycan distributed widely throughout connective and epithelial tissues. Hyaluronic acid is one of the most hygroscopic molecules known in nature and can absorb 1000 times its weight in water. Upon hydration, hydrogen bonding occurs between water molecules and the adjacent carboxyl and N-acetyl groups. In this way, the hyaluronic acid binds the liquid and forms a viscous solution that holds the granules together and enables precise particle application. In the CeraOss HYA formulation, sodium hyaluronate therefore acts as a carrier for bovine particles.

Structural formula of hyaluronic acid

It is a biopolymer composed of repeating units of d-glucuronic acid and N-acetyl-d-glucosamine. The molecular weight of the polymer is dictated by the degree of polymerization (n). High-molecular hyaluronate has a longer degradation time and has an anti-inflammatory effect. [15]



Bacteriostatic effects

The application of hyaluronic acid in the form of membrane, gel, and sponges was shown to reduce bacterial contamination of surgical wounds and attenuate the risk of postsurgical infection yet promoting more predictable regeneration. [16]

Hyaluronic acid in dentistry

Hyaluronic acid is an essential component of the periodontal ligament matrix and influences cell adhesion, migration and differentiation via the binding proteins and cell-surface receptors. Benefits of hyaluronic acid have been reported throughout the healing process of periodontal wounds including inflammation, granulation tissue formation, epithelium formation and tissue remodeling. [17–22] It was also shown that hyaluronic acid induced earlier trabecular bone deposition in tooth sockets and stimulated the expression of osteogenic proteins including bone morphogenetic protein-2 and osteopontin. [23]

Ordering information

Art. No.	Volume	Particle size
BM1015.1005	0.5 cm^3	500–1000 µm
BM1015.1010	1.0 cm^3	500–1000 µm
BM1016.1005	0.5 cm^3	1000–2000 µm
BM1016.1010	1.0 cm^3	1000–2000 µm

Biomaterials are excluded from exchange and return.
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