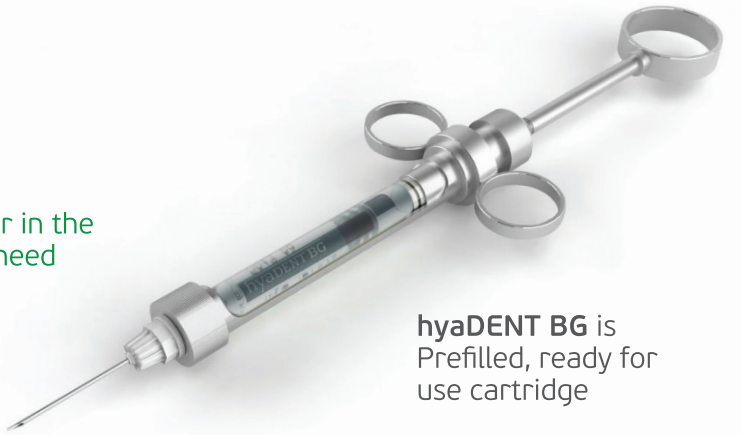
hyaDENT BG

World's
First injectable
HA Dental Treatment

hyaDENT BG can be injected into the gingiva, periodontal pockets, or applied topically

hyaDENT BG

hyaDENT BG is not a dermal filler, nor it holds water in the way dermal fillers do, as in dental applications the need is more than just filling and tissue hydration. The effect of **hyaDENT BG** is on the cellular level; to facilitate tissue healing and regeneration.



hyaDENT BG is Prefilled, ready for use cartridge

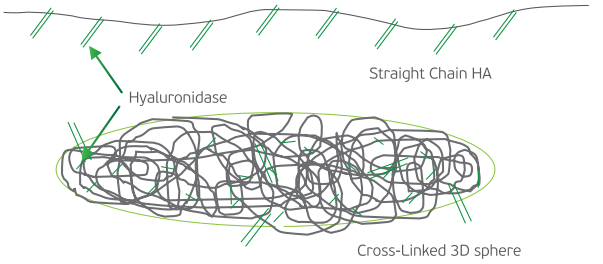
hyaDENT BG is a combination of cross linked and non-cross linked Hyaluronic Acid (HA) from non animal source, chemically altered for dental use. Cross linking means transforming the straight chain molecule to a 3D mesh that gives **hyaDENT BG** its unique properties. Several chemical modifications are made to HA molecules to enhance their physicochemical properties.

The combination of cross-linked and non-modified HA provides immediate and long lasting effects, promoting regeneration and wound healing.

Promoting tissue healing

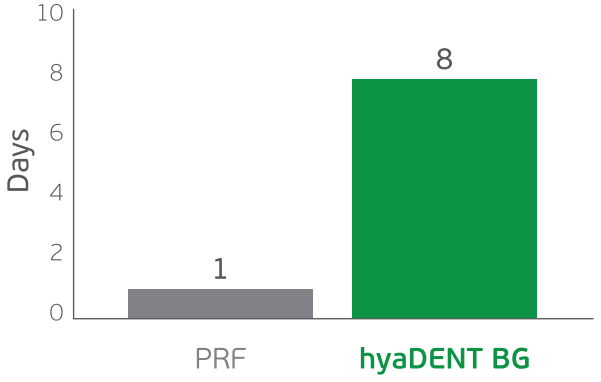
Hyaluronic acid is present in high concentrations during periods of rapid tissue proliferation and regeneration. HA creates an environment that promotes cell proliferation, providing a medium allowing nutrients, cells and small molecules to move but inhibit macromolecules to enter.

Cross-linking of **hyaDENT** BG reduce the effect of hyaluronidase as the 3D matrix protects the HA from degradation. [1]



In adults during the first few days of wound healing, the hyaluronic acid is deposited briefly with fibrin and the platelet plug, providing a provisional cellular matrix for cells, collagen and sulfated glycosaminoglycans deposition and arrangement.[2]

hyaDENT BG is superior to PRF in wound healing

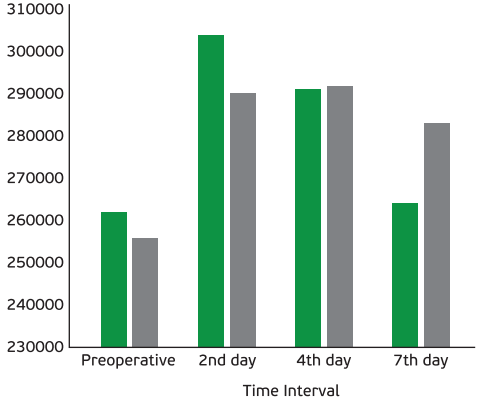


hyaDENT BG stimulatory effect is prolonged over 8 days

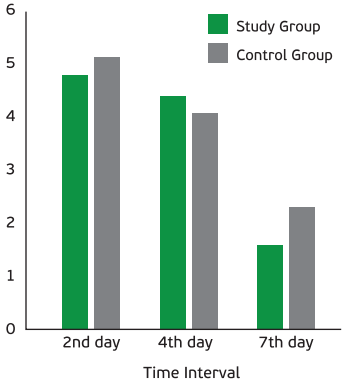
A comparative study between hyaDENT BG & Platelet-Rich Fibrin (PRF) on wound healing. Peck et al. demonstrated in their study that Leukocyte and platelet-rich fibrin (an autologous derived concentrate) has a stimulatory effect that peaks within the first 24h, whereas cross-linked HA (hyaDENT BG, BioScience GmbH, Germany) stimulatory effect is prolonged over 8 days, implying a different, as yet unknown mechanism of action. They concluded that cross-linked HA might be beneficial in the management of wounds that require more prolonged stimulation.[3]

hyaDENT BG statistically significantly reduces swelling, pain, and trismus after surgical procedure.[4]

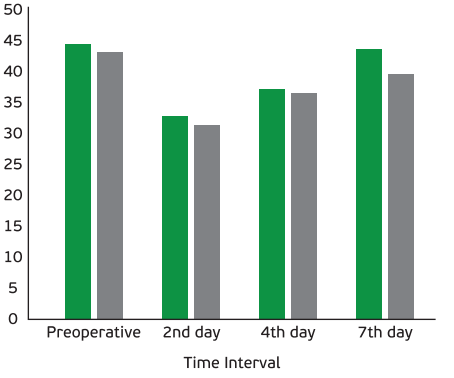
Surface Area of Facial Swelling (mm^2)



Visual Analogue Scale Score

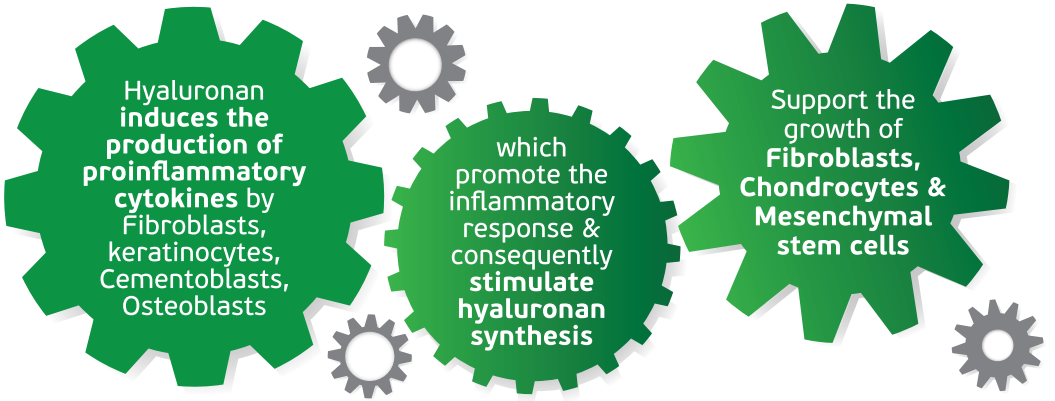


Maximum Mouth Openining (mm)



A study by Mohammed Nadershah et al., a randomized, doubleblind, split mouth designed, conducted at King Abdul Aziz University Dental Hospital (KAUDH) (proposal no. 021-15), demonstrated that the use of cross-linked HA (hyaDENT BG, BioScience GmbH, Germany) after surgical extraction of mandibular third molar has statistically significant reduction in swelling, pain, and trismus on the 7th postoperative day. The study included 14 patients (7 males and 7 females).[4]

HA has unique physiochemical and biological properties, which makes it useful in the treatment of the inflammatory process.



Due to its acceleration in tissue healing properties, it could be used as an adjunct to mechanical therapy.

Several of HA's important physicochemical properties are **molecular weight dependent** and therefore discrete differences in function over the wide range of commercially available molecular weights enables HA to be used in a diverse set of applications. In addition, chemical modification of HA can produce a more mechanically and chemically robust material that still retains its **biocompatibility** and **biodegradability**.[5]

HA has Bacteriostatic effect

Recent studies on regenerative surgical procedures indicate that **reduction of bacterial burden at the wound site may improve the clinical outcome of regenerative therapy.**

The high concentration of medium and lower molecular weight HA has the greatest bacteriostatic effect, particularly on strains, which are commonly found in oral gingival lesions and periodontal wounds:

- ***Aggregatibacter actinomycetemcomitans***
- ***Prevotella oris***
- ***Staphylococcus aureus***

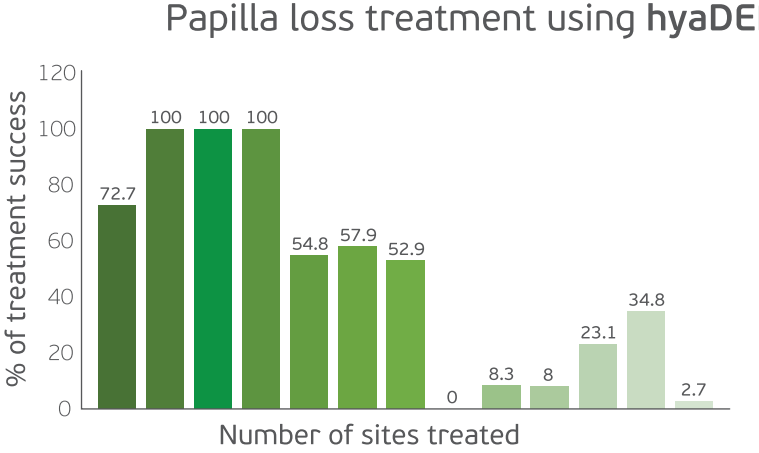
A clinical application of HA membranes, gels, and sponges during the surgical therapy may **reduce the bacterial contamination of surgical wound site, thereby, lessening the risk of postsurgical infection and promoting more predictable regeneration.**[6]

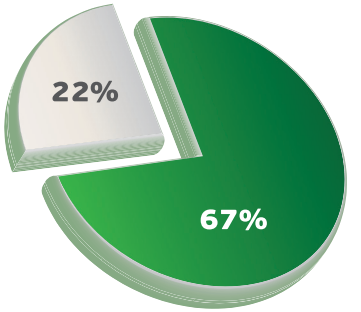
Applications

Interdental Papilla Loss

Interdental papilla: also known as the interdental gingiva, is the part of the gingiva that exists coronal to the free gingival margin and fills the interdental spaces.

Papilla loss treatment using **hyaDENT BG**





67% of patients were very satisfied with their smile after the treatment of the interdental papilla loss, compared to 22% satisfied with their smile prior to treatment.[4]

The interdental papilla as a structure with minor blood supply was left more or less untouched by clinicians. Reconstruction of the lost interdental papilla is one of the most challenging and least predictable problem and hence, it is very important to respect papillary integrity during all dental procedures and to minimize its disappearance as far as possible.[7]

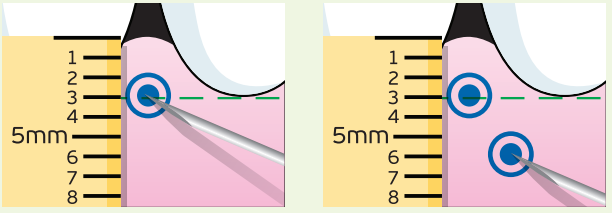
Interdental papilla loss Treatment using **hyaDENT BG**

First step of interdental papilla loss treatment is, identifying and treating the underlying cause, if any, of the interdental papilla loss, which will enhance the outcome of the overall treatment.

The injection of **hyaDENT BG** into the gingiva creates a microenvironment that promotes the formation of new collagen at the site of injection.[8]

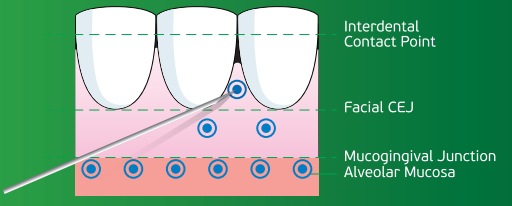
Using **hyaDENT BG** in interdental papilla loss treatment

- Inject multiple (3–4) droplets of **hyaDENT BG** with 27 G needle 3-4 mm bellow the papilla using the three-step technique.
- Gently massage the droplets for 1 min.
- Apply one or more droplets of **hyaDENT BG** topically to the injected area to enhance the healing environment topically.



Three Step Technique (TST)*

Is a unique and reliable reconstruction method for intraoral soft tissue and interdental papillae, depending on the respective tissue status and papilla defect.



*Developed by Dr. Gottfert and colleagues

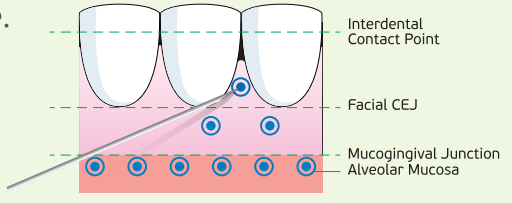
Gingivitis and Periodontitis

Gingivitis is an inflammation of the gums, usually caused by a bacterial infection. If left untreated, it can become a more serious infection known as periodontitis. Periodontitis (together with caries) is one of the major causes of tooth loss in adults.

Gingivitis treatment Using **hyaDENT BG:**

hyaDENT BG muco-adhesive properties provides maximum adhesion to the gingival mucose, allowing the HA to remain in situ for long time.

- After mechanical treatment (scaling, root planning).
- **hyaDENT BG** is injected along the MGJ in droplets, then massaged gently for 1 minute.
- **hyaDENT BG** is spread in a thin layer topically over the gingiva.



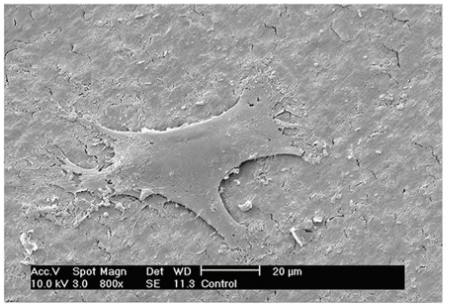
Hyaluronic acid has been identified in all periodontal tissues in varying quantities, being more prominent in the non-mineralized tissues, such as gingiva and periodontal ligament, compared to mineralized tissues, such as the cement and alveolar bone.

hyaDENT BG Promotes Bone and Soft tissue healing and regeneration

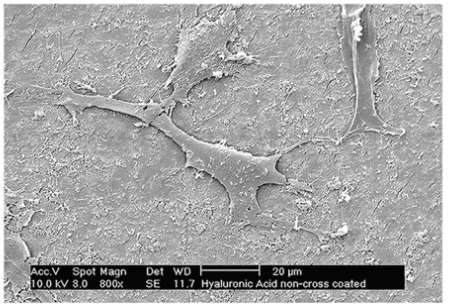
hyaDENT BG provides a choice as a stand alone treatment option or in combination with regular treatments procedures performed at dental clinics for several indication.

HyaDENT BG promotes the regeneration of Periodontal ligament cells by increasing its number and spreading.

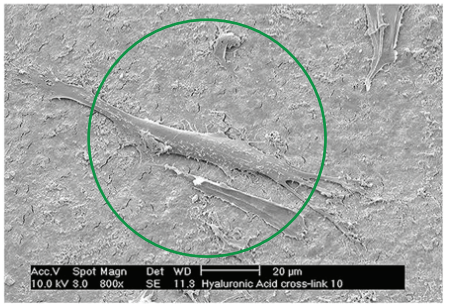
Control



HA



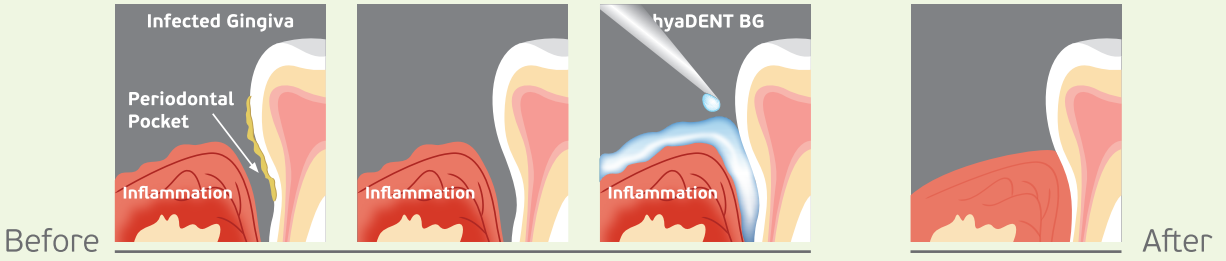
hyaDENT BG



In a study by Miron et al, using 180 bovine roots of freshly extracted teeth and primary human periodontal ligament cells obtained from the middle third portion of 3 teeth extracted from healthy individuals, it was demonstrated that following coating HA (hyaDENT BG, BioScience GmbH, Germany) to dentin surfaces, there were improvements to cell numbers and spreading onto dentin discs (both are necessary events for the successful regeneration of periodontal tissues). Furthermore, using SEM imaging, they demonstrated that primary human periodontal ligament cells seeded on cross-linked HA (hyaDENT BG) were qualitatively more elongated in their morphology when compared to control or cells seeded on non-cross-linked HA.[9]

Non Surgical Periodontal Pockets Treatment Using **hyaDENT BG**

- After mechanical treatment (i.e. scaling, root planning)
- **hyaDENT BG** is applied (poured using blunt needle) to the periodontal pockets and/or around the teeth with periodontitis
- **hyaDENT BG** is injected along the MGJ in droplets, then massaged gently for 1 minute.
- **hyaDENT BG** is spread in a thin layer topically over the gingiva.

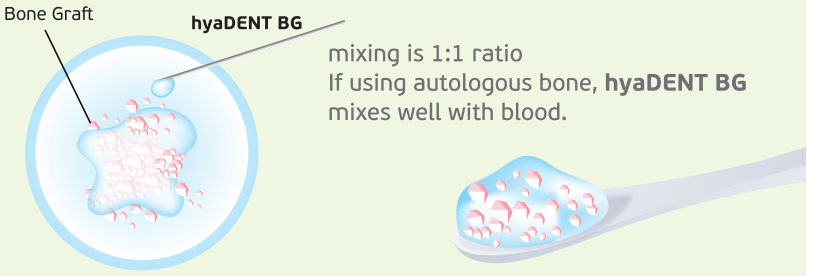


Surgical periodontal treatment using **hyaDENT BG**

In advanced cases of Periodontitis loss of connective tissue and bone support may result in tooth loss in adults. Surgical intervention might be needed.

- Full mouth debridement
- Opening a flap in the gingiva to expose affected teeth
- Adding bone graft to replace lost bone. **hyaDENT BG** is mixed with bone graft to enhance bone graft integration
- **hyaDENT BG** is poured over the bone graft before closing to enhance soft tissue healing
- **hyaDENT BG** is added topically to the sutures to enhance healing gingiva

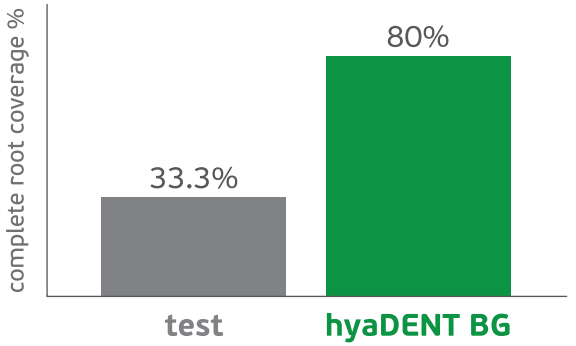
Mixing hyaDENT BG with Bone Graft granuales



mixing is 1:1 ratio
If using autologous bone, **hyaDENT BG** mixes well with blood.

Gingival recession treatment with hyaDENT BG is **3 times better** in root coverage than conventional surgical treatment.

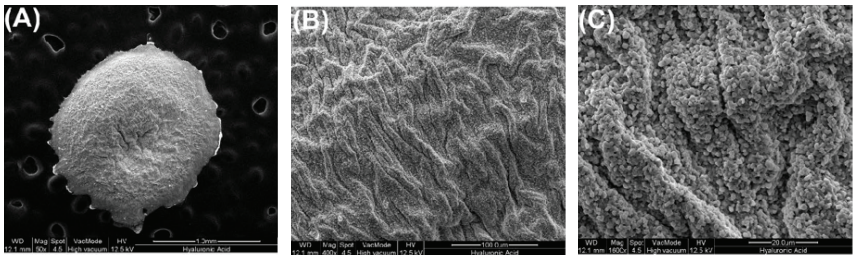
Comparative study on surgical gingival recession treatment using **hyaDENT BG** and regular surgical treatment (18 months)



Pilloni at al. controlled trial evaluated the effectiveness of adjunctive hyaluronic acid (hyaDENT BG, BioScience GmbH, Germany) application in coronally advanced flap in Miller Class I single gingival recession sites. The cross-linked HA represented a highly concentrated hyaluronic acid gel of non-animal origin based mixture of cross-linked HA (16mg/ml) and a natural HA (2mg/ml) and characterized by a slow degradation pattern (several weeks). Fifteen patients were randomly assigned to advance flap procedure with use of HA. After 18 months, the recession reduction was statistically significantly higher in the test group (2.7mm [1.0]) than in the control group (1.9mm [1.0]; p=0.007). complete root coverage was 80% for test and 33.3% for control sites (p<0.05). The test group reported lower swelling and discomfort rates 7-days post-surgery (p<0.05).[10]

hyaDENT BG promotes bone formation

In combination with rhBMP9, **hyaDENT BG** promotes bone formation by acting as a sustained release carrier for 10 days.



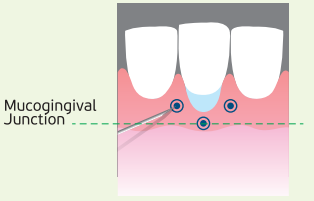
In a study by Miron et al, the HA (hyaDENT BG) has been investigated as a potential carrier for various growth factors for bone tissue engineering, specifically in combination with recombinant human bone morphogenetic protein 9 (rhBMP9). The study demonstrated a specific surface shape and topography of the HA under scanning electron microscopy image (figure 1). It was first found that at early time points, HA maintained a 70% concentration of BMP9 within its scaffold when compared to original loading. The rhBMP9 was then released from 70% to 40% within the first 24h, and thereafter was slowly released up to a 10-day period. At 10 days, HA contained roughly 35% of the initial content of rhBMP9, demonstrating its ability to hold and slowly release this growth factor over time in a controlled manner. [11]

Non surgical treatment of Gingival Recession using **hyaDENT BG**

First step of gingival recession treatment is treating the underlying cause of recession, if any, which will enhance the outcome of the overall treatment.

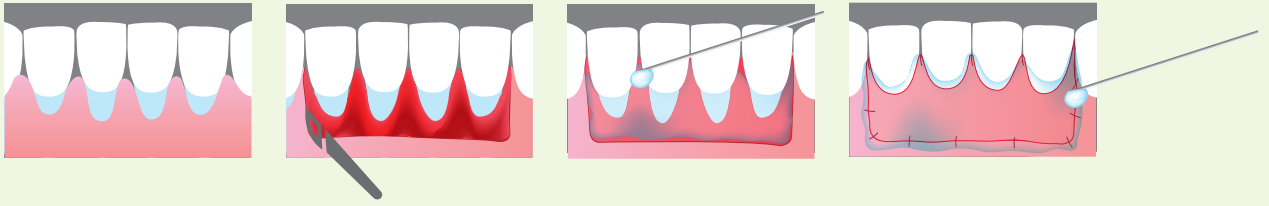
Using **hyaDENT BG** in mild recession without bone loss

- Inject a droplets of **hyaDENT BG** 3 – 4 mm parallel to the receded gingiva line.
- Gently massage the droplets for 1 min.
- Apply one or more droplets of **hyaDENT BG** topically to the injected area to enhance the healing environment topically as well.



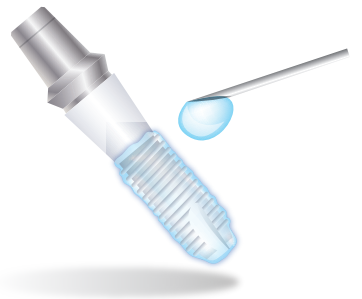
Surgical gingival recession treatment using **hyaDENT BG**

- A flap is made to the gingiva and/or a connective tissue graft is place on the receded gingiva. **hyaDENT BG** is poured under the flap and/or graft.
- Gently massage the flap to ensure spread inside gingiva.
- Apply one or more droplets of **hyaDENT BG** topically over the sutures to enhance the healing environment topically as well.



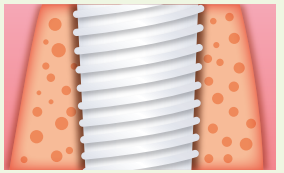
Dental Implant Osseointegration

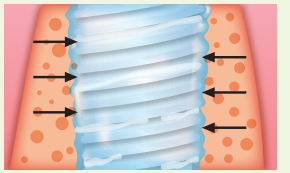
hyaDENT BG Promotes osseointegration of dental implants to alveolar bone AND of the bone grafting material



Osseointegration using **hyaDENT BG**

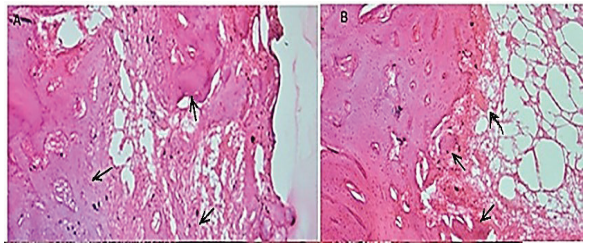
Before the implant is placed into bone, the implant is covered with a layer of **hyaDENT BG** and screwed into bone.

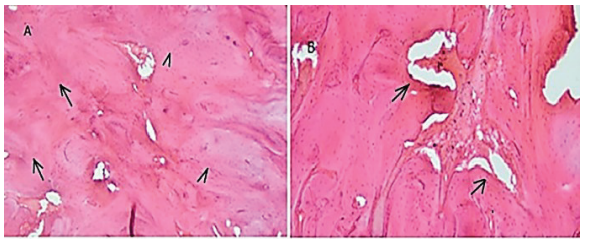


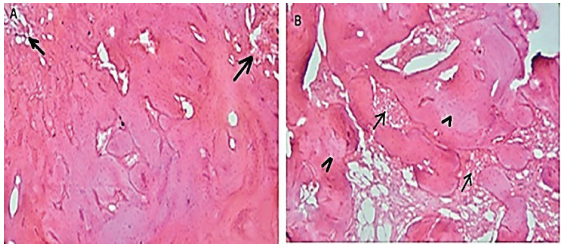


HyaDENT Promotes bone augmentation around implants

HA accelerates the onset of new bone formation when combined with BCP for bone augmentation in the treatment of osseous defects



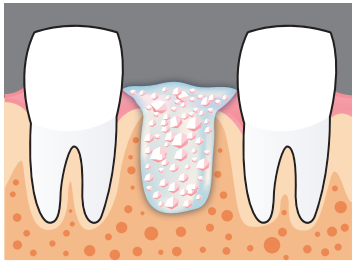




The study by Shamma et al. as a histological evaluation of using HA (hyaDENT, BioScience GmbH, Germany) with biphasic calcium phosphate (BCP) on bone healing around dental implants, using 9 mongrel dogs, concluded that the HA accelerates the onset of new bone formation when combined with BCP for bone augmentation in the treatment of osseous defects.[5]

Socket Preservation

Socket preservation and alveolar ridge preservation (ARP) are procedures to reduce bone loss after tooth extraction. This will facilitate the future implant placement and help preserve both alveolar bone and soft tissues.



hyaDENT BG

- Promotes the formation and stabilization of the blood clot
- Promotes osseointegration of the bone grafting material
- Preserves the adjacent soft tissues

Site preservation ultimately provides stability of the hard and soft tissues at the level of the marginal gingiva post extraction by preventing soft tissue collapse. Support of the labial plate through the initial healing of the extraction socket also maintains the osseous ridge contour thereby simplifying subsequent implant placement.[12]

Sinus Lift (Sinus Augmentation)

Sinus augmentation is a common procedure to increase bone volume and allow for proper implant placement in the atrophic posterior maxilla.

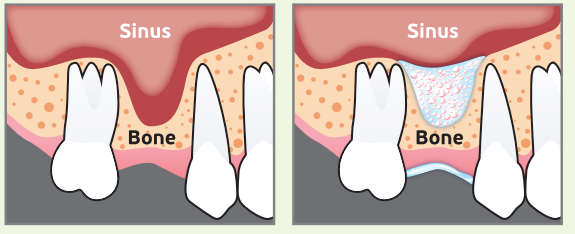
hyaDENT BG

- Promotes osseointegration of bone grafting material
- Provides better handling of bone graft, and prevent migration

Treatment using **hyaDENT BG** (Socket Preservation, Sinus lift)

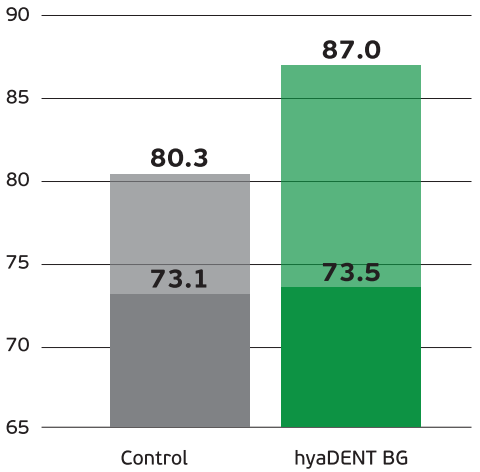
- Mix **hyaDENT BG** with bone graft in 1:1 ratio
- Add **hyaDENT BG**/bone graft mixture to application site.
- Top the mixture with a layer of **hyaDENT BG** .
- Membranes -if needed- can be used on top of **hyaDENT BG**.

Gingival sutures covered with **hyaDENT BG** provide a better healing environment, and enhance gingival margin preservation.

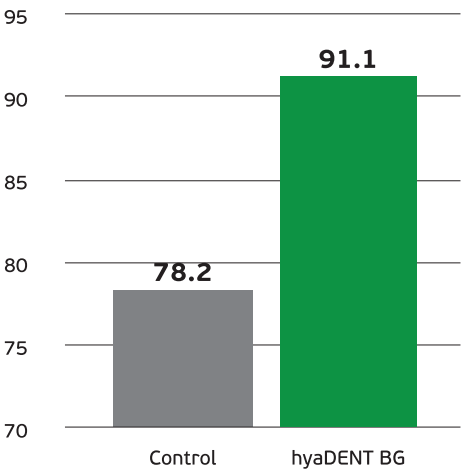


Better bone density and coverage is formed when using hyaDENT BG in socket preservation.

Median recorded Bone density Immediately after bone graft placement and 2 months later



Median coverage %



Taman et al. randomized clinical trial was carried out in 10 patients having 20 mandibular extraction sockets of single rooted teeth with age ranged between 22-55 years. Ten sockets were grafted with autogenous bone graft mixed with HA (hyaDENT, BioScience GmbH, Germany). Histological evaluation revealed rapid thick bone deposition with many well-organized osteocytes as well as osteoblast lining of the bone surfaces in the study group and increased mean area percent of formed bone. Radiographic bone density changes were found to be statistically significant between the two studied groups. They concluded that the use of autogenous bone graft with HA appears to be more efficient in osteoconduction when compared with autogenous bone graft alone and could be a promising strategy for preservation of alveolar sockets.[12]

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- Used in both surgical and non-surgical procedures to:
  - ✓ **Promote tissue healing**
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- Dental specific treatment
- Improves healing of gum post dental procedure
- Promotes and accelerates bone formation
- Cost effective
- Safe

Composition

Each 1.2 ml hyaDENT BG cartridge contains:

Cross-linked Hyaluronic Acid		**16 mg/ml**
Hyaluronic Acid		**2 mg/ml**
Sodium Chloride		**6.9 mg**
Water For Injection	ad	**1.2 ml**

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