NOVABONE® Dental Putty

Product Guide

The Synthetic Solution to Bone Regeneration

www.nbputty.com

Uncommon Handling....
....Uncompromised Results!

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NovaBone Putty is available in multiple dispensing systems. Variations are priced for affordability and efficiency. Products are available through a network of distributors world-wide, with a presence in over 40 countries.

Cartridge System	Quantity
Cartridge Dispenser	Each
0.5cc Cartridges (blue)	2/Pack
0.5cc Cartridges (blue)	4/Pack
0.25cc Cartridges (grey)	4/Pack

Syringe	Quantity
0.5cc Syringe	1/Pack
0.5cc Syringe	2/Pack
1.0cc Syringe	1/Pack
2.0cc Syringe	1/Pack

Clam Shell	Quantity
0.5cc Shell	1/Pack
0.5cc Shell	2/Pack

Not all dispensing formats are available in all countries. Please check with your local distributor for sizes, part # and availability.

NovaBone Dental Putty

The next generation Calcium-Phosphosilicate bone substitute engineered for enhanced handling and improved performance

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Product Characteristics

NovaBone Dental Putty was introduced after extensive market research which suggested that clinicians did not expect great strides in the rate of bone formation but rather in delivery, handling and performance of bone graft substitutes without a significant cost increase.

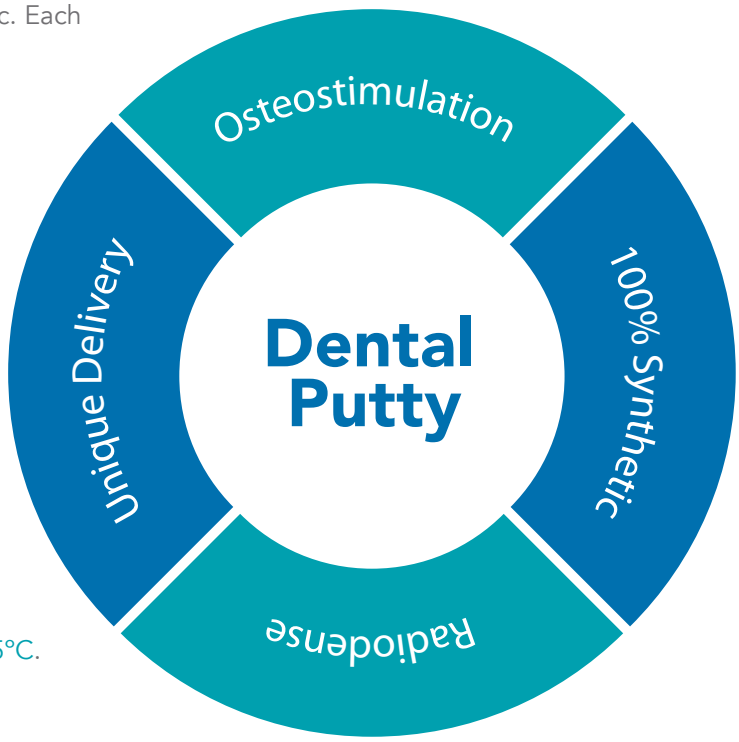
NB Putty has bimodal particle distribution of Calcium Phosphosilicate (CPS) (active ingredient), with Polyethylene Glycol (PEG) as an additive and Glycerin as the Binder. The volume of the active ingredient is approximately 70%. The Putty format allows easier manipulation due to its format and eliminates the need for any preparation prior to placement. NB Putty offers clinicians various delivery systems (Shells, Cartridges & Syringes) in various sizes with benefits of consistent, reliable bone regeneration. Putty received its FDA & CE approval for dental indications in 2006-07.

NB Putty is available in unique uni-dose cartridges – an industry first; ideal for minimally invasive surgeries, hard to access defects, immediate implant surgeries, osteotome sinus surgeries, etc. Each cartridge holds 0.25-0.5cc of putty.

Putty does not set like a cement. CPS has a transient hemostatic effect providing a comfortable environment for the clinician to work with. It encourages clot stabilization and promotes healing. Putty has good retention and can adapt to the defect shape.

Putty is radio-dense and can be visualized on radiographs. Upon implantation, it appears as a mass at the defect site which can be differentiated from surrounding bone by the lack of trabecular pattern. Over time, with bone remodeling, the grafted area appears analogous to the natural bone in the region.

Putty has a 4 year shelf life does not need refrigeration but caution should be exercised at temperatures higher than 45°C.



Superior Delivery System

NovaBone Dental Putty is available in multiple delivery options: trays, pre-filled syringes and a unique cartridge delivery system. The diameter of the cannula is 2.8mm which is ideal for dispensing of the graft, especially in minimally invasive techniques such as gaps in immediate implant and crestal approach sinus lifts. Cartridges are available in various sizes and are used in conjunction with cartridge dispenser.

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Smart Science™ - Osteostimulation

Unlike other synthetic grafts that are bioinert, NB Putty belongs to the class of bioactive regenerative materials that not only acts as an osteoconductive scaffold but also interacts with the surrounding tissues and imparts an osteostimulatory effect. NB Putty is not osteoinductive but a number of in vivo studies have demonstrated an accelerated bone formation with CPS particles. Also, the viability and proliferation potential of osteoblasts has been shown to be accelerated in the presence of CPS particles. Studies also demonstrate increased osteocalcin and alkaline phosphatase levels in the presence of CPS particles providing a favorable environment for bone formation.

Osteostimulation is an active process. NovaBone Dental Putty acts as a bone matrix and encourages differentiation of new bone cells at the site. This phenomenon results in faster bone regeneration than exhibited by osteoconduction alone while simultaneously increasing the resorption rate of the graft material.

Biologic Interpretation

- Immediately upon implantation, silicon and calcium ion release initiates a cascade of events that signals and recruits undifferentiated cells to the site
- Several genes are regulated, resulting in proliferation and differentiation of undifferentiated cells into osteoblasts
- The osteoblasts mature into osteocytes (mature bone cells) at the terminal stage
- This process continues resulting in bone regeneration at a much faster pace than osteoconduction

Clinical Interpretation

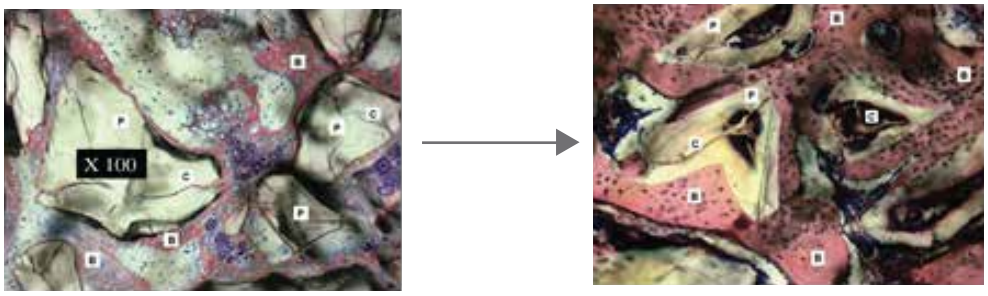
- Upon implantation, the binder gets absorbed within 24-72 hrs, creating a 3-dimensional porous scaffold that facilitates active movement of blood and tissue fluids through the matrix
- Smaller CPS particles interact with blood providing the initial burst of calcium and phosphate ions
- This provides a favorable area for bone regeneration as it creates numerous calcium phosphate nodules that mature individually to form bone throughout the defect
- Subsequently, the larger particles react and continue the process of bone regeneration

Histologic Interpretation

Rabbit Histology at 3 and 6 weeks helps visualize the osteostimulation phenomenon. At 3 weeks, cracks developing through individual particles can be noticed with bone growing through them. Pink areas of bone formation are also seen around the putty particles along with areas of cartilaginous cells & giant cells (purple).

At 6 weeks, abundant bone around each particle can be seen (pink areas). The cracks have progressed completely into the center of each particle, and an area of bone regeneration (pink) is seen within each individual particle. This is very unique to CPS products and results in the creation of multiple foci of bone regeneration resulting in enhanced bone regeneration and consequently faster material absorption!

3 Weeks **6 Weeks**



B- Bone, P- Graft Particle, C- Cracks

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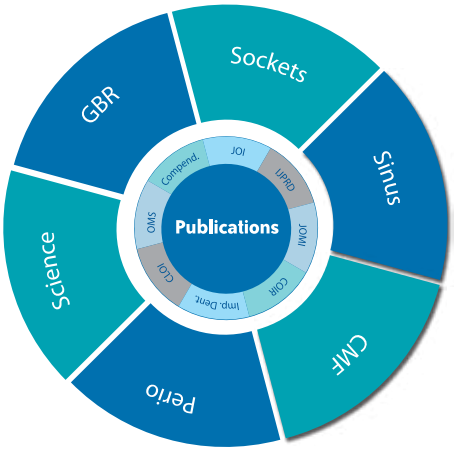
Clincial Evidence

With over 50 technical publications and 32 clinical publications in peer reviewed journals, NB Putty has consistently proven to regenerate bone in various osseous defects including ridge augmentations, sinuses, sockets, periodontal defects, etc. Most studies suggest approx. 80%-90% graft absorption in 4-6 months, while regenerating bone at the same time.



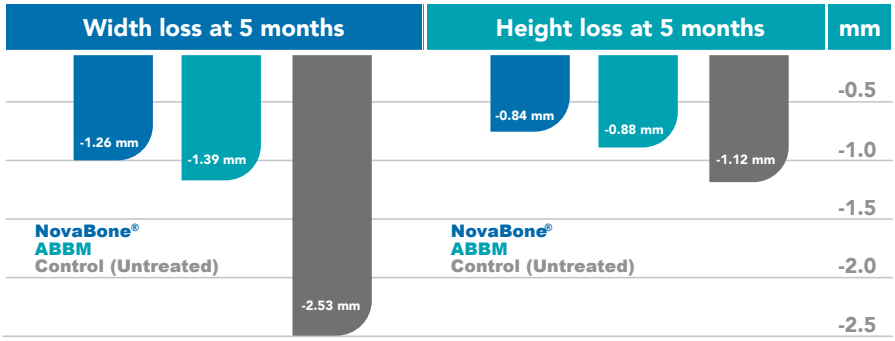
NB Putty with its unique cartridge delivery system has redefined sinus augmentation surgeries facilitating minimally invasive surgical approaches and improvisations. NB Putty with its handling characteristics acts as an excellent carrier for guided bone regeneration surgeries in combination with NovaBone Morsels or Allograft bone (1:1).

Comparision with Bovine Bone

2015 JOI article by Lanka et al., evaluated both NB Putty & Bovine xenograft histomorphometrically. They concluded that ridge preservation using a putty calcium phosphosilicate alloplastic bone substitute results in more timely graft substitution and increased bone regeneration when compared to an anorganic bovine bone xenograft.

In a 2014 JOMI article, Kotsakis et al., published data from a blinded randomized controlled trial comparing dimensional changes at 5 months following socket preservation using NovaBone Dental Putty (PUT) or anorganic bovine bone mineral (ABBM), both groups showed a statistically significant reduction in ridge width loss. NovaBone® treated sites showed comparable results to sites treated with ABBM in both width and height changes. The maximum implant insertion torque (MIT) was measured as an index of primary implant stability.

MIT for PUT was ≤35 N/cm² (MIT grade 4) for seven of the nine implants.
MIT values in the ABBM group ranged from grade 1 (10 to 19 N/cm²) to grade 4, which was statistically significantly lower than the PUT group. The overall implant success rate was 94.1% (16 of 17 implants were successful). They concluded that Putty was good to preserve ridge dimensions and had favorable bone density values for implant placement.



Histomorphometry

In four separate studies, histomorphometric evaluation of cores taken from extraction sockets grafted with NovaBone Dental Putty showed vital bone regeneration and significant graft resorption.[1,2,3,4]

	Number of Sites	Average Re-Entry Time	Mean Vital Bone Content	Mean Residual Graft
2015 Lanka et al.[1]	N=10	4.9 months	47.15%	17.4%
2014 Kotsakis et al.[2]	N=17	5.7 months	31.76%	11.47%
2012 Lanka et al.[3]	N=20	4.9 months	49.57%	4.3%
2011 Gonshor et al.[4]	N=22	5.4 months	48.2%	2.4%

1. Lanka M. et al. Alveolar ridge preservation with the socket-plug technique utilizing an alloplastic putty bone substitute or a particulate xenograft: a histological pilot study. J Oral Implantol 2015 Apr; 41(2):178-83
2. Kotsakis GA, et al. Histomorphometric evaluation of a calcium-phosphosilicate putty bone substitute in extraction sockets. Int. J Periodontics Restorative Dent. 2014 Mar-Apr; 34(2):233-9
3. Lanka M, et al. Socket grafting with calcium phosphosilicate alloplast putty: a histomorphometric evaluation. Compend Contin Educ Dent. 2012 Sep;33(8):e109-15.
4. Gonshor A, et al. Histologic and Clinical Evaluation of a Bioactive Calcium Phosphosilicate Bone Graft Material in Postextraction Alveolar Sockets. Int J Oral Imp and Clin Res. 2011;2(2): 79-84.

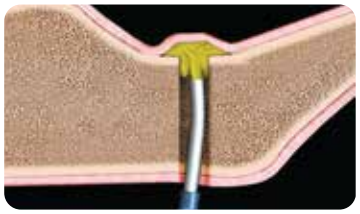
Minimally Invasive Transcrestal Sinus Augmentation

There are several ways to access the sinus via crestal approach and elevate the sinus membrane prior to augmentation: A) Osteotome technique B) Piezo Technique C) Neurosurgical Bur D) Densah Burs, etc. Bone graft delivery into the sinus can be difficult and challenging. NovaBone Cartridge System simplifies the delivery of graft into the sinus especially when accessed through the crest of the ridge. The tip of the cartridge is 2.8 mm in diameter and was designed specifically to deliver the graft seamlessly into the sinus. Putty consistency can help prevent membrane tears. The delivery of the putty graft can elevate the membrane with minimal instrumentation and hydraulic pressure.

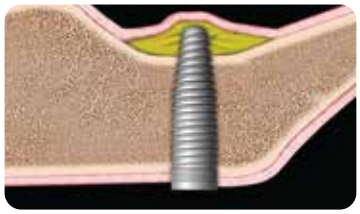
Minimally Invasive Transcrestal
Sinus Augmentation

Step 1

Step 2



Step 3



Step 4

Easy access into sinus through crestal floor for sinus augmentation with Osteotome technique can be achieved in 4 simple steps.

Step 1: Prepare the osteotomy to less than 1mm from the sinus floor.

Step 2: An osteotome is then used to gently fracture the bone in the area.

Step 3: The canula from the cartridge tip can be pressed against the surface of the bone and the putty is injected into the area resulting in membrane elevation with hydraulic pressure from Putty delivery.

Step 4: An implant can then be placed in the augmented area.

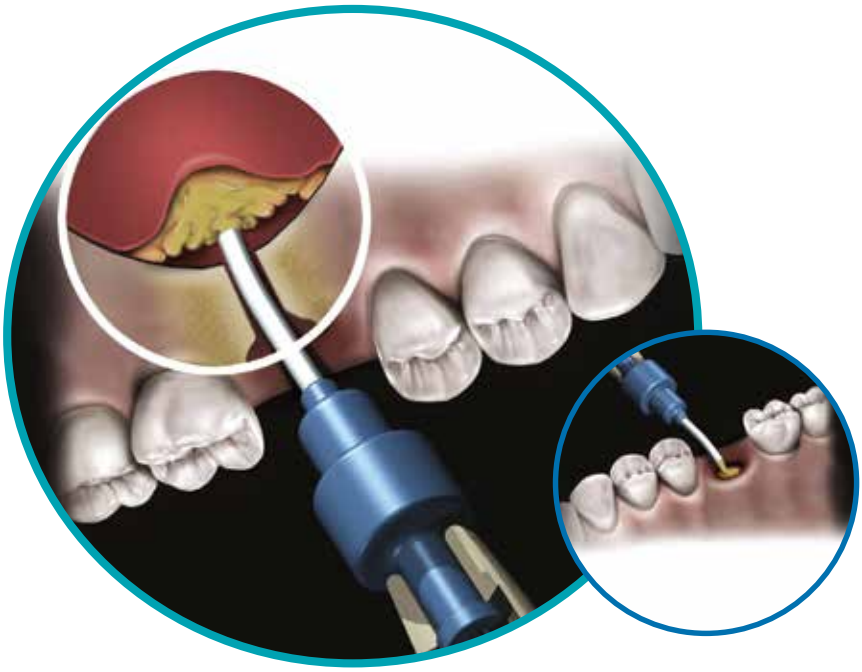
Testimonials

"The unique handling characteristics of the NovaBone putty in combination with the cartridge delivery system allow for significant simplification of routinely used techniques in implant dentistry and significant reduction in intra-operative treatment time" Dr. George Kotsakis, Periodontist, Assistant Prof., Univ. Washington, Seattle."

"The putty consistency of NovaBone is easy to manipulate, and the unique cartridge delivery allows access to unreachable areas. I am able to do sinus grafts through smaller windows with reduced intra-operative complications. The radiopacity of the material is optimum for visibility on a radiograph. Above all, the material holds its form long enough to facilitate new bone formation" Dr. Udatta Kher, Oral Surgeon, Private Practice, Mumbai, India

NOVABONE®

Grafting Simplified



Simple Delivery, Great Handling
& Proven Results

Dental Putty cartridge system redefines minimally invasive bone grafting surgeries!

- **No Mixing**
- **Easy Handling**
- **Exceptional Results**

NovaBone Dental Putty will truly revolutionize the way you use bone graft substitutes. You won't believe how easy the putty handles, yet delivering outstanding outcomes you demand.

Experience the sheer simplicity of NovaBone Dental Putty!

- **Think Productivity**
- **Think Putty**

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