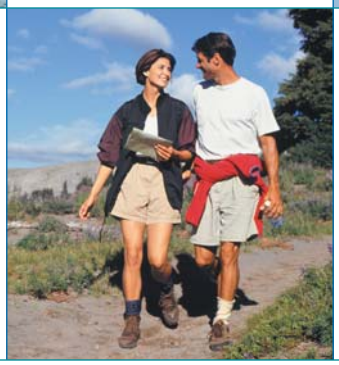
NOVABONE®

BIOACTIVE SYNTHETIC GRAFT

BUILD STRONG BONE FAST



MTF Musculoskeletal Transplant Foundation

THE ALLOGRAFT LEADER℠

NOVABONE®

BIOACTIVE SYNTHETIC GRAFT

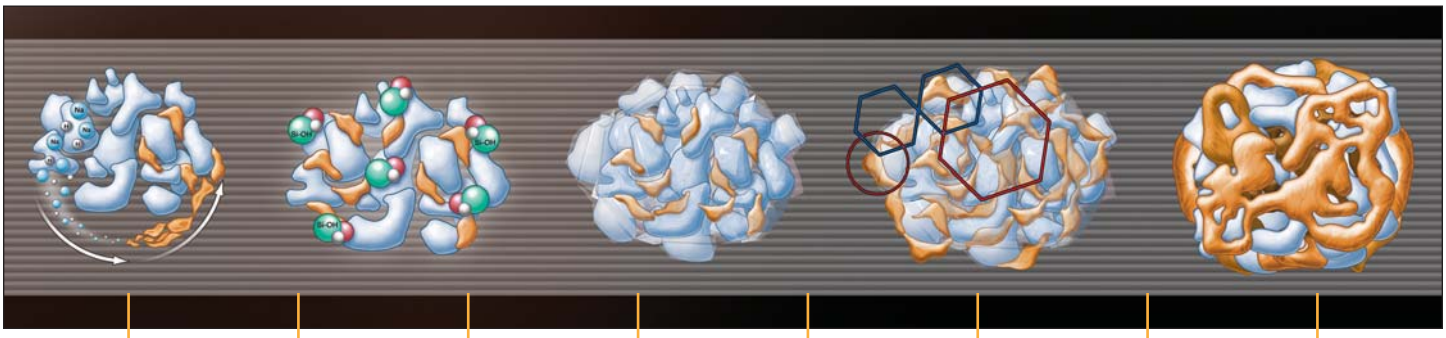
Putty · Particulate · Morsels

A BIOACTIVE SYNTHETIC BONE FOR FASTER HEALING

- NovaBone® is a 100% bioactive synthetic material composed from elements that occur naturally in the body – silicon, sodium, calcium, phosphorus, and oxygen.
- NovaBone is osteostimulative; defined as an accelerated bone formation process characterized by the active stimulation of osteoblast proliferation and differentiation due to cellular interaction with the ionic dissolution released during absorption.
- NovaBone is a bioactive synthetic material capable of regenerating new bone from existing bone.
- NovaBone demonstrated equivalent rates of bone growth when compared to autogenous bone graft.[3]
- NovaBone causes genetic activation to osteoblast recruitment and proliferation.[4,5]
- NovaBone is the optimum bone void filler, providing patients with reduced morbidity resulting from the harvesting of autograft.
- NovaBone's activating chemistry promotes bone formation and creates a scaffold for new bone growth.
- NovaBone is a clinically proven bone growth catalyst.

- NovaBone can be easily combined with autograft, allograft or autogenous growth factors to extend surgical options and promote accelerated healing.
- NovaBone is available through MTF, the world's largest tissue bank.

A TIMELINE OF BIOACTIVE HEALING



WITHIN MINUTES
Exchange of Na+ and H+

1 HOUR
Loss of Na+ initiates the release of soluble silica and the formation of surface silanol groups (Si-OH), which repolymerize into a silica-rich layer

6 HOURS
Precipitation of a layer of amorphous calcium phosphate

10 HOURS
Crystallization of a layer of hydroxyl carbonate apatite and growth from 1 to 10 days

20 HOURS
Absorption of biological compounds

24 HOURS
Action of macrophages

50 HOURS
Fixation of the stem cells

100 HOURS
Differentiation of the stem cells

- NovaBone initiates a surface chemical reaction immediately upon introduction to the surgical site.
- Ions released from NovaBone stimulate osteoblasts and modify the material's surface which attracts and binds the critical components for bone regeneration in the surgical site.
- The ion release occurs continuously over time and is particularly critical in the initial weeks of healing. As the ion release progresses, the NovaBone material is transformed into an increasingly porous scaffold with a resulting increase in surface area. The ion release and surface modification combine to actually stimulate the osteoblasts involved in the repair process.

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Putty

EXCELLENT HANDLING CHARACTERISTICS

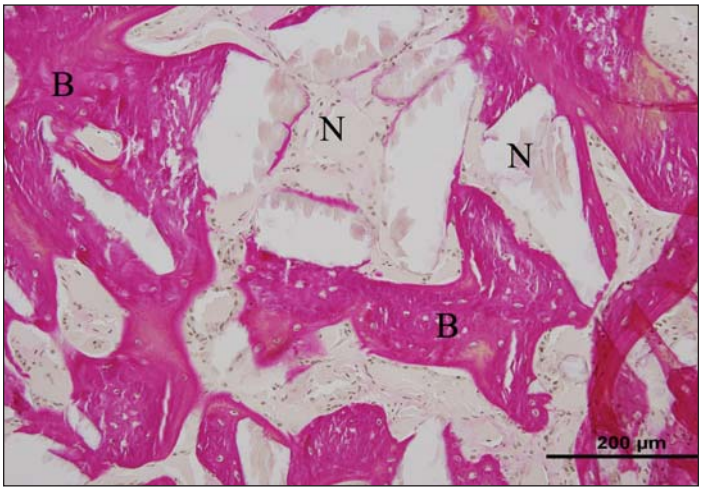
- NovaBone Putty is a user friendly, ready to use bioactive synthetic. The formulation readily packs with autograft and other autogenous growth factors.
- NovaBone Putty has exceptional handling characteristics. The bioactive synthetic easily forms into any shape, packs voids, and will not adhere to gloves.
- NovaBone Putty will stay in place during irrigation. Surgeons can be confident that it will not wash away, ensuring bone growth at the desired site.

ORDERING INFORMATION

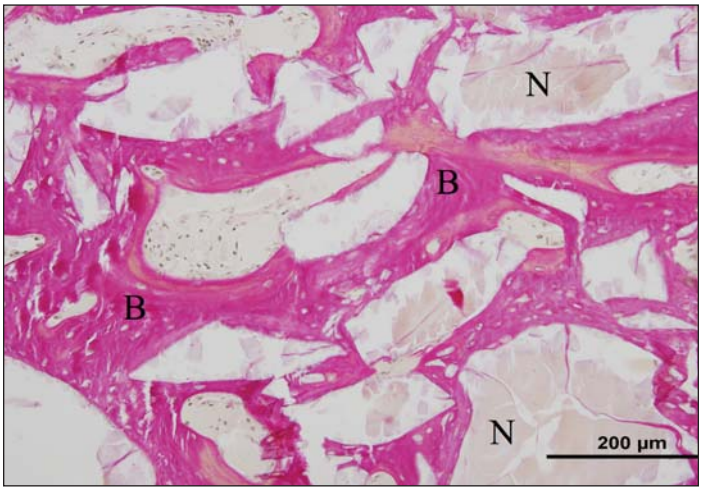
Cat. No.	Description
770602	NovaBone Putty, 2.5cc
770605	NovaBone Putty, 5cc
770610	NovaBone Putty, 10cc

PROVEN BONE FORMATION

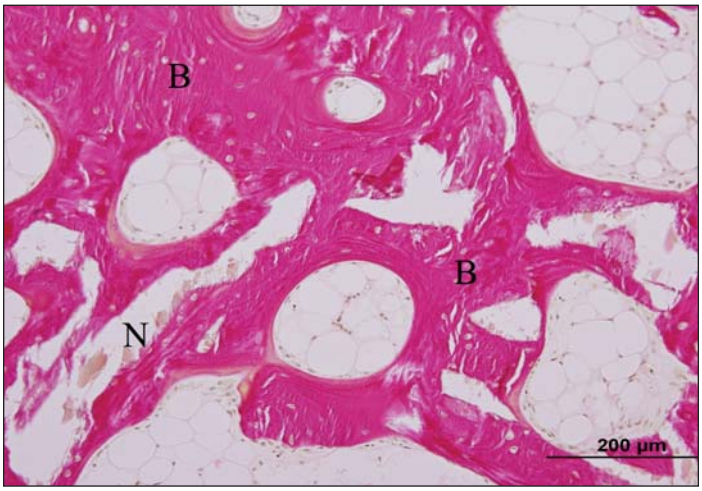
- NovaBone Putty was shown to be substantially equivalent to NovaBone Particulate in a rabbit femoral condyle defect study. The critical sized femoral condyle model showed early bone formation at 6 weeks and mature bone at 12 weeks.



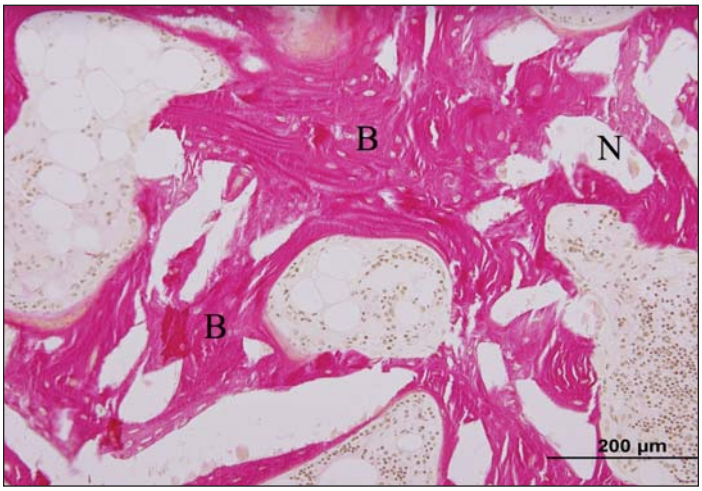
NovaBone Particulate (control) at 6 weeks



NovaBone Putty at 6 weeks



NovaBone Particulate (control) at 12 weeks



NovaBone Putty at 12 weeks

B = Formation of new bone
N = Residual NovaBone Particulate or Putty particles

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Particulate

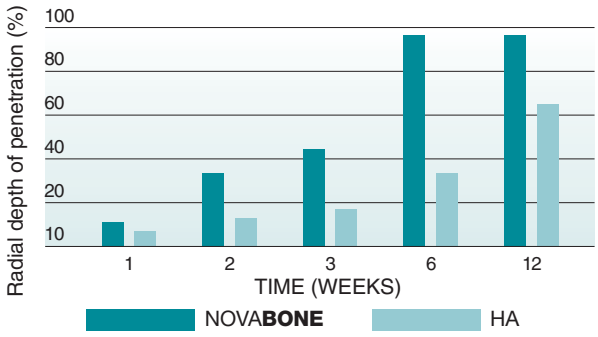
OPTIMUM GRAFT EXTENDER

- Surgeons prefer the properties of NovaBone Particulate not only because it accelerates healing, but also because it complements a range of techniques and affords numerous advantages over alternative products.
- NovaBone Particulate's size and composition combine to create an almost magnetic effect that allows it to gently adhere to instruments. This attractive property makes working with NovaBone Particulate easy and precise.
- Once NovaBone Particulate is positioned in a surgical site, it bonds to surrounding tissue and remains *in situ*. Additionally, NovaBone Particulate only grows bone in a bony environment—eliminating the dangers associated with ectopic bone growth.
- NovaBone Particulate can be used alone or mixed with autograft, allograft, or autogenous materials to extend the volume of available grafting material to the surgical site.

ORDERING INFORMATION

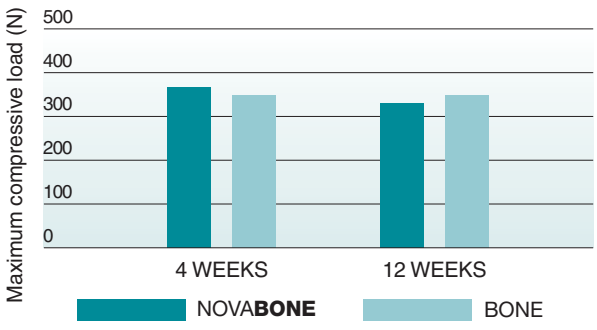
Cat. No.	Description
770704	NovaBone Particulate, 2cc
770705	NovaBone Particulate, 5cc
770710	NovaBone Particulate, 10cc
770715	NovaBone Particulate, 15cc

NovaBone vs. Hydroxyapatite



In contrast to calcium phosphate ceramics, new bone formation stabilizes NovaBone particles beginning the very first week after implantation.[1]

NovaBone vs. Bone



Initially the hardness and density of NovaBone are greater than those of bone. During the course of new bone formation, the NovaBone particles undergo resorption. Finally the density and hardness of the graft decrease, becoming indistinguishable from those of bone.[2]

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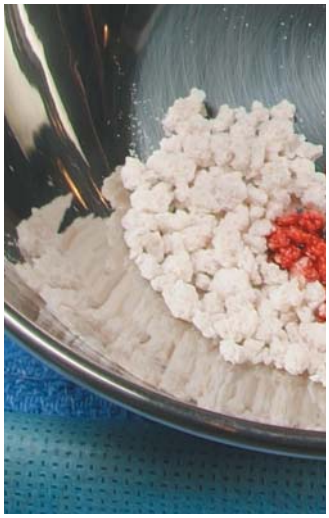
Morsels

EXCELLENT HYDROPHILIC PROPERTIES

- NovaBone Morsels provide a favorable environment for cell infiltration while attracting osteoprogenitor cells, resulting in the formation of new bone. Its osteostimulative and osteoconductive capabilities make it the ideal choice for a variety of surgical applications, while eliminating the morbidity associated with harvesting autologous bone.
  - Osteostimulative and osteoconductive.
  - Excellent hydrophilic properties (readily attracts and absorbs blood, etc.).
  - Eliminates the morbidity associated with the harvest of autologous bone.
  - Attractive alternative to autograft and allograft.
  - Incorporates into host bone.
  - Porosity mimics the structure of human cancellous bone.



ORDERING INFORMATION

Cat. No.	Description
770805	NovaBone Morsels, 5cc (2-5mm)
770810	NovaBone Morsels, 10cc (2-5mm)
770815	NovaBone Morsels, 15cc (2-5mm)

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THE SCIENCE OF NOVABONE

NovaBone has been the subject of more than thirty basic science, *in vivo*, and human studies. It has been favorably compared to multiple alternative materials on the market today. NovaBone has a 15-year track record of safety and efficacy in a wide range of clinical applications. Additionally, NovaBone has demonstrated equivalent rates of bone growth when compared to autogenous bone graft.

References

1. Oonishi H, Kushitani S, Yasakawa E, et al. Particulate Bioglass Compared with Hydroxyapatite as a Bone Graft Substitute. *Clin Orthop*. 1997;334:316-325.
2. Wheeler DL, Stokes KE, Hoellrich RG, Chamberland DL, McLoughlin SW. Effect of Bioactive Glass Particle Size on Osseous Regeneration of Cancellous Defects. *J Biomed Mater Res*. 1998;41:527-533.
3. Brice Ilharreborde, MD, Etienne Morel, MD, Franck Fitoussi, MD, Ana Presedo, MD, Philippe Souchet, MD, Georges-François Penneçot, MD, and Keyvan Madza, MD. Bioactive Glass as a Bone Substitute for Spinal Fusion in Adolescent Idiopathic Scoliosis. *J Pediatr Orthop.* 2008; 28: 347-351.
4. Larry L. Hench, Julia M. Polak. A Genetic Basis for Design of Biomaterials for In Situ Tissue Regeneration. *Key Engineering Materials* 2008; 377: 151-166.
5. Larry L. Hench, David M. Gaisser, The Genetic Basis for Osteogenesis Stimulation by Controlled Release of Ionic Dissolution Products. Transactions of the Orthopedic Research Society, Annual Meeting, San Francisco, California, USA. March 2008: 1697.

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