# NanoBone®

## POWER TO REMODEL RAPIDILY

Biocomposites®

# NanoBone®

## Perfect partner for remodeling bone defects rapidly

Reliable and convenient, NanoBone is a next generation, fully synthetic bone graft substitute. Consisting of nanostructured hydroxyapatite (HA) embedded in a silica gel matrix – suspended in a hydrogel/polymer silica carrier – it provides the fullest support for bone regeneration at every stage of the healing process.

- Comparable healing rate to autograft without the costs and complications of harvesting[1]
- Rapid absorption and reliable bone fusion[1,2]
- Early osteogenesis – silica matrix exchanged for autologous proteins within 10 days[3]
- Patented nanostructure and optimized composition[4]
- Preloaded, versatile and ready-to-use[4]

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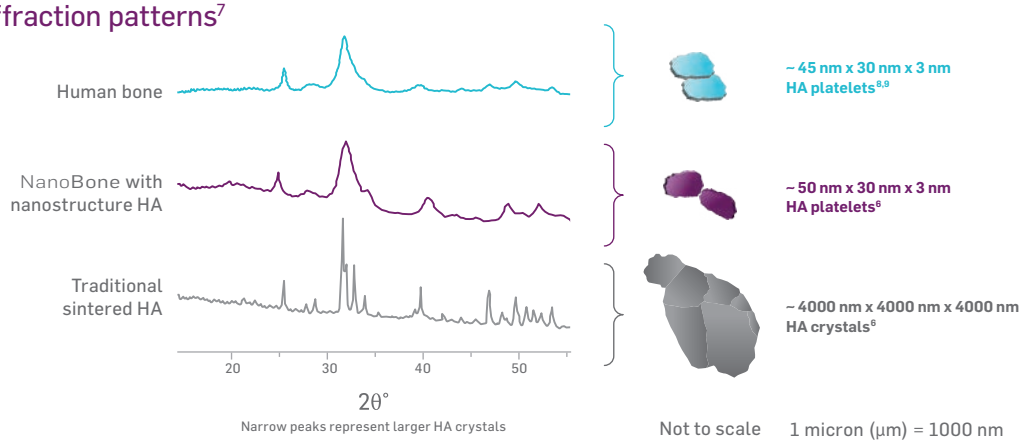
Ideal properties of bone graft

- Easy to prepare and apply
- Rapid and reliable bone formation
- Completely absorbs

# Nanostructure of HA platelets is identical in morphology to HA in bone

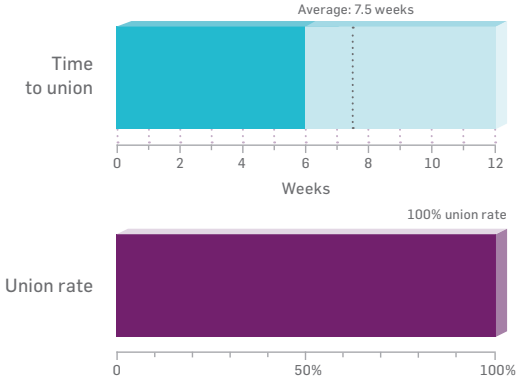
NanoBone is precipitated to achieve a HA morphology that mimics the HA in natural bone and ensures that complete natural bone remodeling takes place. Traditional sintered HA consists of larger connected crystals, which lower porosity and its ability to degrade.[5,6]

## HA diffraction patterns[7]



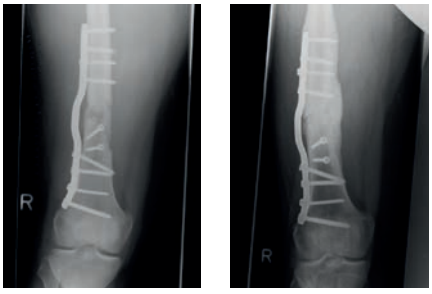

# Rapid absorption and reliable bone fusion

Nanocrystalline HA particles contained in a silica gel matrix may be an alternative to autologous bone grafting, offering low complication rates, high union rates, and early healing.[2]




Using Nanotechnology as Stand-Alone Bone Grafting in Open Fracture Bone Defects and Nonunions - OTA 2020

Full bone consolidation at 12 months and patient fully mobile.[10]




**Post-operative** **12 months**

Multi-fragment distal femoral shaft fracture

# NanoBone®

## Save procedure time and resource

NanoBone is preloaded and ready-to-use in a wide variety of applications to maximize flexibility and efficiency during procedures.

- ✔ No mixing or preparation time needed
- ✔ Versatile, ergonomic handling and placement
- ✔ Maintains shape when molded and adheres to surfaces

### NanoBone SBX Putty

High extrusion volume for placement into larger open wounds

### NanoBone QD

Slender profile for placement into deep cavities and minimally invasive procedures

| Order number | Product | Volume | Outer diameter | Length |
|---|---|---|---|---|
| 200053 | NanoBone SBX Putty | 10.0 ml | 18 mm | 100 mm |
| 200052 | NanoBone SBX Putty | 5.0 ml | 18 mm | 100 mm |
| 200051 | NanoBone SBX Putty | 2.5 ml | 11 mm | 70 mm |

| Order number | Product | Volume | Outer diameter | Length |
|---|---|---|---|---|
| 200073 | NanoBone QD | 10.0 ml | 8 mm | 185 mm |
| 200072 | NanoBone QD | 5.0 ml | 8 mm | 185 mm |

**References: 1.** Kienast B et al. (2016). Nanostrukturiertes synthetisches Knochenersatzmaterial zur Behandlung von Knochendefekten. Trauma und Berufskrankheit, 4(18), 308-18. **2.** Ortega, G. Using Nanotechnology as stand-alone bone grafting in open fracture bone defects and nonunions, Orthopaedic Trauma Association Annual Meeting, #1043, 2020. **3.** Xu W (2011). Evaluation of injectable silica-embedded nanohydroxyapatite bone substitute in a rat tibia defect model. Int J Nanomedicine, 6, 1543-52. **4.** NanoBone® Summary of product characteristics. **5.** Götz W et al. (2008). Immunohistochemical characterization of nanocrystalline hydroxyapatite silica gel (NanoBone) osteogenesis: a study on biopsies from human jaws. Clinical Oral Implants Research, 19(10), 1016–1026. **6.** Gerber T et al. (2012). Nanostructured bone grafting substitutes–A pathway to osteoinductivity. In Key Engineering Materials, 493, 147-152. **7.** Scherrer P., (1918). Bestimmung der Grösse und der inneren Struktur von Kolloidteilchen mittels Röntgenstrahlen, Nachrichten von der Gesellschaft der Wissenschaften zu Göttingen, Mathematisch-Physikalische Klasse, 98-100. **8.** Fratzl P et al. (1991). Nucleation and Growth of Mineral Crystals in Bone Studied by Small-Angle-X-Ray Scattering. Calcif Tissue Int, 48, 407-413. **9.** Weiner S et al. (1986). Disaggregation of Bone Into Crystals. Calcif Tissue Int, 39, 365-375. **10.** Data on file.



Patents granted: EP 1 624 904 B1, US 8,715,744 B2, JP4764821B2, 284158, CA2537620C, RU2354408C2, ZL200480020915.3, DE 50 2004 002 554.4, ES2280969T3, AU 2004241740 B2, HK1080766A1, EP 3 600 464 B1, US 11,324,859 B2, JP7118132B2, CN110650754B, DE 50 2018 009 567.7, ES2917406T3, MX2019011659A, RU2768695C2, 386769, AU2018246310A1, BR112019020029A2, CA3058253A1

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