



pioneer of health

Orthopaedics

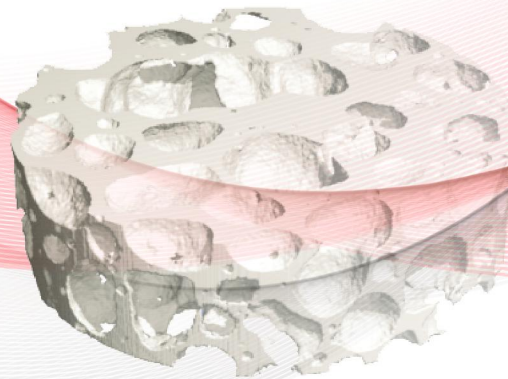
Trauma

Spine

Sports Medicine

Dental

Regenerative Solutions
Synthetic Biomaterials



Granule
Stick - Block
Flexible Strip
Putty - Gel
Dental Putty
Barrier Membrane

BONEGRAFT
— BIOMATERIALS —



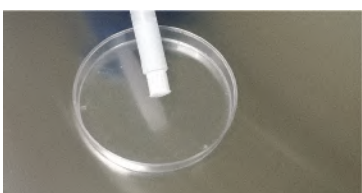
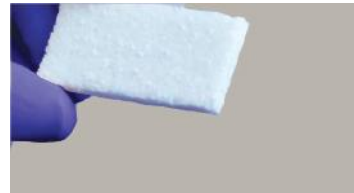
powerbone®

pioneer of health



BONEGRAFT Co.

Bonegraft is a biotechnology based company that is focusing on research and development on biomaterials such as bone and cartilage tissue scaffolds and polymeric membranes in the modern laboratory of ISO Class 7 (Class 10.000) clean rooms in Ege University Technology Development Center.



Powerbone products are indicated for use as a bone graft substitute for the support of bone tissue formation at non-load bearing osseous defects created surgically or through traumatic injury. Powerbone products may be combined with autogenous blood and/or bone marrow as well as with other bone grafts.

General Features of Bone Substitutes

- **100% Synthetic**

Contains no tissue of human or animal origin therefore carries no risk of disease transmission.

- **Osteoconductive**

Act as a scaffold and support bone tissue regeneration. Similar to the mineral found in bone tissue.

- **Bioresorbable**

With its optimized porous structure and chemical composition, Powerbone is suitable for the continuous remodeling cycle of healthy bone. β -TCP resorbs over time and is replaced with bone during the healing process.

- **Safe**

Powerbone is supplied sterile and CE marked as a Class III Medical Device according to Directive 93/42/EEC.

- **Biocompatible and Sterile**

Powerbone is tested using: Pre-clinical studies, Biocompatibility tests (in vitro and in vivo), Biomechanical tests, Biodegradation tests, Bioburden and Sterility tests.

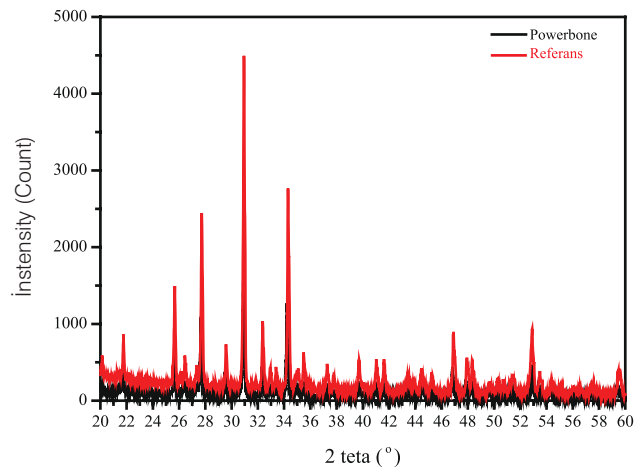
- **Radiopaque**

Could be detected via CT and X-ray.

- **Antibacterial**

- **Versatile**

Available in granules, sticks, blocks, edges, putty and gel form at different sizes for different indications.

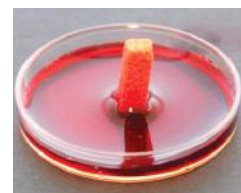
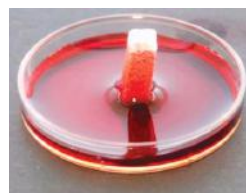
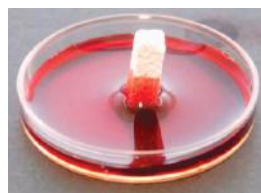
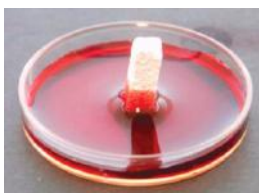


XRD Graphic of β -TCP Powder

The maximum peak 2θ values of the phases are defined by matching with the JCPDS (Joint Committee on Powder Diffraction Standards) database. When examining the XRD data of the Powerbone branded product, the maximum peak grades were found to be compatible with whitlockite with JCPDS 090169 card number 27,77 (214), 31,03 (210), 34,37 (220) respectively. Since β -TCP and whitlockite have similar XRD profiles, [1,2] data are compared with a commercial product obtained from 100% crystalline β -TCP, based on $\geq 98\%$ beta phase according to manufacturer's description. Besides, XRD profile of Powerbone β -TCP were compared with a well-known commercial product which has $\geq 98\%$

(1) Gopal R, Calvo C (1972) Structural Relationship of Whitlockite β Ca₃(PO₄)₂. Nat Phys Sci 237: 30-32

(2) Frondel C. (1943) Mineralogy of the calcium phosphates insular phosphate rock. Am Mineral 28: 215-23.

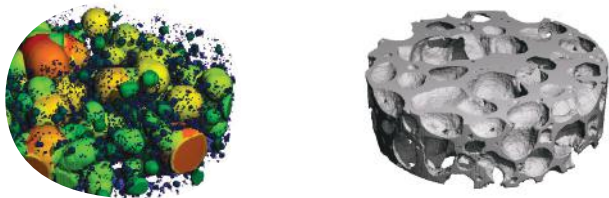


Incubating Powerbone Stick in red ink solution. Images captured in every 5 seconds. After 20 seconds sticks are completely covered.

Powerbone Granule, Stick & Block

The interconnectivity of porous structure and microporosity assist capillary motion of blood and body fluids, enhanced penetration for osteogenic cells, and ossification of the synthetic matrix. For Macroporosity, Powerbone Granules and Stick & Block allows deep invasion of bone cells into the matrix. Powerbone polygonal granules have different particle size between 0,25-7 mm.

The irregularly shaped granules promote interlocking and improve mechanical stability.



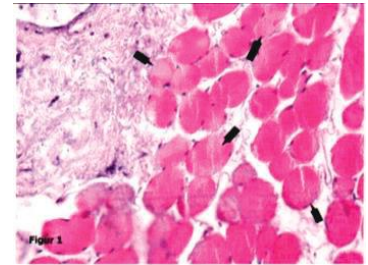
Micro CT analysis of Granules

When the images are examined, it is observed Powerbone grafts has as interconnective porous structure and this structure is spread throughout the sample. Also micro and macro pores are determined in the structure of Powerbone granules and sticks. Given cell attachment and development, the presence of interconnective pores in contact with each other promotes cell attachment and development [1-3].

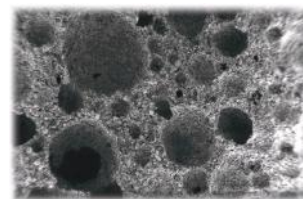
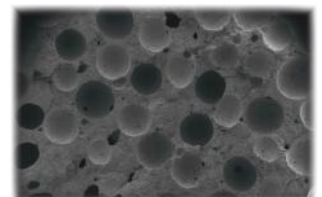
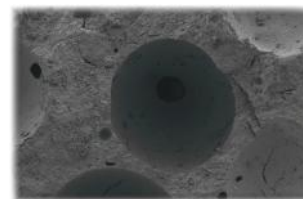
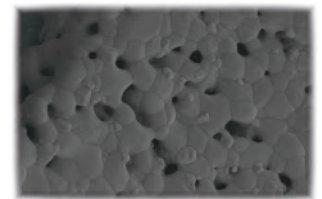
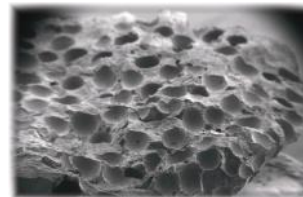
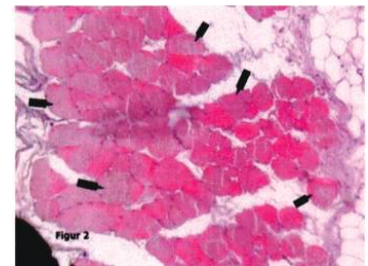
(1) BMP-induced osteogenesis on the surface of hydroxyapatite with geometrically feasible and nonfeasible structures: topology of osteogenesis J Biomed Mater Res, 39 (2) (1998), pp. 190-199.

(2) S.F. Hulbert, F.A. Young, R.S. Mathews, J.J. Klawitte, C.D. Talbert, F.H. Stelling potential of ceramic materials as permanently implantable skeletal prostheses J Biomed Mater Res, 4(3) 1970, pp. 433-456

(3)A.I. Itala, H.O. Ylanen, C. Ekholm, K.H. Karlsson, H.T. Aro Pore diameter of more than 100 micron is no requisite for bone ingrowth in rabbits J Biomed Mater Res, 58 (6) (2001), pp. 679-683.



Osteoid formation (Osteoinductive characteristics) 2 months after implantation of Powerbone Granule (Crunch) in skeletal muscle



SEM analysis of Granules

Powerbone Flexible Strip

Powerbone Flexible Strip is a bioresorbable synthetic bone graft that provides great handling with high elasticity for specific cases including bone defects in the pelvis, extremities, and the posterolateral spine fusion.

Powerbone Flexible Strip is composed of silicate additive β -TCP and PLA based synthetic polymer.

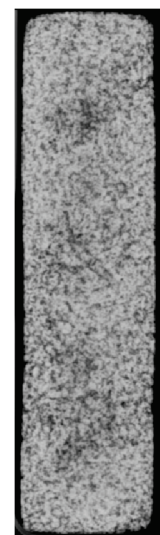


Powerbone Flexible Strip

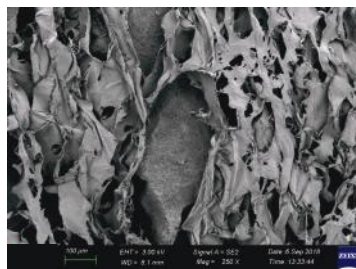
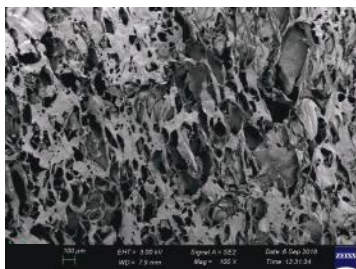


Instructions of Implanting Powerbone Flexible Strip

- Powerbone Flexible Strip can be applied directly or combination with bone marrow aspirate/blood to the surgical site.
- Wetting Powerbone Flexible Strip increases flexibility.
- Place Powerbone Flexible Strip into the surgical site just before the closure of the surgical area once all metallic implants are stable.
- Powerbone Flexible Strip can be cut to fit into a cage.



Micro-CT analysis of Powerbone Flexible Strip



SEM analysis

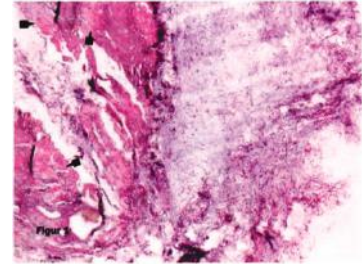
Powerbone Putty, Gel, and Dental Putty

Reasons to select Powerbone Dental Putty;

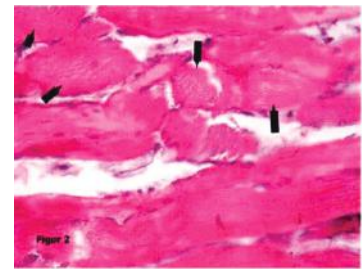
- Minimal invasive surgical protocol
- Easier and faster application
- Ready to use
- No mixing required
- Enhance bone regeneration
- No membrane usage (for dental putty only)
- Reduce chair time

General procedure of Powerbone Dental Putty in sinus lifting, lateral augmentation, and socket grafting;

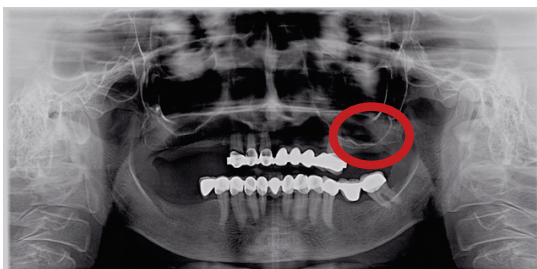
1. Lift a flap
 - The flap should be minimally reflected to open up whole graft site.
 - Prepare the defect site for grafting
2. Dental Putty application
 - Inject the dental putty and press gently for 5 seconds to get the defect shape by using sterile dry gauze.
3. Flap Closure
 - Reposition the flap and suture the for maximal closure.



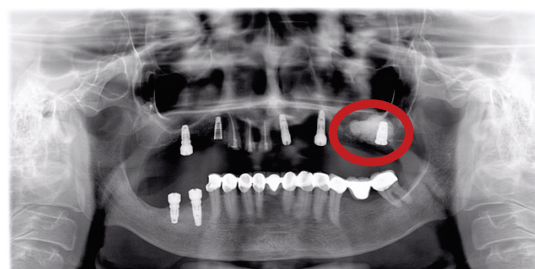
Osteoid formation (Osteoinductive characteristics) 2 months after implantation of Powerbone Putty in skeletal muscle



Use of Powerbone Putty in sinus lifting operation.



A- Before grafting procedure



B- 5 months after grafting procedure

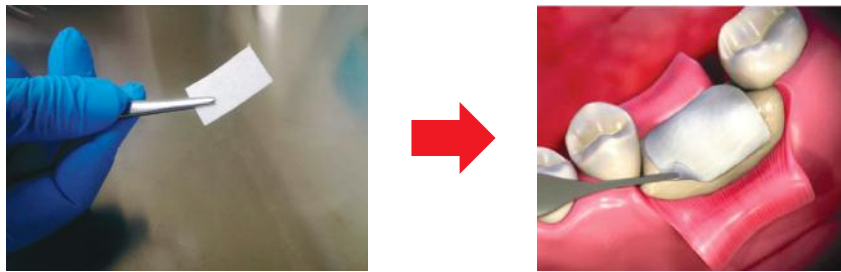
The sinus defect filled with Powerbone Putty heals completely after 5 months. Radiological view of before and after grafting application. As it is seen, bone tissue completely regenerated and dental implant was successfully placed.

Powerbone Dental Barrier Membrane

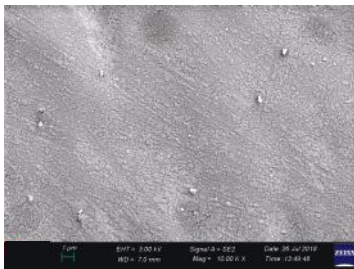
- Specifically engineered for periodontal restorative surgeries and assists in the regeneration of bone and periodontal support tissues.
- Fabricated from a biocompatible and bioresorbable medical grade poly(lactic acid) based synthetic polymer with a long history of safe medical use.
- The Powerbone Barrier Membrane maintains its architecture and completely resorbed 15-20 weeks after implantation.

Advantages of Powerbone Dental Barrier Membrane;

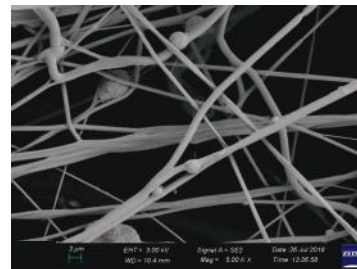
- Prevents fibrous tissue growth in bone zone
- No risks of virus or disease transmission
- No requirement for removing membranes due to complete bioresorption



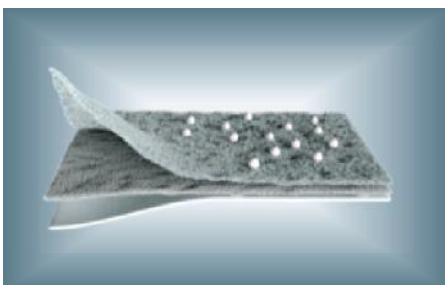
Application of Powerbone Dental Barrier Membrane.



Exterior side of Powerbone Dental Barrier Membrane compose of non-porous poly(lactic acid) (PLA) based film to prevent epithelial cells and fibroblast migratio



Interior side of Powerbone Dental Barrier Membrane compose of porous poly(lactic acid) (PLA) based microfibers to enhance mesenchymal stem cells adhesion, proliferation and differentiation.



Three-layer construction of Powerbone Dental Barrier Membrane

PRODUCT NAME

REFERENCE CODE

PARTICLE SIZE

VOLUME

Powerbone Granule



PG02501005	0.25-1 mm	0,5 cc
PG02501010	0.25-1 mm	1 cc
PG02501020	0.25-1 mm	2 cc
PG05001005	0.5-1 mm	0,5 cc
PG05001010	0.5-1 mm	1 cc
PG05001020	0.5-1 mm	2 cc
PG05001050	0.5-1 mm	5 cc
PG05001075	0.5-1 mm	7,5 cc
PG05001100	0.5-1 mm	10 cc
PG10002005	1-2 mm	0,5 cc
PG10002010	1-2 mm	1 cc
PG10002020	1-2 mm	2 cc
PG10002050	1-2 mm	5 cc
PG10002075	1-2 mm	7,5 cc
PG10002100	1-2 mm	10 cc
PG10002150	1-2 mm	15 cc
PG10002200	1-2 mm	20 cc
PG10002300	1-2 mm	30 cc
PG020405	2-4 mm	5 cc
PG0204075	2-4 mm	7,50 cc
PG020410	2-4 mm	10 cc
PG020415	2-4 mm	15 cc
PG020420	2-4 mm	20 cc
PG020430	2-4 mm	30 cc
PG030505	3-5 mm	5 cc
PG030510	3-5 mm	10 cc
PG030515	3-5 mm	15 cc
PG030520	3-5 mm	20 cc
PG030530	3-5 mm	30 cc
PG040705	4-7 mm	5 cc
PG0407075	4-7 mm	7,50 cc
PG040710	4-7 mm	10 cc
PG040715	4-7 mm	15 cc
PG040720	4-7 mm	20 cc
PG040730	4-7 mm	30 cc
PG070905	7-9 mm	5 cc
PG0709075	7-9 mm	7,5 cc
PG070910	7-9 mm	10 cc
PG070915	7-9 mm	15 cc
PG070920	7-9 mm	20 cc
PG070930	7-9 mm	30 cc

PRODUCT NAME

REFERENCE CODE

PARTICLE SIZE

VOLUME

Powerbone Stick



PS44201	4x4x20 mm	(1 pcs) 2,03 cc
PS44202	4x4x20 mm	(2 pcs) 4,05 cc
PS44204	4x4x20 mm	(4 pcs) 8,10 cc
PS44205	4x4x20 mm	10,13 cc
PS44206	4x4x20 mm	12,15 cc
PS55204	5x5x20 mm	16,50 cc
PS55205	5x5x20 mm	20,63 cc
PS55206	5x5x20 mm	24,76 cc
PS55254	5x5x25 mm	18,80 cc
PS55255	5x5x25 mm	23,50 cc
PS55256	5x5x25 mm	25,00 cc
PS5510	5x5x10 mm	2,06 cc
PS5520	5x5x20 mm	4,13 cc
PS5617	5x6x17 mm	4,21 cc
PS5634	5x6x34 mm	8,42 cc
PS6717	6x7x17 mm	5,89 cc
PS6734	6x7x34 mm	11,78 cc
PS8820	8x8x20 mm	10,56 cc
PS101020	10x10x20 mm	16,50 cc
PS151520	15x15x20 mm	24,50 cc
PS71214	7x12x14 mm	9,69 cc
PS71216	7x12x16 mm	11,07 cc
PS81214	8x12x14 mm	11,07 cc
PS81216	8x12x16 mm	12,66 cc
PS91214	9x12x14 mm	14,24 cc
PS91216	9x12x16 mm	16,27 cc
PS101040	10x10x40 mm	9,95 cc
PS101147	10x11x47 mm	10,00 cc
PS111947	11x19x47 mm	20,00 cc
PS1010402	10x10x40 mm	19,90 cc
PSC4204	4x20 mm	10,40 cc
PSC5204	5x20 mm	12,96 cc
PSC6204	6x20 mm	15,56 cc
PSC8204	8x20 mm	20,76 cc
PW062530	6x25x30 mm	5,15 cc
PW082530	8x25x30 mm	7,65 cc
PW102530	10x25x30 mm	10,15 cc
PW122530	12x25x30 mm	15,15 cc
PW142530	14x25x30 mm	20,15 cc
PW061520	6x15x20 mm	2,06 cc
PW081520	8x15x20 mm	2,75 cc
PW101520	10x15x20 mm	3,44 cc
PW121520	12x15x20 mm	4,13 cc
PW141520	14x15x20 mm	4,82 cc

PRODUCT NAME

REFERENCE CODE

PARTICLE SIZE

VOLUME

Powerbone Flexible Graft



PFS25254

25x25x4 mm

2,50 cc

PFS25504

25x50x4 mm

5,00 cc

PFS25505

25x50x5 mm

6,25 cc

PFS25506

25x50x6 mm

7,50 cc

PFS25508

25x50x8 mm

10,00 cc

PFS50504

50x50x4 mm

10,00 cc

PFS50506

50x50x6 mm

15,00 cc

PFS60504

60x50x4 mm

12,00 cc

PFS60505

60x50x5 mm

15,00 cc

PFS60606

60x60x6 mm

21,60 cc

PFS35605

35x60x5 mm

10,50 cc

PFS35606

35x60x6 mm

12,60 cc

PFS75405

75x40x5 mm

15,00 cc

PFS30306

30x30x6 mm

5,40 cc

PRODUCT NAME

REFERENCE CODE

PARTICLE SIZE

Powerbone Putty



PP005

0,5 cc

PP0055

0,55 cc

PP006

0,6 cc

PP01

1 cc

PP02

2 cc

PP03

3 cc

PP05

5 cc

PP06

6 cc

PP075

7,5 cc

PP10

10 cc

PRODUCT NAME

REFERENCE CODE

PARTICLE SIZE

Powerbone Gel



PG01

1 cc

PG02

2 cc

PG03

3 cc

PG05

5 cc

PG06

6 cc

PG10

10 cc

PRODUCT NAME

REFERENCE CODE

PARTICLE SIZE

Powerbone Dental Putty



PDP050
PDP075
PDP100
PDP150
PDP200
PDP500

0,5 cc
0,75 cc
1 cc
1,5 cc
2 cc
5 cc

PRODUCT NAME

REFERENCE CODE

PARTICLE SIZE

Powerbone Barrier Membrane




PM1520
PM1525
PM2020
PM2025
PM2030
PM2530
PM3040

15x20 mm
15x25 mm
20x20 mm
20x25 mm
20x30 mm
25x30 mm
30x40 mm

BONEGRAFT

BIOMATERIALS

 BONEGRAFT Biyolojik Malzemeler San. ve Tic. A.Ş.
Ege Üniversitesi Sit. İdege Teknoloji Geliştirme Bölgesi A.Ş.
Erzene Mah. Ankara Cad. No: 172/67
Bornova / İZMİR - TÜRKİYE - P.K.35100

Tel : +90 232 373 33 38 Fax : +90 232 373 33 39
www.bonegraft.com.tr www.powerbone.com.tr
info@bonegraft.com.tr



@bonegraftbiomaterials



@bonegraftbiomaterials



@bonegraftbiomaterials



@BonegraftBiomat