odontit

IMPLANT SYSTEMS

synergy

BONE GRAFTING MATERIAL

SYNERGY
Bone mineral matrix for bone grafting

A sterile biocompatible anorganic porous bone mineral for use in periodontal, oral and maxillofacial surgery.

Description

SYNERGY is a porous bone mineral matrix. It is produced by removal of organic components from bovine bone. Synergy provides a supportive structure for osteoconduction. The presence of pores in Synergy is of great importance for repearing bone defects. It is available in cancellous (spongiosa) granules and block.

Properties/actions

The anorganic bone matrix of SYNERGY has macro and microcopic structures that mimics human bone. The formation and ingrowth of new bone at implantation site of SYNERGY is favoured, due to its trabecular architecture, interconnecting macro and micro pores. The use of SYNERGY may be considered when autogenous bone is not indicated, or insufficient in quantity to fulfill the needs of the proposed surgical procedure.

Indications and usage

SYNERGY is recommended for:

- Augmentation or reconstructive treatment of the alveolar ridges.
- Filling of infrabony periodontal defects
- Filing of defects after root resection, apicoectomy, and cystectomy
- Filling of extraction sockets to enhance preservation of the alveolar ridge
- Elevation of the maxillary sinus floor
- Filing of periodontal defects in conjunction with products intended for Guided Tissue Regeneration (GTR) and Guided Bone Regeneration (GBR)
- Filling of per-implant defects in conjunction with products intended for Guided
- Bone Regeneration (GBR)

Instructions for use

- After exposure of the bony defect with a mucoperiosteal flap, all granulation tissue must be carefully removed
- SYNERGY can be mixed with sterile standard saline. If large maxillofacial defects are present, SYNERGY should be mixed with autogenous bone in a ratio of approximately 1:1
- In order to assure the formation of new bone SYNERGY should only be placed in direct contact with well vascularized surface.
- Loosely pack SYNERGY granules into osseous defect using a sterile instrument. The use of excessive force will result in compression of the particles and loss of trabecular architecture.
- Overfilling of the defects should be avoided.
- Mucoperiosteal flaps should be sutured to achieve primary closure, if possible.
- If primary wound closure can not be achieved completely, further immobilization of the flap (e.g., by incision through the periosteum) should be performed and/or a bioabsorbable membrane should be placed over the bone graft site

Contraindications

Contraindications customary to the use of bone grafts should be observed. SYNERGY should not be used in patients with:

- Acute or chronic infection (osteomyelitis) at the surgical site
- Metabolic diseases (diabetes, hyperpara thyroidism, osteomalacia)
- Severe renal dysfunction.
- Severe liver disease.
- High dose corticosteroid therapy.
- Vascular impairment at the implant site.
- Osteoporosis.

Precautions

In order to facilitate the formation of new bone SYNERGY should only be implanted in direct contact with a well vascularized bone tissue. Drilling may be recommended to facilitate bleeding from cortical bone.
In larger defects a mixture of autogenous bone or bone marrow may improve the formation of new bone.
Excessive flap tension or rough handling of flaps may result in flap sloughing and loss of the implant.

Implantology

The placement of titanium fixtures should not take place until 6 months after implantation of Synergy.
For sinus floor elevation, typically 9-12 months should be allowed after implantation of bone graft material before placement of the titanium fixtures.
X-rays should be taken to confirm the bone integrity prior to dental implant placement.

Periodontology

The filling of periodontal defects with SYNERGY requires (along with plaque control) the successful local treatment of the periodontal lesion (e.g. root planning, debridement of granular tissue) prior to implantation.

Caution

Federal law restricts this device to sale by or on the order of a licensed dentist.

Adverse reactions

No adverse reactions have been reported.

How supplied

SYNERGY is supplied sterile, non bacterial endotoxin, and for single use only. Synergy is delivered in the following sizes and configurations:
SYNERGY cancellous-bone granulate:

Granule size: **0.840 mm – 2.0 mm**
Vials of 0.5 grams and 2.0 grams
Granule size: **0.350 mm – 0.840 mm**
Vials of 0.25 grams, 0.5 grams, and 2.0 grams
SYNERGY cancellous -bone block
Double-blister pack with 1 block
Block size: 1 cm x 1 cm x 2 cm.

The proper mixing ration and the wetting time

The proper mixing ratio for a 0.5 grams dose of SYNERGY Granule: 0.840 to 2.0 mm is between 0.35 – 0.40 ml of saline.
The proper mixing ratio for a 0.5 grams dose of SYNERGY Granule: 350 to 840 is between 0.50 – 0.55 ml of saline.
For both granules the wetting time is around 5 seconds.

Storage

Store at room temperature.

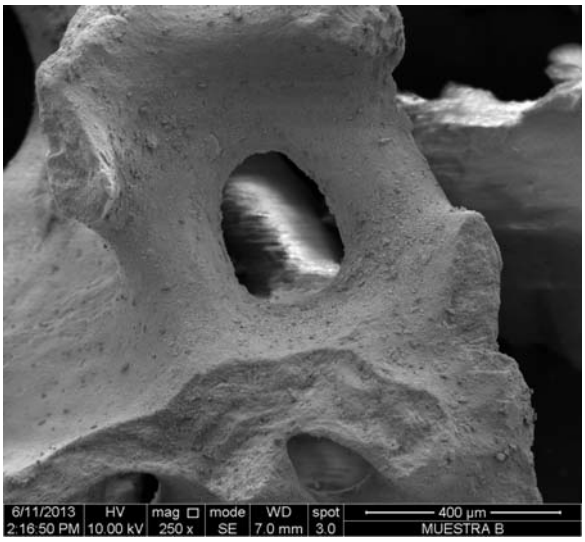
Manufacturer

ODONTIT S.A.
Necochea 854
Ciudad Autónoma de Buenos Aires
Argentina

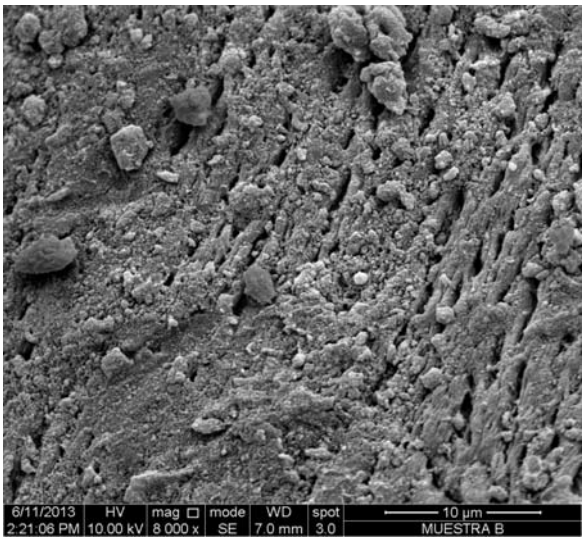
El producto Synergy , que se fabrica a partir de hueso bovino, presenta macro y micro poros interconectados que son similares a los que se reportan para el Bio-Oss. Esta propiedad permite utilizar al producto Synergy como material de relleno óseo.
Las imágenes SEM de la muestra Bio-Oss, denominada B y las de Synergy denominada: Lote H1306007 fueron obtenidas utilizando un microscopio electrónico de barrido (FEI QUANTA FEG 250). Ambos productos mostraron una estructura porosa, donde el tamaño, forma y distribución son causadas por el proceso de fabricación. Synergy tiene un sistema de poros interconectados. El tamaño de los mismos son similares a la estructura que presenta Bio-Oss.

BIO OSS

The following SEM image corresponds to Bio - Oss.
Pores between of 242.5 µm x 310 µm



Magnification 250X

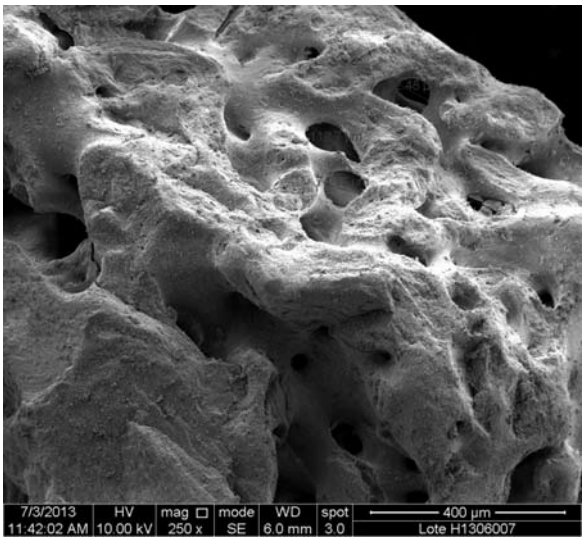


Magnification 8000X

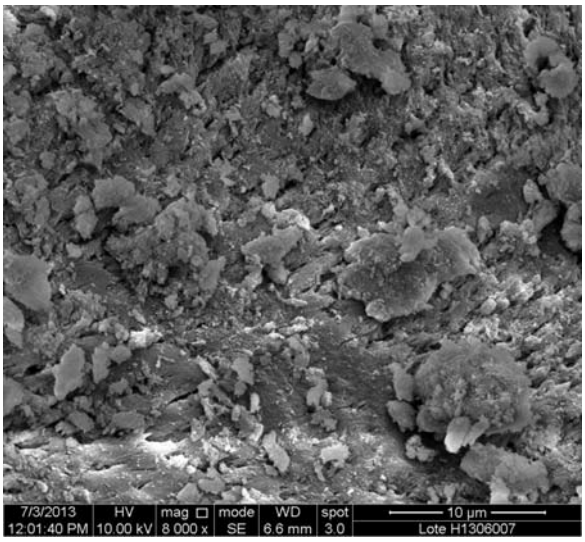
Synergy product, which is manufactured from bovine bone, presents macro and micro interconnected pores which are similar to those reported for Bio-Oss. This property allows to use the product as bone grafting material.
SEM images for Bio-Oss, sample B and Synergy sample Lote H1306007 were obtained using a scanning electron microscope (FEI Quanta 250 FEG).
Both products showed a porous structure, where the size, shape and distribution are caused by manufacturing process. Synergy has interconnected pores with a pore size similar to Bio-Oss.

SYNERGY BY ODONTIT

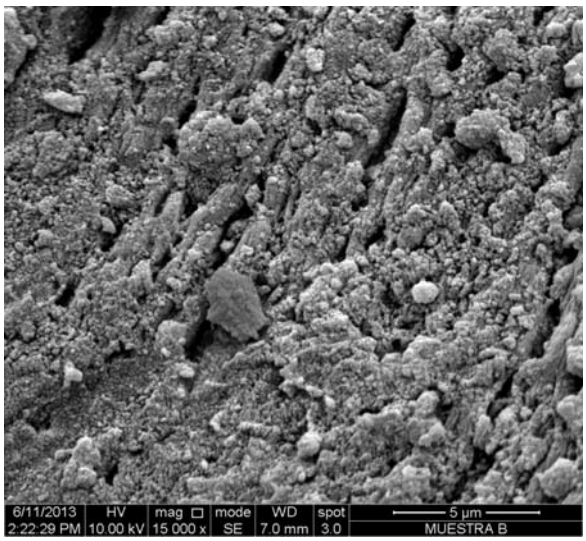
The following SEM image corresponds to Synergy.
Pores between 118 and 410 µm



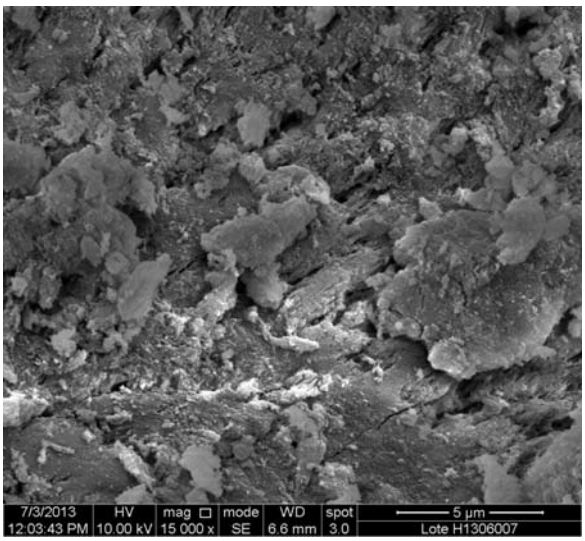
Magnification 250X



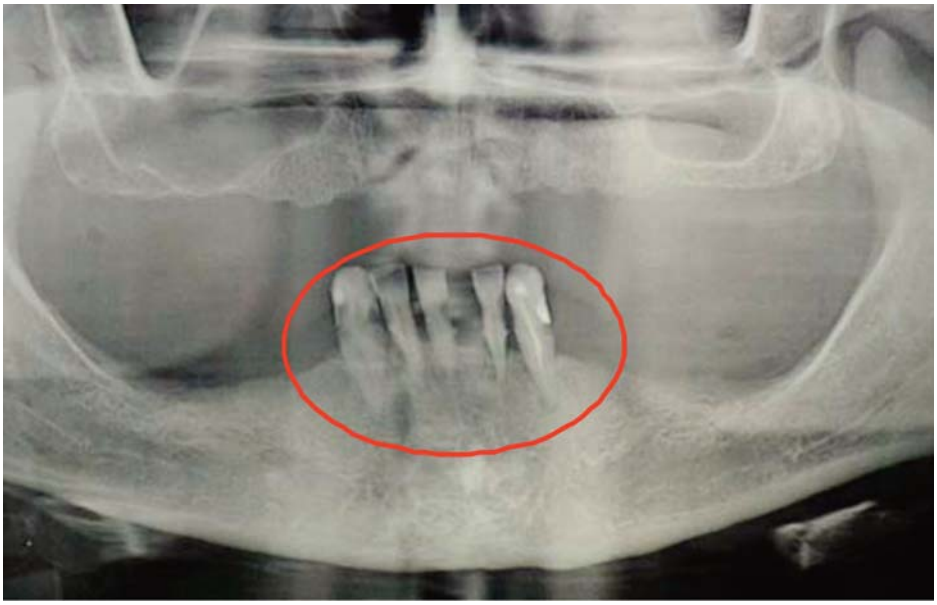
Magnification 8000X



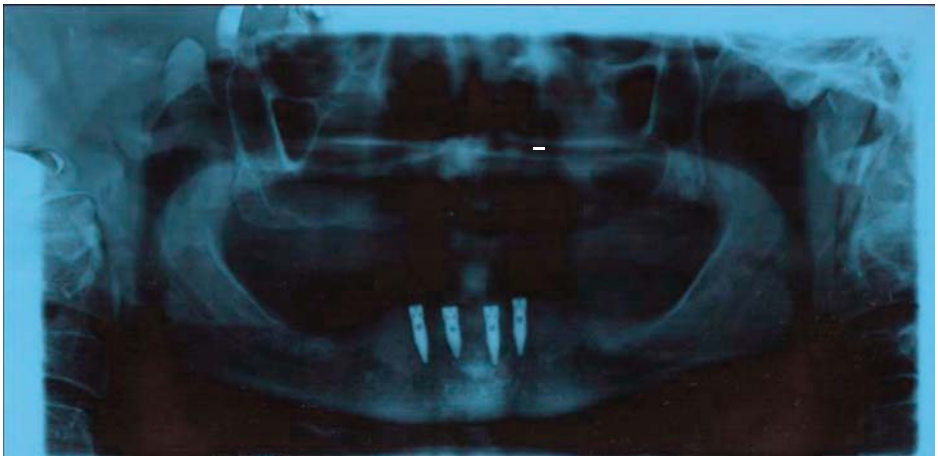
Magnification 15000X



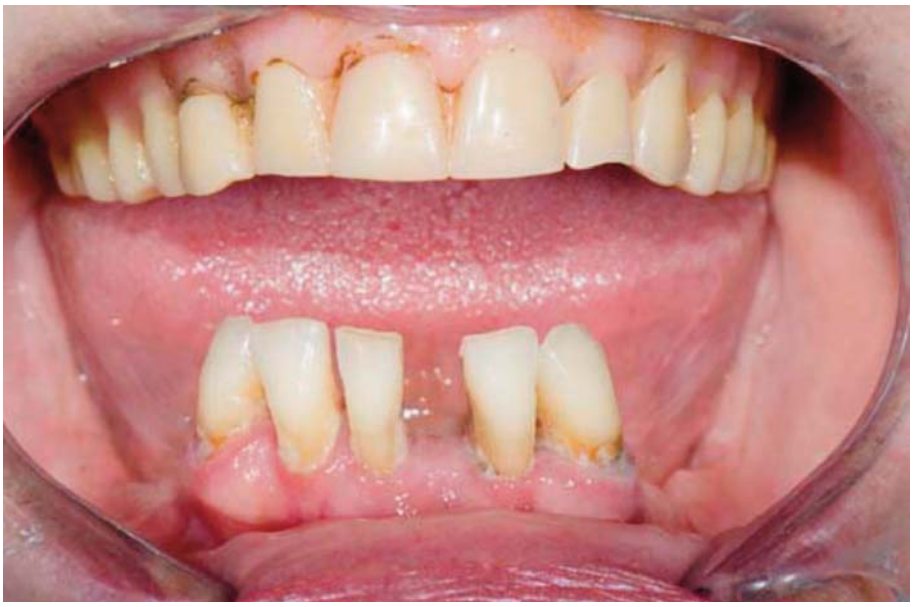
Magnification 15000X



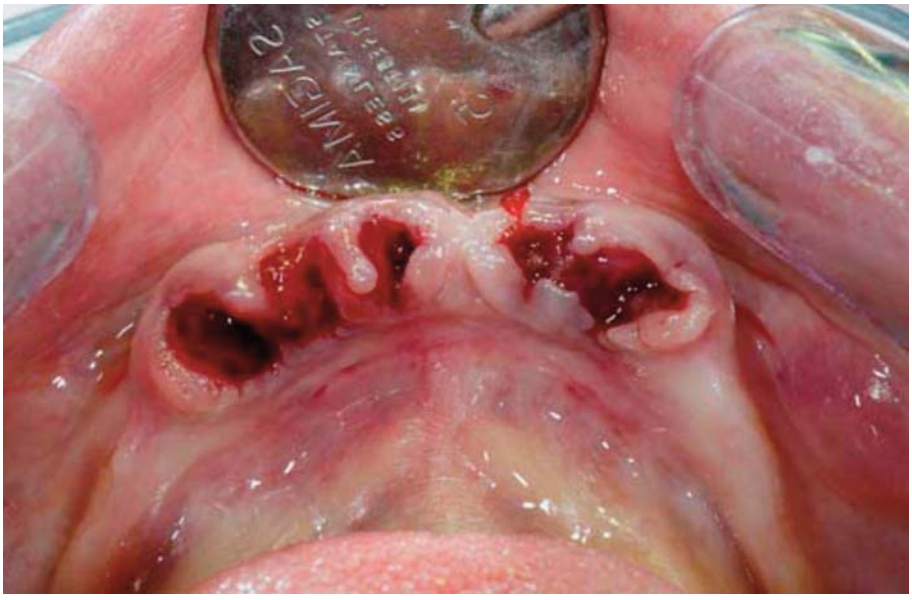
Panoramic Xr pre-surgical. Circle indicates the surgical area.



Panoramic Xr, post surgical with implants in place.

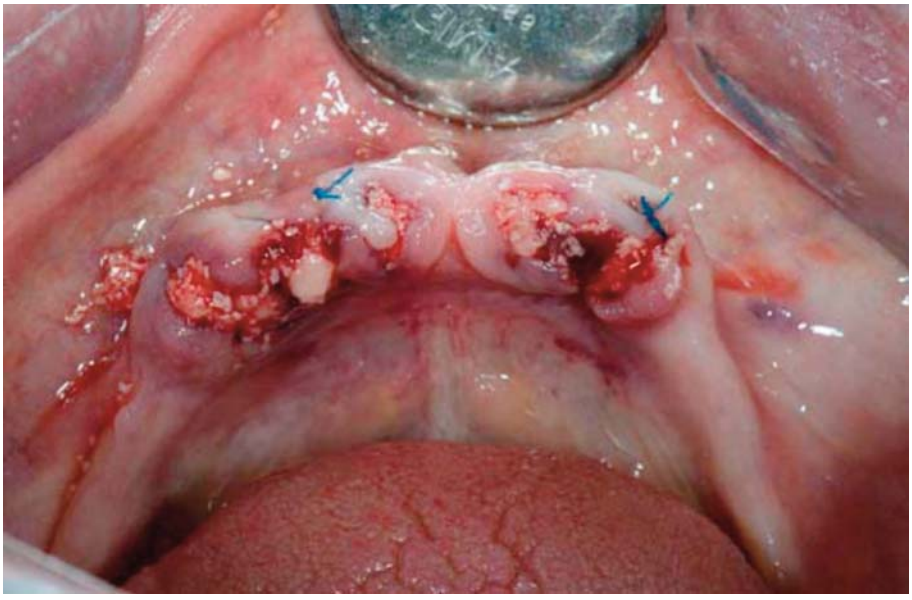


Pre surgical photography. Lower teeth to be extracted.



Post extraction sockets.

Synergy bovine bone grafting material.



Sockets filled with Synergy and suture in plac.

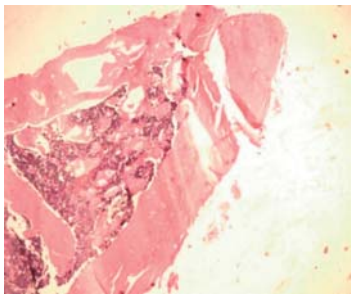
Summary Table

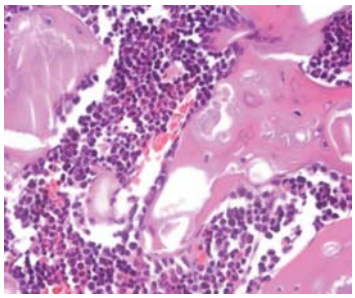
Analyzed Parameter	**Granule Size 350-840 microns**	**Granule Size 840-2000 microns**	**Synergy Block**
PH	7.0	7.0	7.0
Pore Distribution	0.7 – 50 µm	0.7 – 50 µm	0.7 – 50 µm
Surface Area	93,0 m^2/g +/-2 m^2/g	99,5 m^2/g +/-2 m^2/g	107 m^2/g +/-2 m^2/g
External Surface Area	93,0 m^2/g	95,0 m^2/g	109,0 m^2/g
Mesopore surface area	140 m^2/g	116,0 m^2/g	151,0 m^2/g
Pore Size	0.0154 µm	0.0144 µm	0.0120 µm
Total Pores Volume	0,36 cm^3/g	0,36 cm^3/g	0,32 cm^3/g
Interconnectivity	100%	100 %	100%
% Open Porosity	53%		
% Total Porosity	48%		
Obteined Density	3.42 g/cm^3 +/-0.1 g/cm^3.		

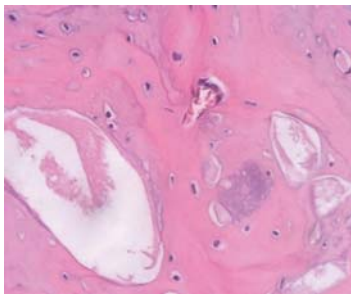
EXPERIMENTAL STUDIES

1) Rats

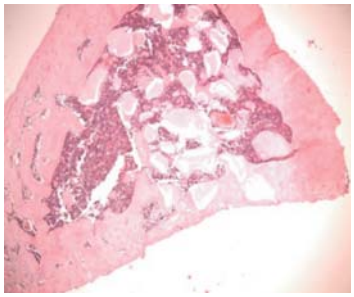
SYNERGY

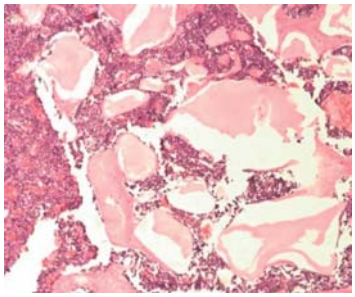

A

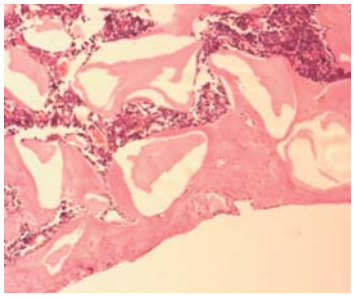

B


C

BIO OSS


D


E


F

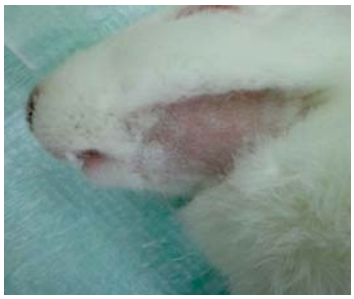
Histological observations of bone defects filled with Synergy (**A**, **B** and **C**) and Bio-Oss (**D**, **E**, and **F**). **A and D.** Cortical and medullary section.
B and E. bone marrow. Arrows indicate the presence of synergy/ bio-oss
C and F. Cortical. Arrows indicate negative images that where occupied with Synergy (**B** and **C**) and Bio-Oss (**E** and **F**) and the laminar bone tissue surrounding them.

Cross-sections of tibiae shows negative images of different sizes in the thickness of cortical bone, where the deffect was made to incorporate each biomaterial, integrating to the process of bone healing.

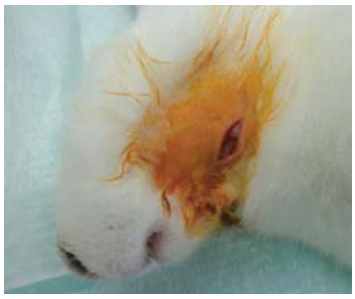
Multiple negative images of different shapes and sizes surrounded by laminar bone tissue can be observed in the medullary space which indicates that the both bone substitutes are osteoconductive.

No signs of inflammation were observed which indicates biological acceptability (Figure 5 A, B, C, D, E and F).

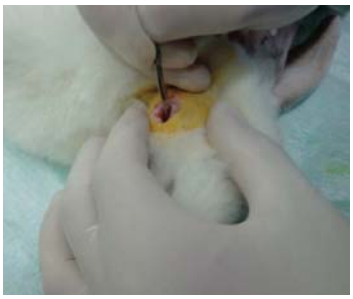
2) Rabbits



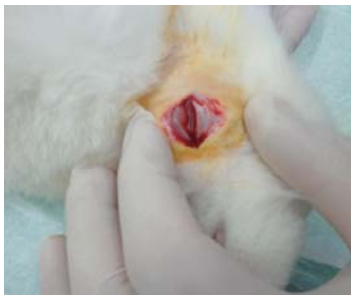
A



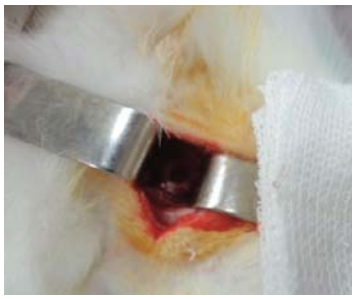
B



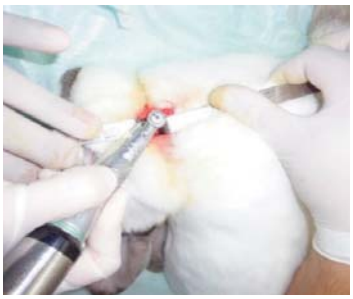
C



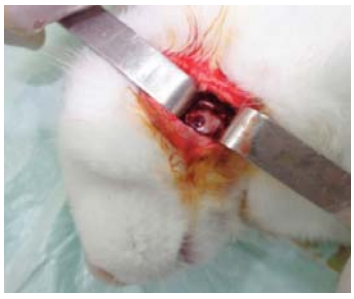
D



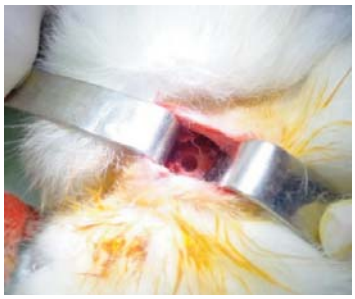
E



F



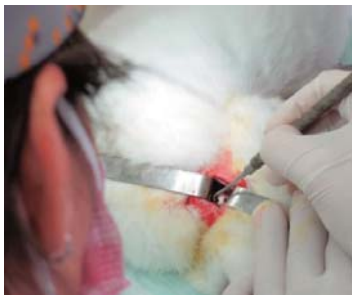
G



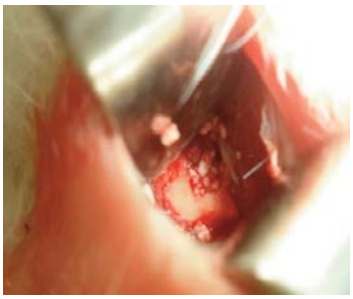
H

I

J

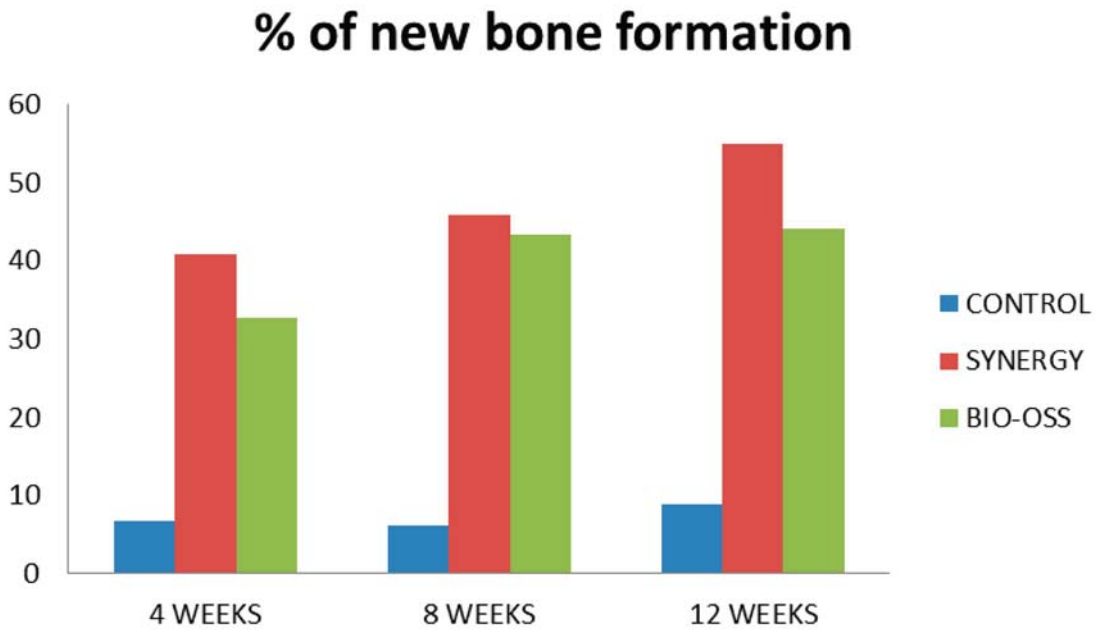


K

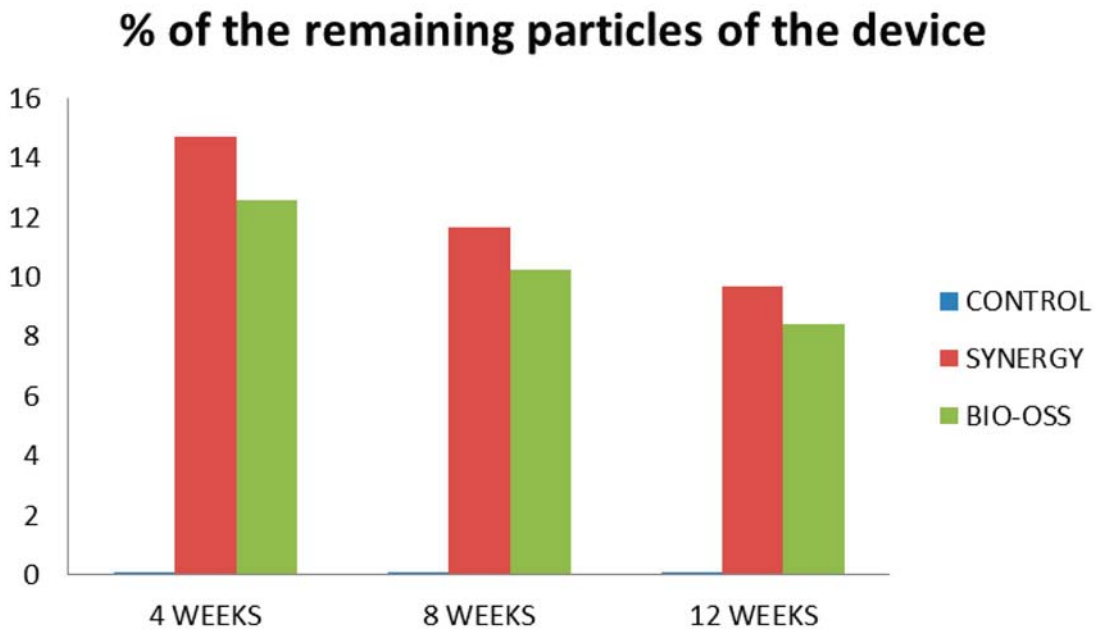


L

HISTOMORPHOMETRIC RESULTS



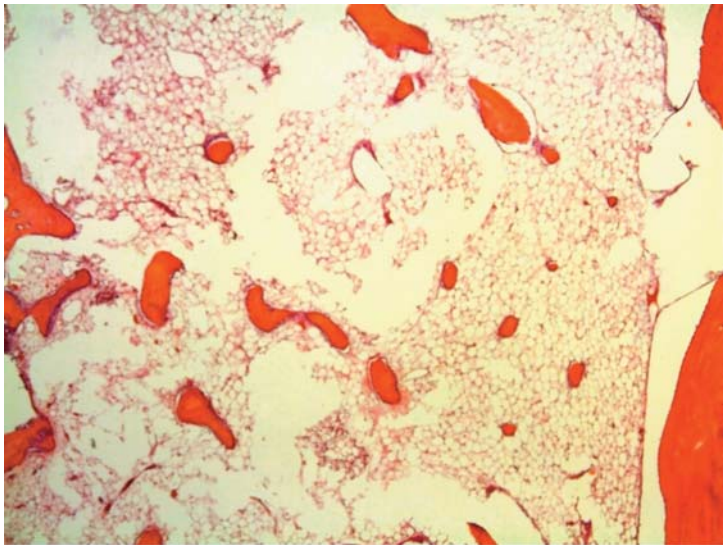
New bone formation plot for Synergy and Bio-Oss at different end-points.



Remaining of the particle of the bone grafts (Synergy and Bio-Oss) at different end-points.

For both Synergy and Bio-Oss, a trend was observed to increase bone volume as a function of time.

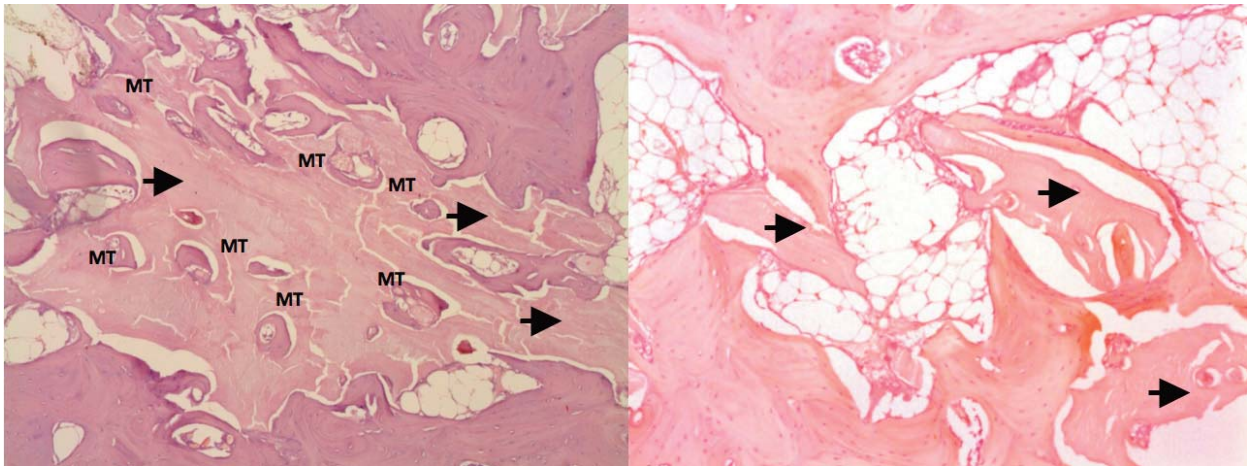
CONTROL



Control bone deffect. Magnification: 4x, (H-E)

4 WEEKS

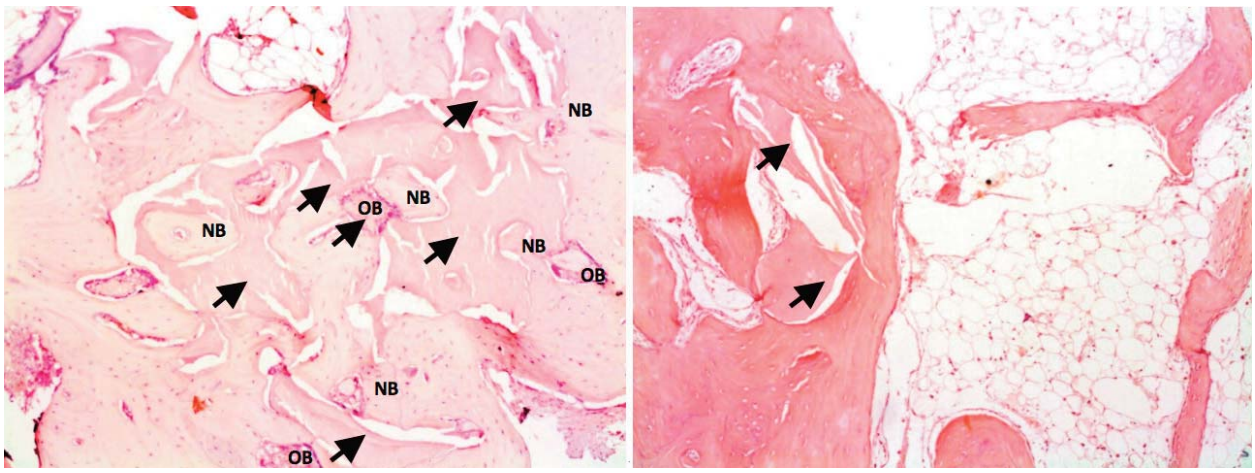
SYNERGY **BIO-OSS**



S: Arrows indicate Synergy bovine bone graft particles. Newly formed bone micro trabeculae (MT). (10x, H-E)
B: Arrows indicate Bio-Oss bovine bone graft particles. Newly formed bone micro trabeculae (MT). (10x, H-E)

8 WEEKS

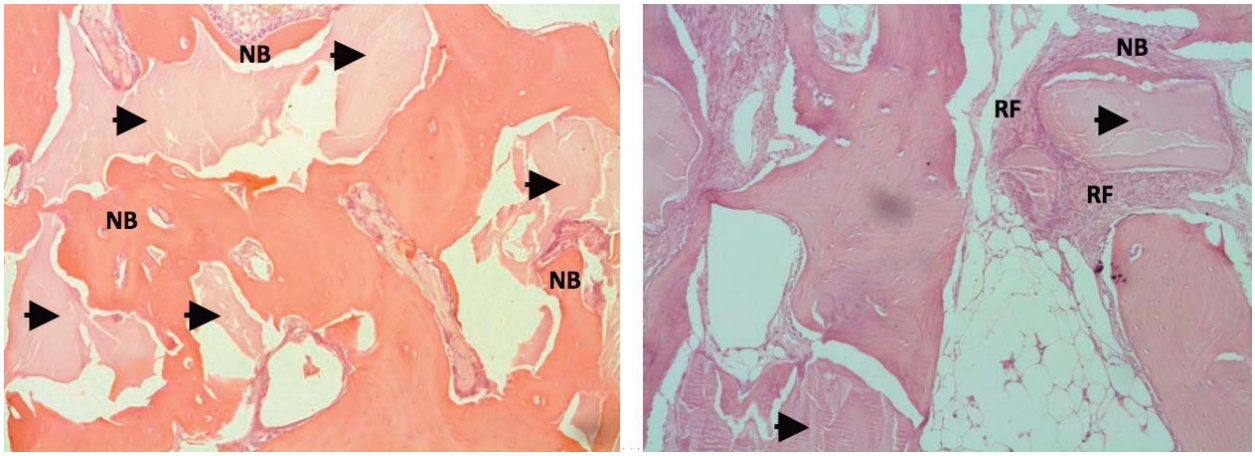
SYNERGY **BIO-OSS**



S: Arrows indicate Synergy particles. NB: new bone formation foci, OB: osteoblasts. (10x, H-E).
B: Arrows indicate Bio-Oss particles. (10x, H-E).

12 WEEKS

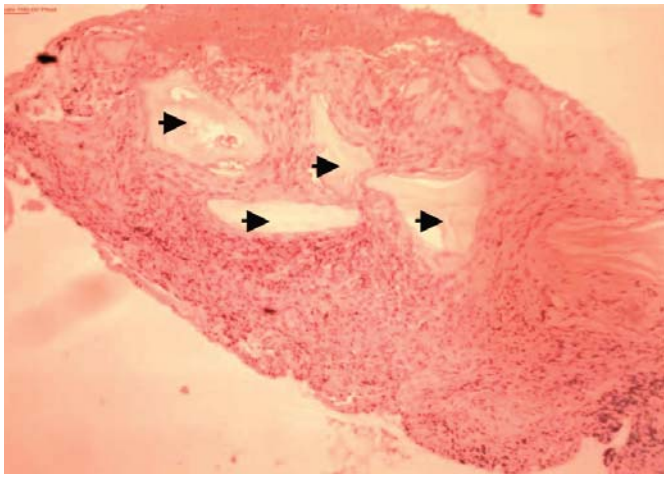
SYNERGY **BIO-OSS**



S: Arrows indicate Synergy. Newly formed bone trabeculae (NB). (10x, H-E)
B: Arrows indicate Bio-Oss. Presence of reparative fibrous tissue (RF) . Newly formed bone trabeculae (NB). (10x, H-E)

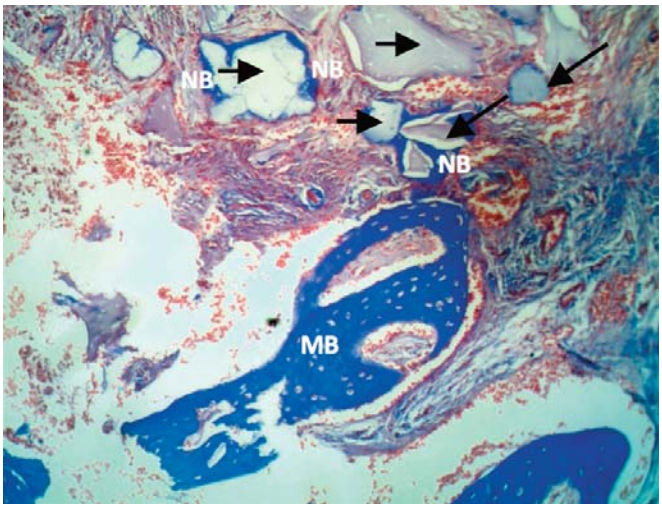
HUMAN CLINICAL CASES AND BIOPSIES

Clinical case I - 15 days



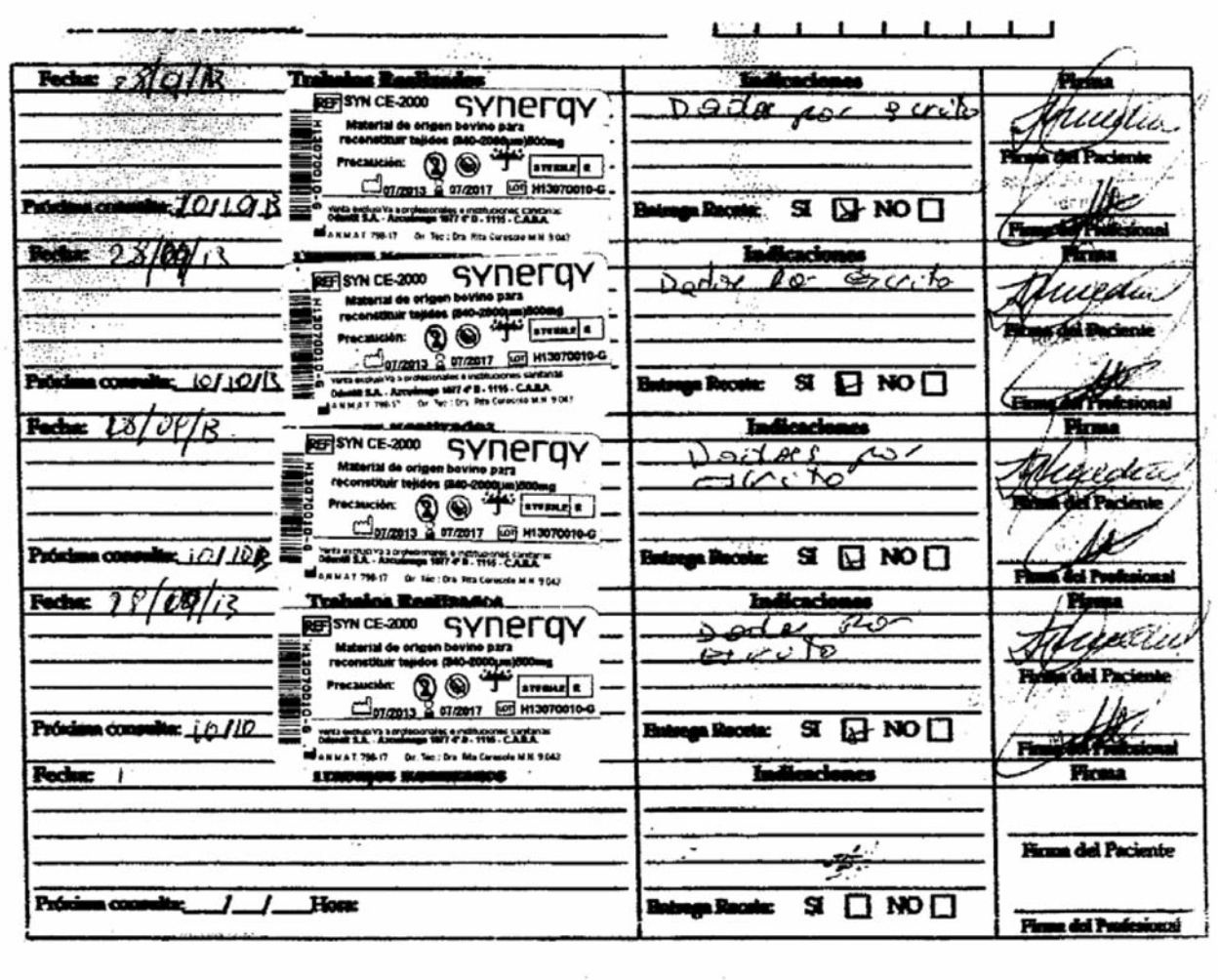
Photomicrography of a post-extraction socket filled with Synergy. Cross-setional cut. Magnification: 10xHematoxilin- eosin. Synergy deposit (Arrows).

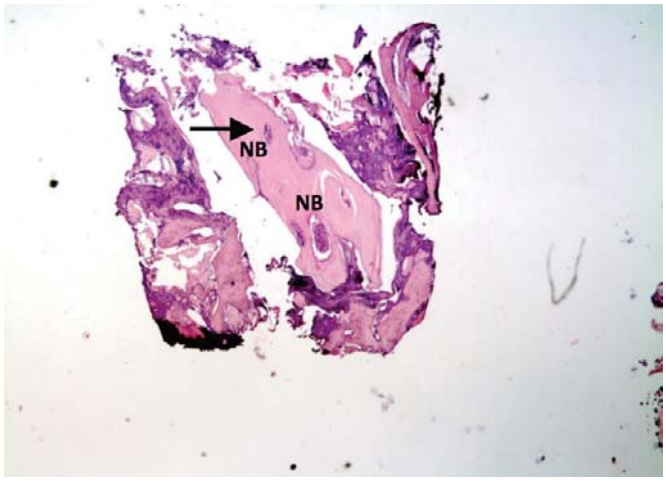
Clinical Case II - 90 days



Photomicrography of peri-implant defect filled with Synergy. Cross-setional cut. Magnification: 10x, Masson´s trichrome and anilin blue. Presence of bone neotrabeculae (NB).Synergy deposit (Arrows) and mature trabecular bone (MB).

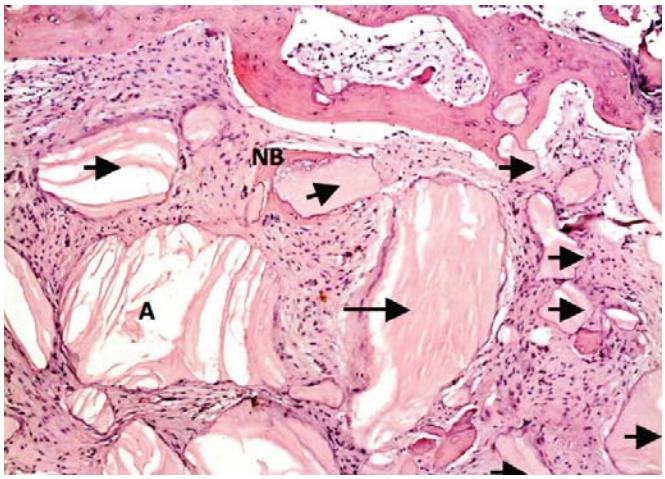
Clinical Case III - 110 days



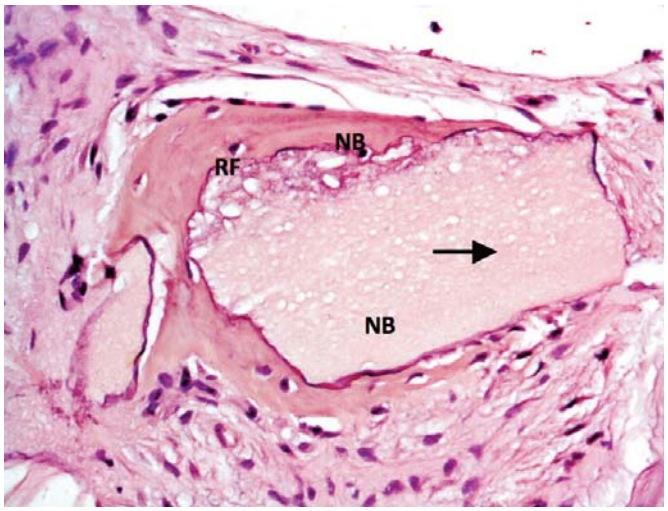


Arrows indicate Synergy graft and NB the presence of neoformation foci. (4x, H-E).

P.32

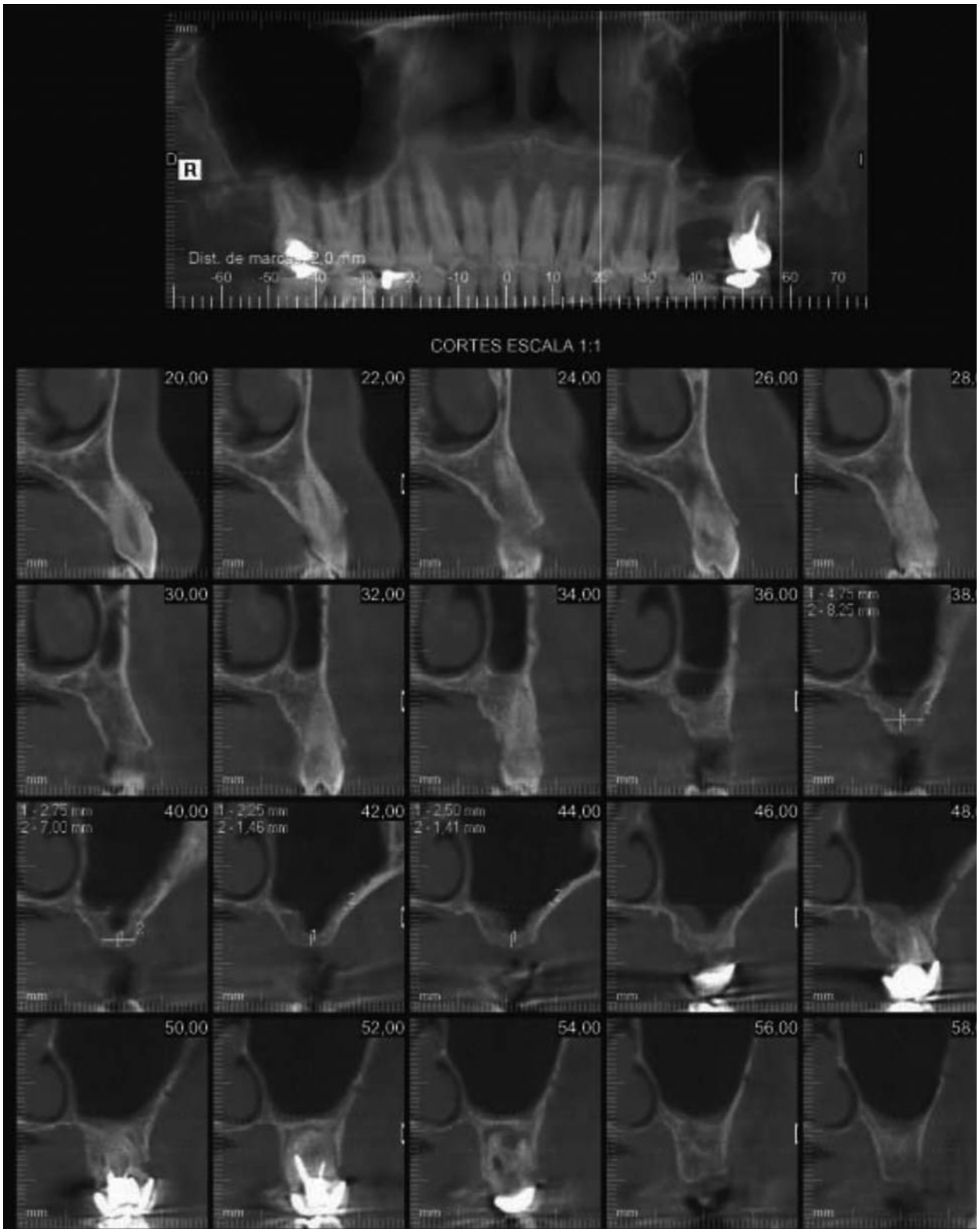


Arrows indicate Synergy graft. Presence of new bone trabecula (NB), Synergy deposit witn lamellar artifact (A). 10X, H-E.

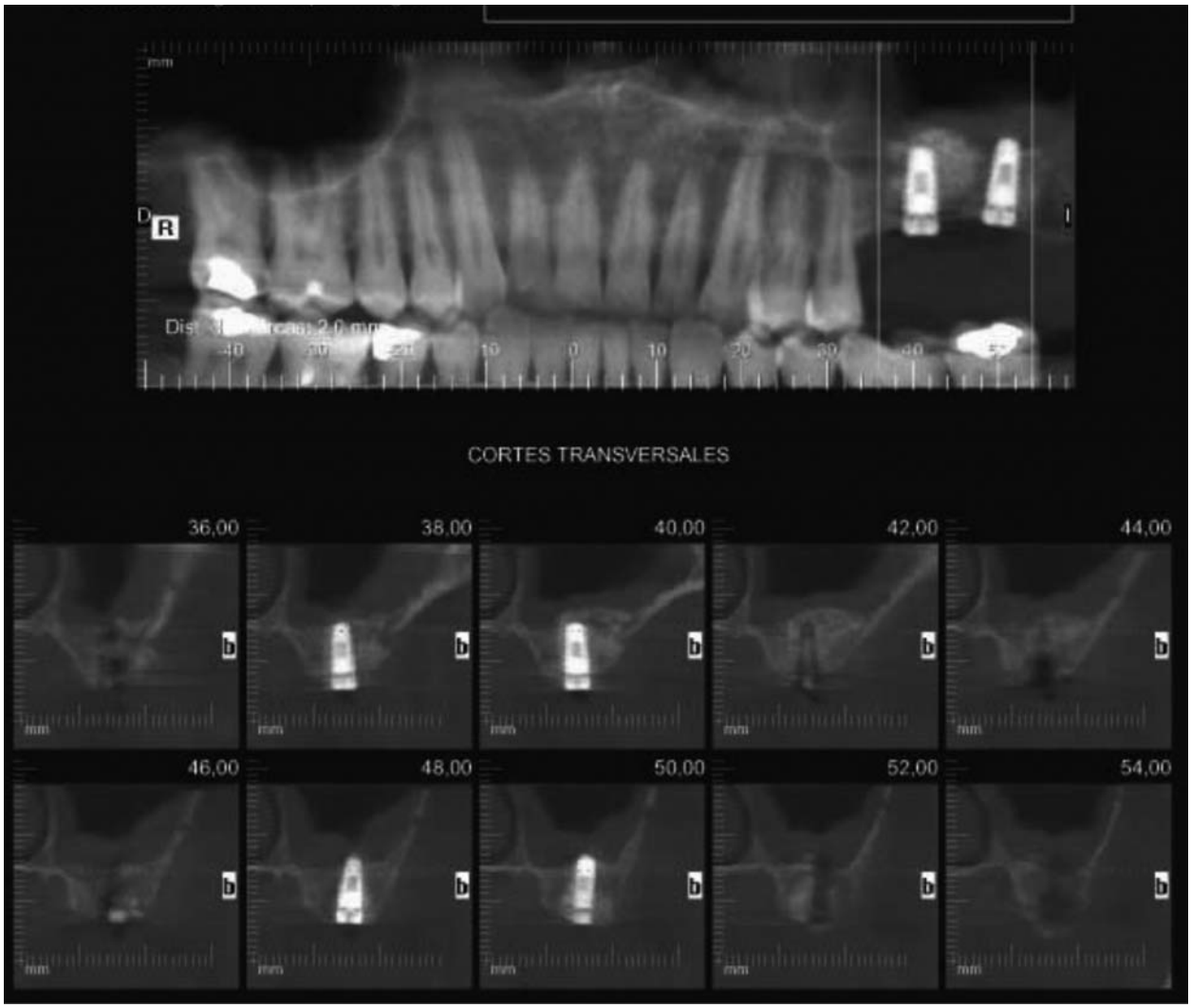


Photomicrography of the previous image. (40x, H-E). Arrows indicate Synergy graft. Presence of new bone trabecula (NB), Residual fibrosis area (RF).

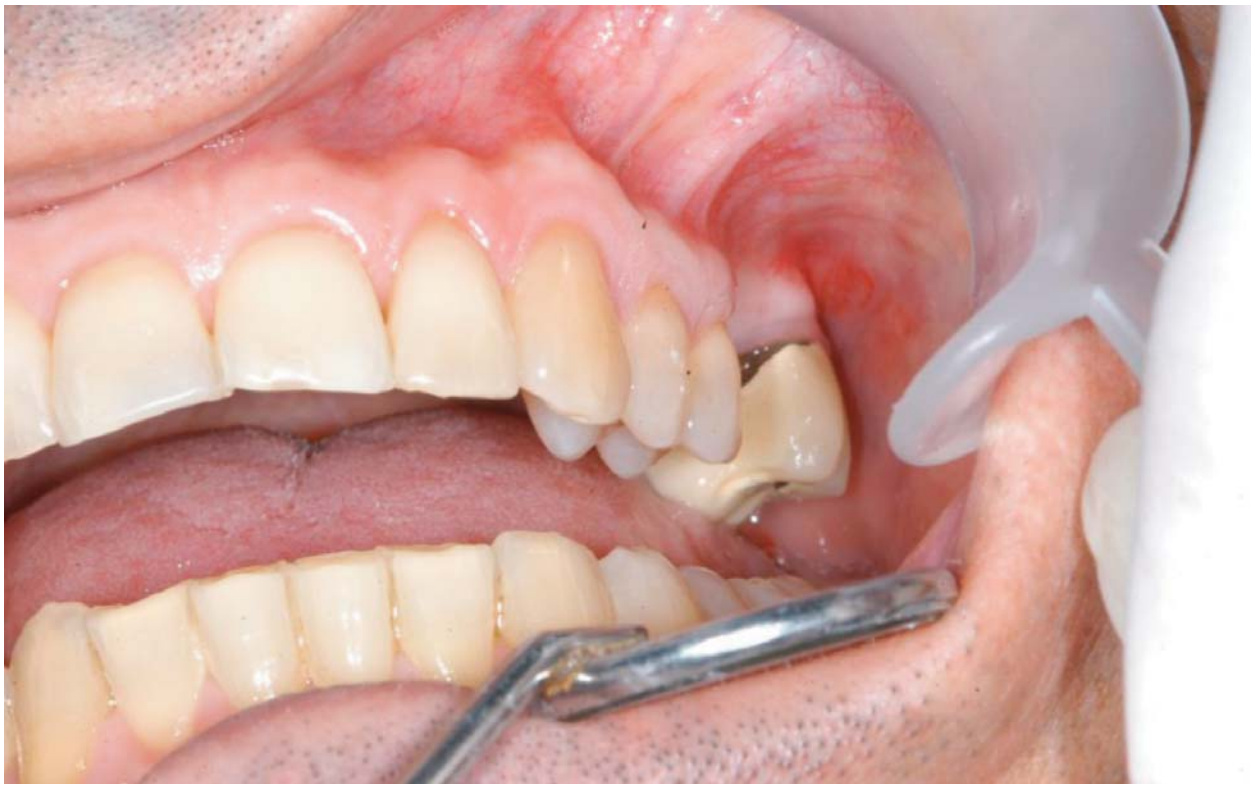
Climical Case IV - 120 days

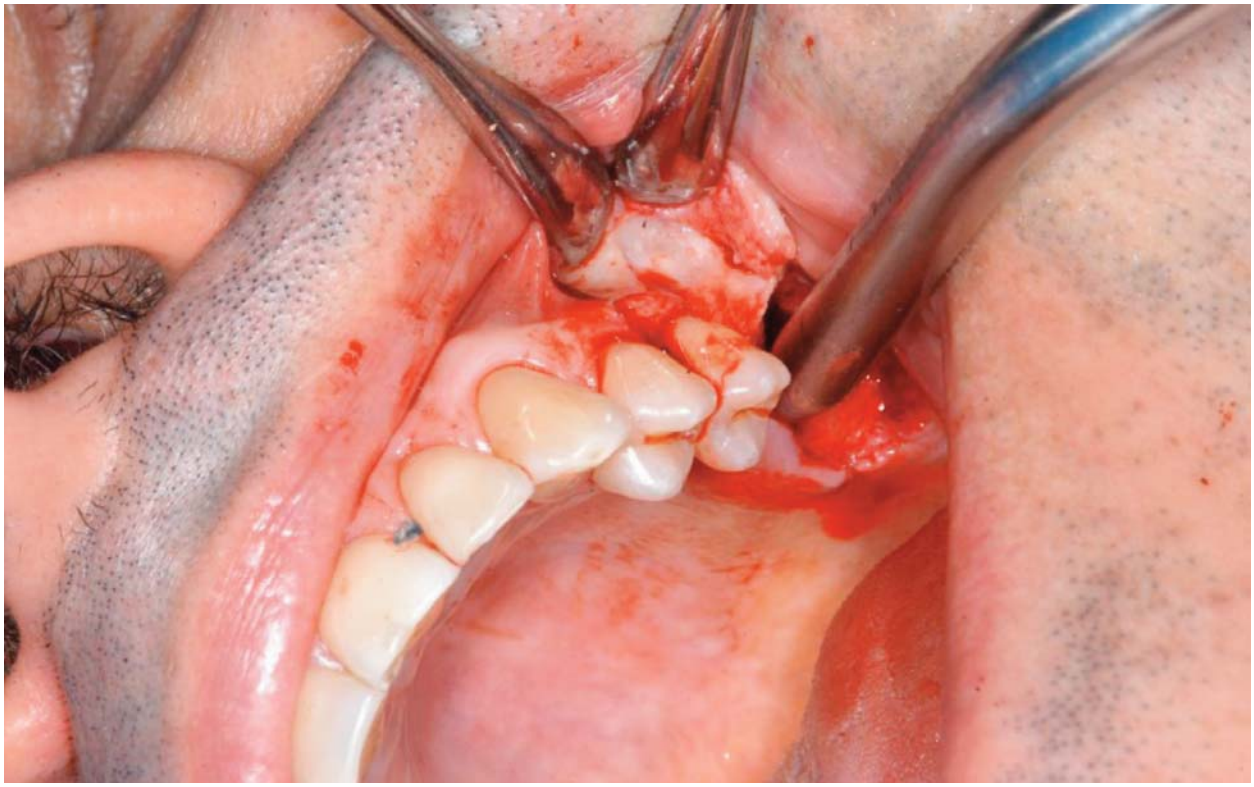


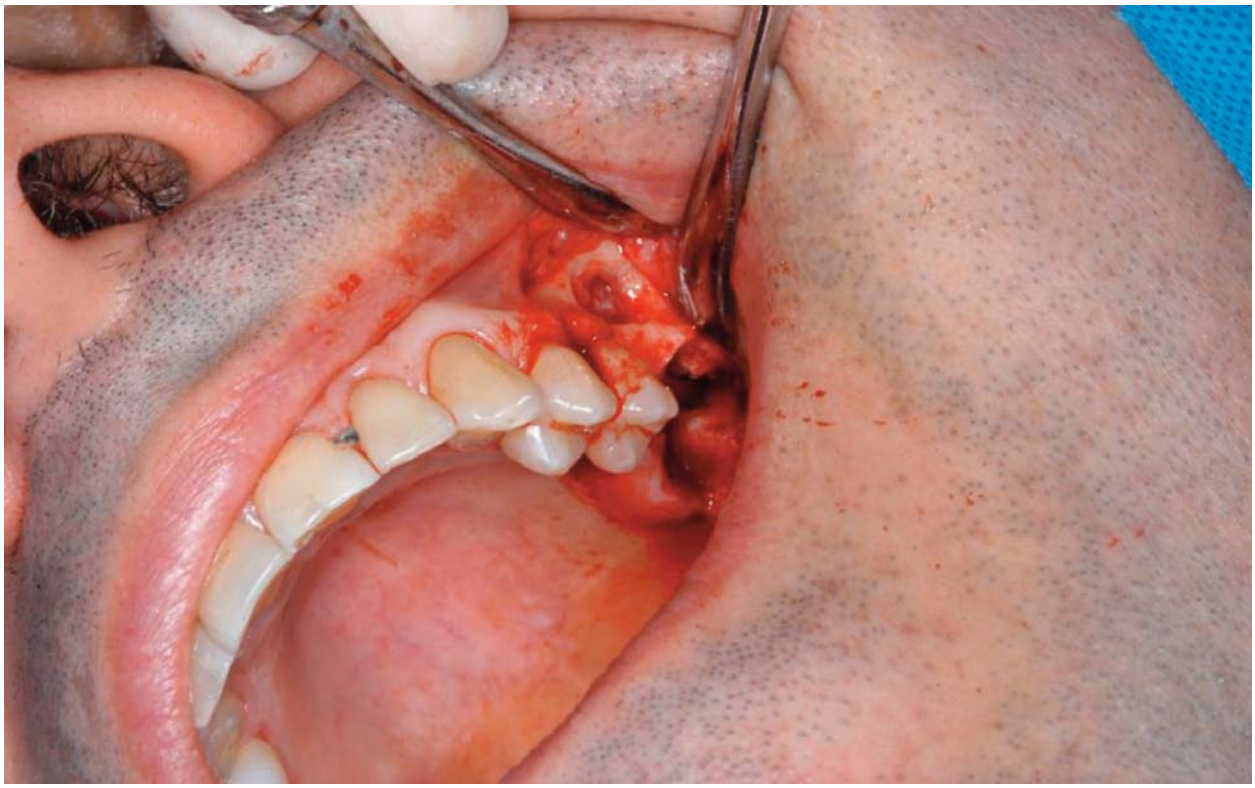
Pre surgical CAT. Circles indicates implantation area.



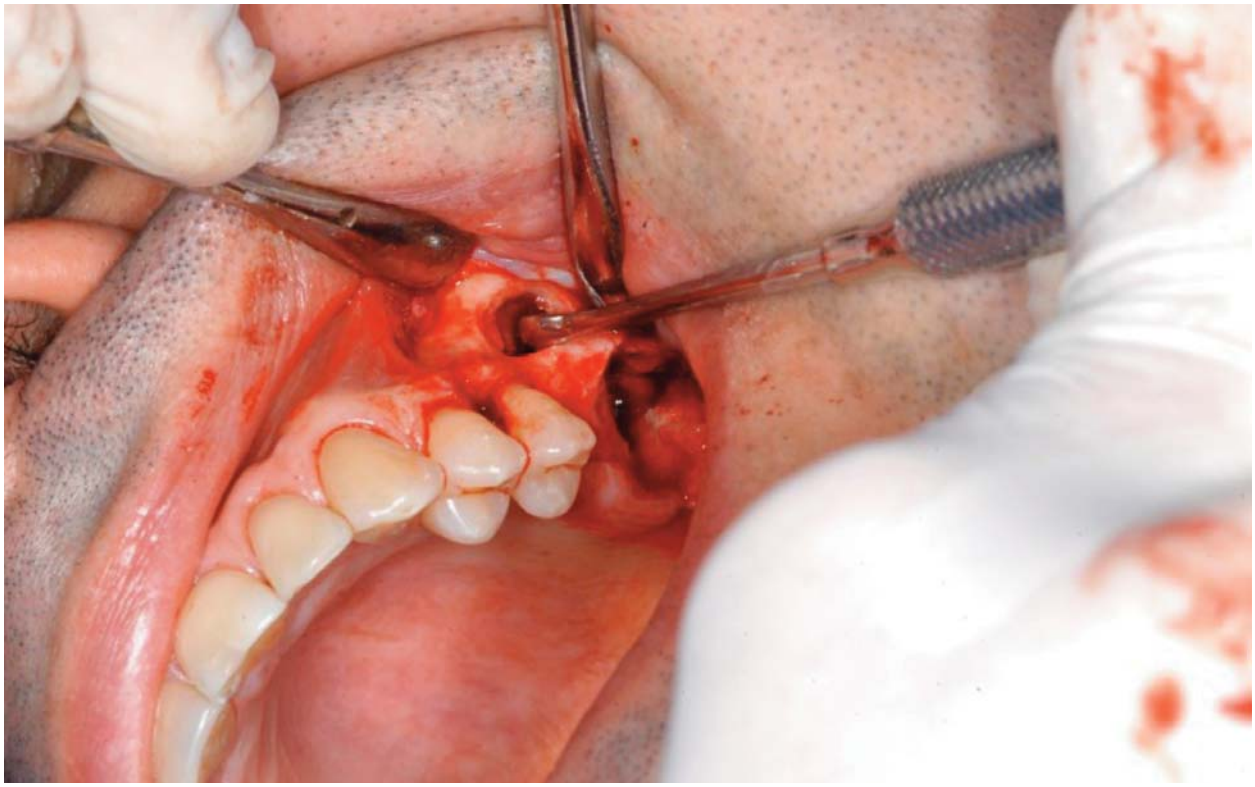
Post surgical CAT showing sinus elevation (left side) and implants placement. Arrows indicates the presence of Synergy.

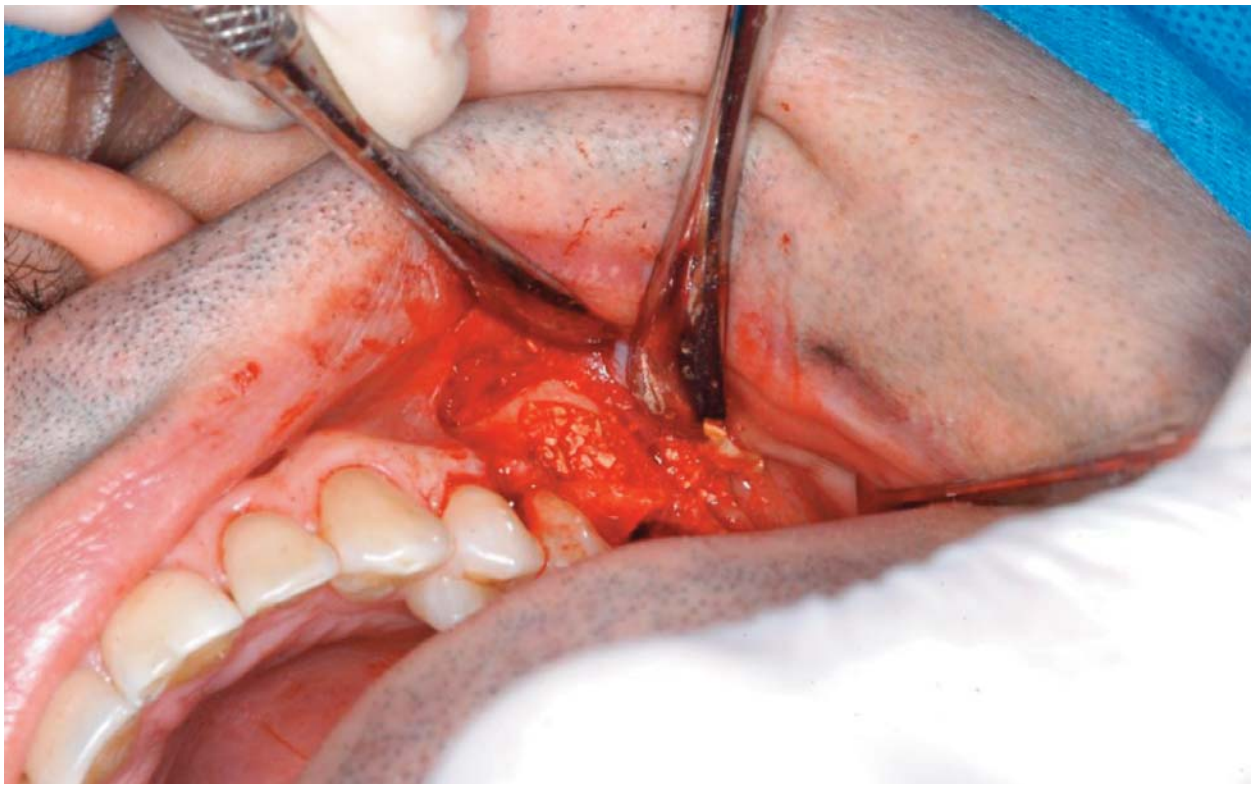




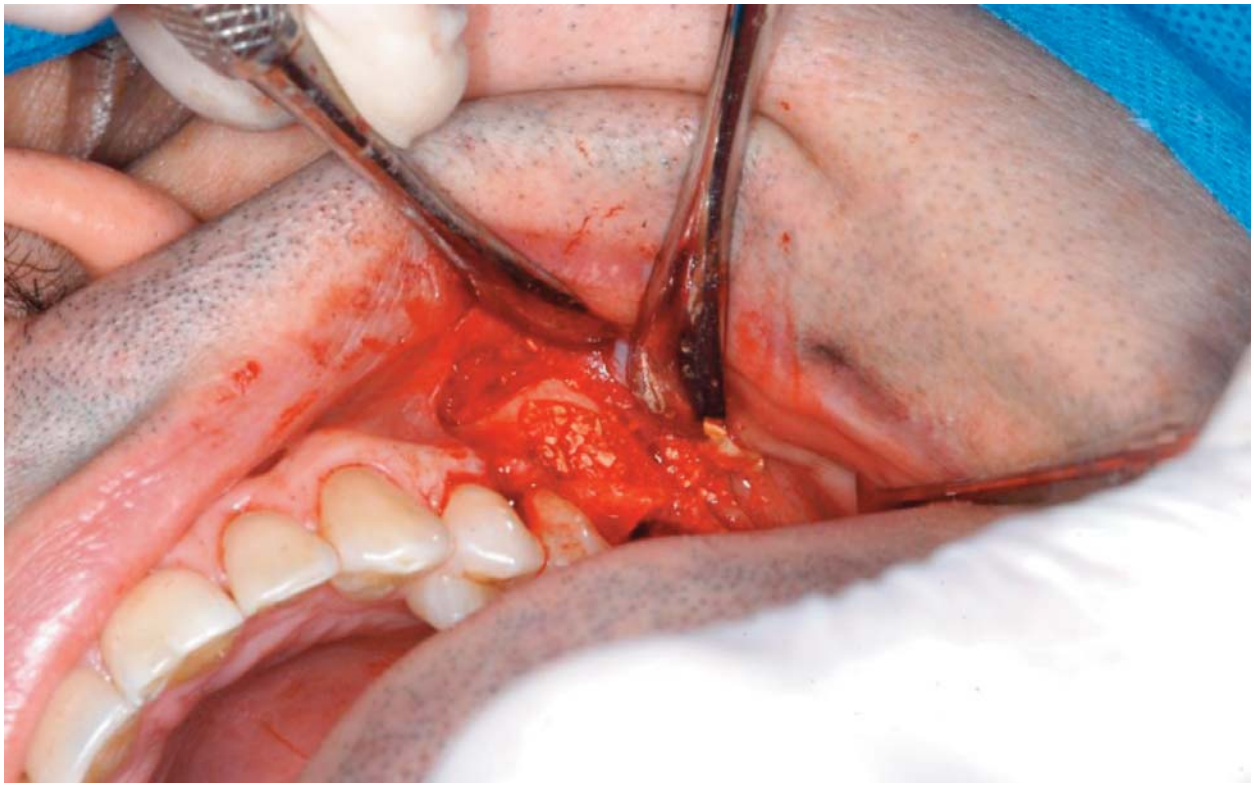


Sinus lifting surgery.

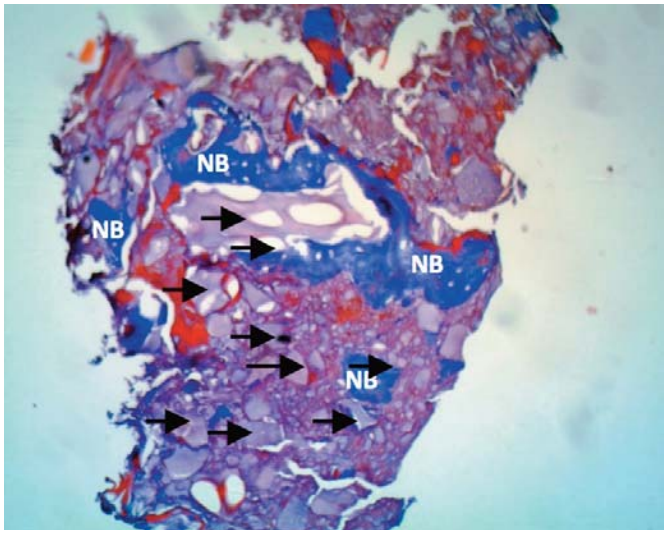




Sinus elevation with Synergy grafting material.



Sinus elevation with Synergy grafting material.



Photomicrography of right sinus floor elevation with Synergy. Cross-setional cut. (4x, Masson´s trichrome and anilin blue). Arrows indicate Synergy deposit. Presence of trabecular bone neoformation (NB).

SUBSTANTIALLY EQUIVALENT

Based upon comparison of the intended use, biocompatibility, sterility, physical and chemical testing, and the performance evaluation of the subject and predicate device in an anatomically relevant animal model, and the results of clinical cases, Odontit concludes that SYNERGY is substantially equivalent to the predicate devices Bio-Oss™ and Equimatrix™.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Food and Drug Administration
10903 New Hampshire Avenue
Document Control Center – WO66-G609
Silver Spring, MD 20993-0002

Re: K123876
Trade/Device Name: Synergy
Regulation Number: 21 CFR 872.3930
Regulation Name: Bone Grafting Material, Animal Source
Regulatory Class: II
Product Code: NPM
Dated: May 19, 2014
Received: May 19, 2014

We have reviewed your Section 510(k) premarket notification of intent to market the device referenced above and have determined the device is substantially equivalent (for the indications for use stated in the enclosure) to legally marketed predicate devices marketed in interstate commerce prior to May 28, 1976, the enactment date of the Medical Device Amendments, or to

Project Manager: Mario Gersberg, Architect
Scientific Consultant: Dr. Gretel Pellegrini, PhD
Date started: March, 2011
Date ended: May 2014
Special Thanks to:
Miguel Angel Pellegrini, DDS
Gabriel Noriega, DDS
Ricardo Georgiett, DDS
Reynaldo Gomez Sarno, DDS
Lucio Caceres, DDS
Fernando Cueva, MD

Odontit Argentina
TEL: (+54) 11- 4825-0221
info@odontit.com
Azcuénaga 1077 • 4ºD • Buenos Aires.