

Modern Nanomedicine & Nanobiotechnology in Maxillofaciale Surgery and Stomatology

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Abstract

Nanomedicine-trend in modern medicine, based on the use of the unique capabilities of nanomaterials and nano-objects for the selection, design, and changes in biological systems on human low-molecular level.

Keywords: Modern Nanomedicine; Nanobiotechnology; Surgery; Stomatology

Introduction

Nanotechnology- an interdisciplinary field of fundamental and applied science and technology, which consists of a combination of theoretical study and

practical research methods, analysis and synthesis, as well as methods of production and application products with a given atomic structure by controlled manipulation of individual atoms and molecules (Figure 1) [1].

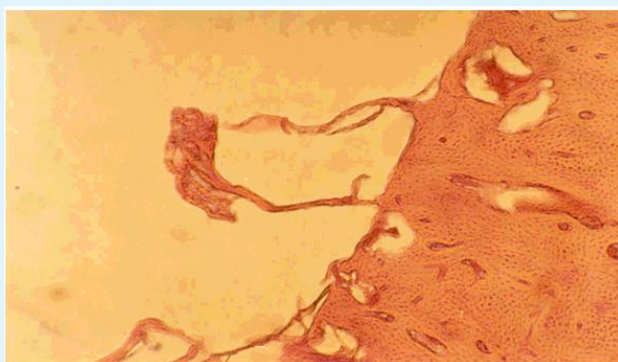


Figure 1: Cooperation of biocomposit with bone-osteointegration, dense fitting closely of bone

Artificial bone (biocomposites), bioactive inorganic multiphase composite material (synthesized on the basis of nanocrystals gidroksilapatit, tricalcium- phosphate, bioactive glass, mixed oxides of metals and nonmetals),

similar in composition to natural bone mineral and intended to restore it with different pathologies Figures 2 & 3.

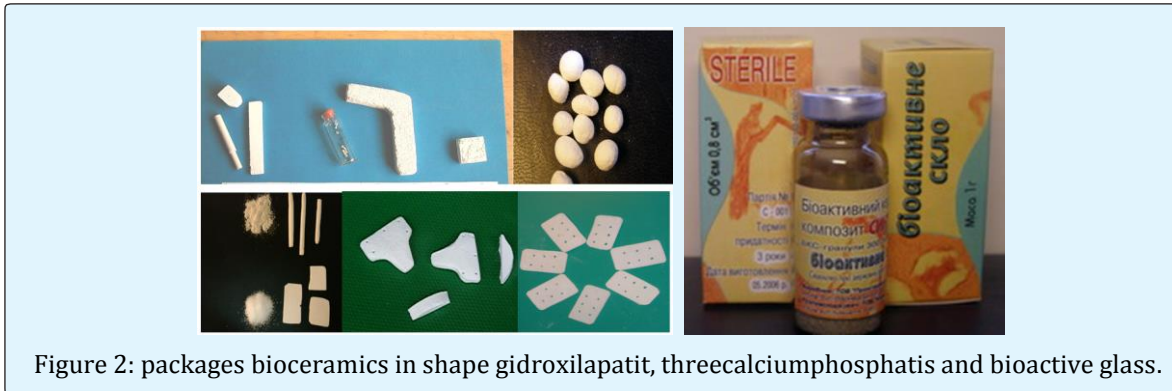


Figure 2: packages bioceramics in shape of hydroxylapatite, tricalcium phosphate and bioactive glass.

System of artificial bone are multifunctional materials, as they have the ability to osseointegration, osteoconduction, osteoinduction, osteostimulation and osteogenesis Figure 4 [2,3].

After the occurrence of bone-ceramic complex in the body material is partially or completely resorbed at the planned time-from 1,5-2 months- to several years, being replaced by bone tissue, which consists of products of resorption and synthesis.

Mechanism, the nature and rate of resorption is planned and managed composition and structure of complex artificial bone.

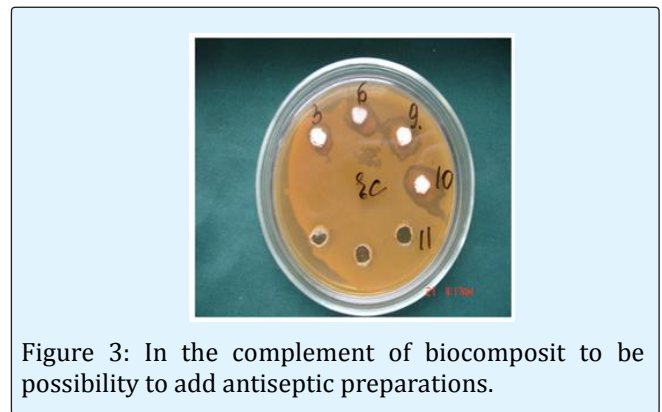


Figure 3: In the complement of biocomposite to be possibility to add antiseptic preparations.

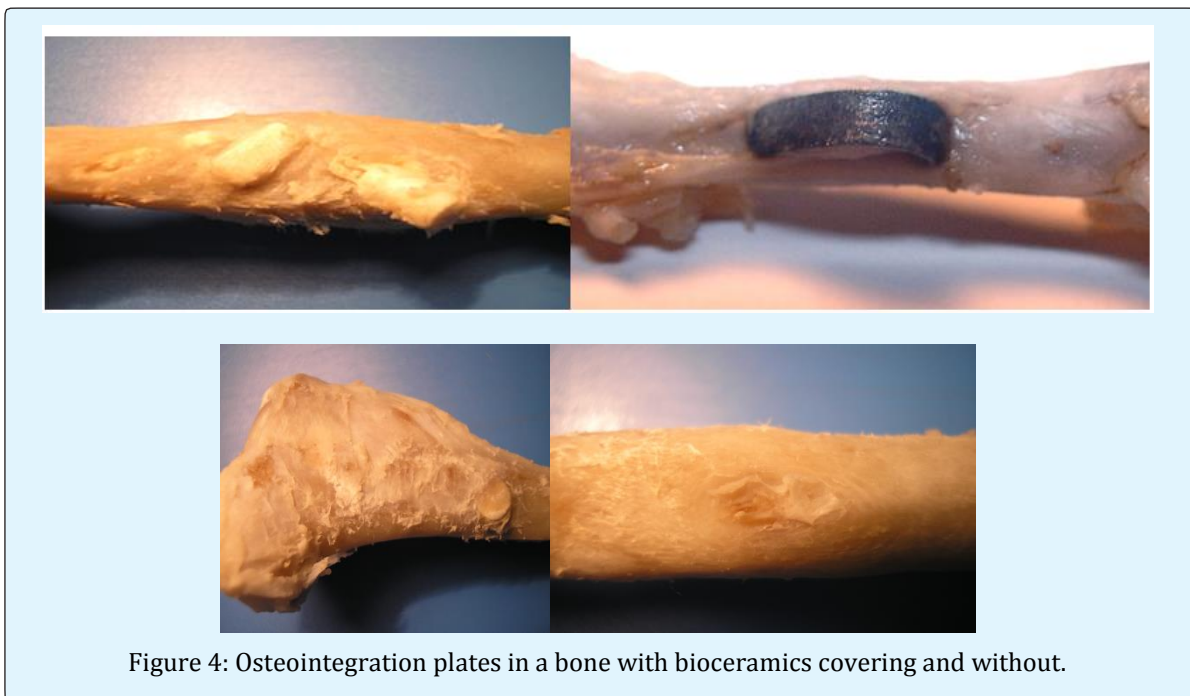


Figure 4: Osteointegration plates in a bone with bioceramics covering and without.

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Selection of nonresorption of the complex, which firmly holds the specified shape and volume, such as

alveolar jaw. Biocomposit contains only the highest biocompatibility of inorganic constituents, which do not cause abnormal immune reactions, and inorganic bactericidus supplements, preobstruction inflammatory complications.

Due to the absence of organic components is possible multisterilization of reusable material. The using of autologous bone-may be replaced and supplemented by using of modern bioactive ceramics with the planned biological properties (Figure 5).

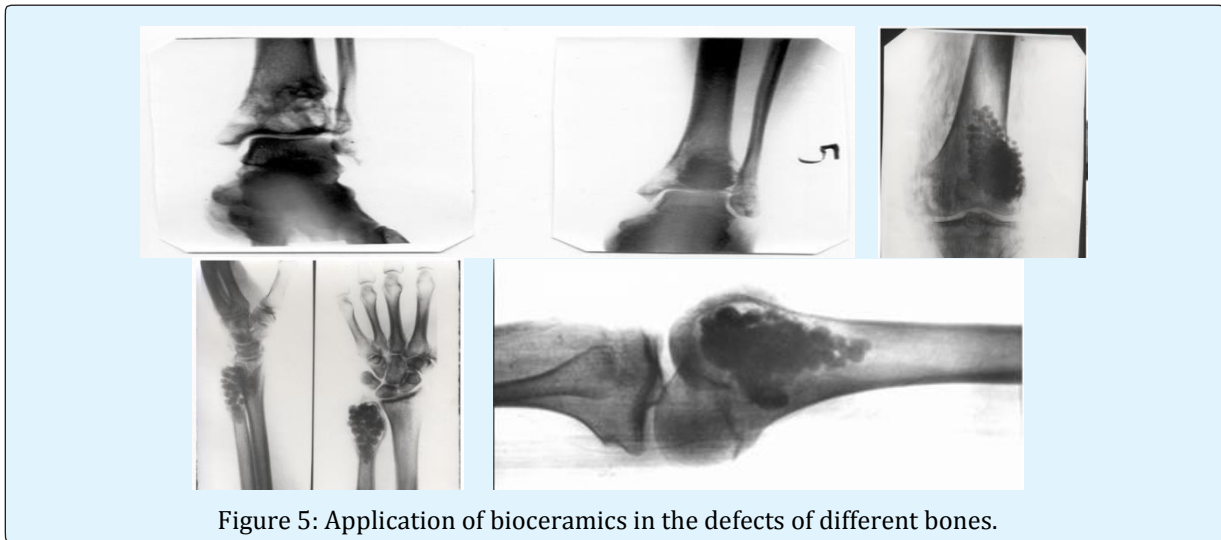


Figure 5: Application of bioceramics in the defects of different bones.

Using of biocomposites in oral and maxillo-facial surgery is possible (Figure 6):

-For replacement elements maxillo-facial bones and joints.

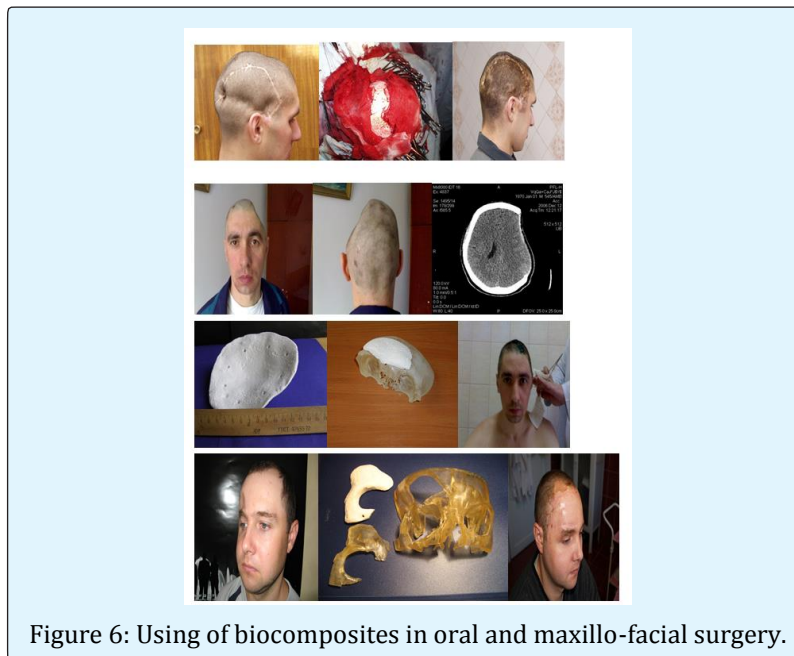


Figure 6: Using of biocomposites in oral and maxillo-facial surgery.

- To fill the bone cavities after capsulotomy and cystectomy, treatment of osteomyelitis.
- To form the bone wall with perforated sinusitis.
- For bone grafting in plastic surgery.
- To fill bone defects.
- For a sinus-lift. (Figure 8)
- At chronic sinusitis

- In stomatology (Figure 7)[4-6]:
- For the filling of periodontal defects.
 - To fill the holes removed teeth.
 - When you atrophy of alveolar bone in the jaw bone for augmentation.
 - For obturating dentinal canals.
 - In a deep root canal fillings, including extraapix therapy.

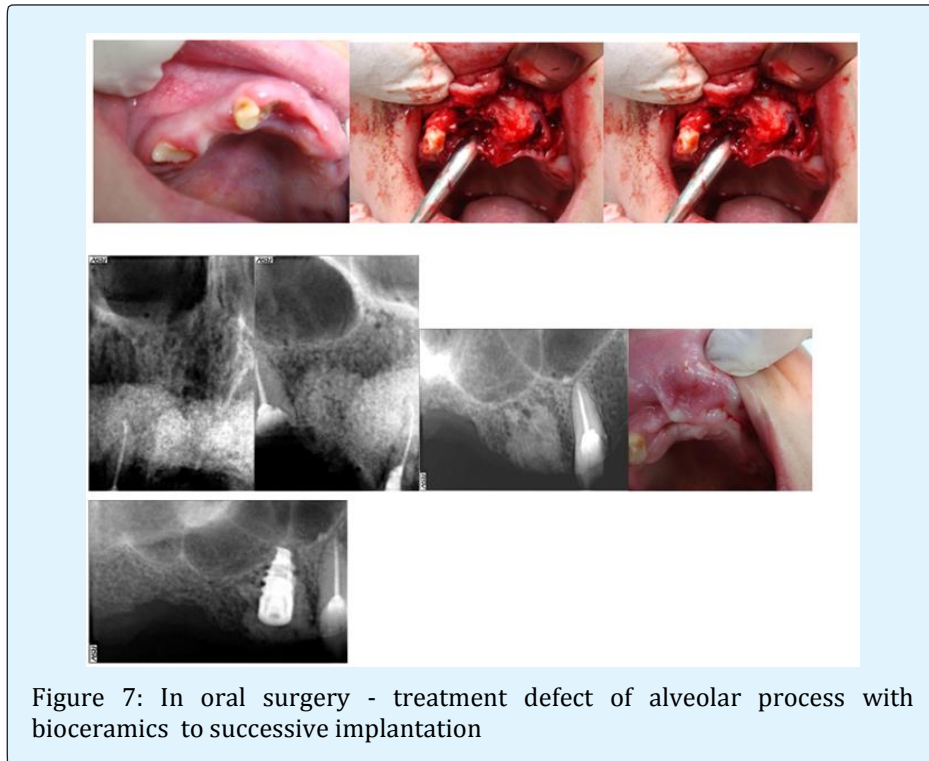


Figure 7: In oral surgery - treatment defect of alveolar process with bioceramics to successive implantation

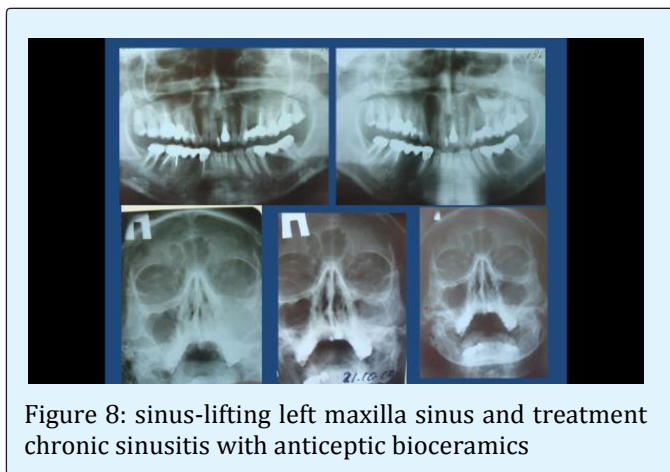


Figure 8: sinus-lifting left maxilla sinus and treatment chronic sinusitis with antiseptic bioceramics

Thus, modern biocomposites represent the latest concept in the development of bioactive inorganic materials for reconstruction of bone tissue.

References

1. Drexler KE, Peterson C, Pergamit G, Brand S (1991) Unbundling the future: The nanotechnology revolution.
2. Roco MC (2001) International strategy for nanotechnology research and development. *Journal of Nanoparticle Research* 3(5-6): 353-360.
3. Rybachuk AV, Rieznichenko LS, Dybkova SN, Gruzina T, Ulberg Z, et al. (2014) Prospects of using silver and gold nanoparticles in the prevention and treatment of purulent-inflammatory diseases of the maxillofacial

area. Ukrainian scientific and medical youth magazine 4: 42-47.

4. Rybachuk AV Silver nanoparticles and their combination with gold nanoparticles as new effective antimicrobial substances for maxillofacial surgery and dental implantology.
5. Rieznichenko LS, Malanchuk VA (2015) E-MRS Spring Meeting 11-15 May 2015, Lille, France. Rieznichenko

LS, Rybachuk AV, Bilous S (2016) Silver nanoparticles: synthesis, effectiveness in treatment of purulent inflammatory diseases of the maxillofacial area, development of dosage forms. Journal of Chemical and Pharmaceutical Research 8(1): 332-338.

