

## IMMUNOLOGICAL ASPECTS RELATED TO THE BIOMATERIALS USED IN BONE ADDITIONS

Kiro PAPAKOCA<sup>1</sup>, Raluca NEAMTU<sup>1</sup>, Sergiu DRAFTA<sup>1</sup>, Bogdan DIMITRIU<sup>1</sup>, Augustin MIHAI<sup>1</sup>, Ioana DURBACA<sup>2</sup>

<sup>1</sup>Faculty of Dentistry, University of Medicine and Pharmacy "Carol Davila" Bucharest, <sup>2</sup>Faculty of Dentistry, University of Medicine and Pharmacy Galati

**Key words:** biomaterials, bone addition, bone augmentation.

**Abstract:** *In the last two decades, biomaterials have become of great importance for medical practice. Thus, biomaterials used for bone addition or bone augmentation are used not only in orthopedics or traumatology, but also in dental medicine, especially in oral implantology to repair some bone defects small or vast in scope.*

### INTRODUCTION

It is known that, in cases when the bone supply of the alveolar crests is insufficient for the application of dental implants, then a specific addition or bone augmentation technique is used, a certain one used both in orthopedics and traumatology, not only in oral implantology or maxillo-facial surgery [1].

Thus, the augmentation materials can be used to rebuild the bone lost as a result of some dental problems, to augment the postextraction alveoli and to maintain the toothless alveolar ridge height and thickness. To be used for augmentation, biomaterials must meet several conditions.

### BIOCOMPATIBILITY AND BIOFUNCTIONALITY OF BONE ADDITION MATERIALS

Biocompatibility of materials, which are currently used in oral implantology in orthopedics, but also in traumatology, was solved through continuous research, which finally led to the discovery of certain next-generation biomaterials, such as zirconium as well as non-corrosive ceramic materials with superior mechanical properties. Biocompatibility and biofunctionality of materials are very important, being in direct connection with all precise indications on biomaterial and number of dental implants necessary to an adequate implanto-prosthetic rehabilitation [2].

Thus, the biofunctional quality of the therapeutic implanto-prosthetic complex, by respecting the occluso-articular balances, is finally the guarantee of success over time. If one does not respect these considerations, total failures will certainly come in relatively short time.

Within these complex implanto-prosthetic treatments, we will also face up the volumetric and qualitative bone offer. The bone reconstruction techniques currently allow overcoming many shortcomings, regarding the bone offer. This method of treatment is considered to be very modern, replacing the classical therapy with increasingly mobile prostheses, with far superior results [3, 4, 5].

### THE BIOLOGY OF THE BONE AUTOTRANSPLANT AND ARTIFICIAL MATERIALS

To have a better understanding of the integration of a receiver bone bed and its improvement, we shall analyze the process of normal bone recovery.

The biological value of a bone transplant displays many contradictions, especially between data and research studies presented by the experts in molecular biology and with clinical experience.

It is considered that the autogenic bone is the best material for grafts for the following reasons [6, 7, 8]:

- it has the shortest period of integration in the receiver bone bed;
- it participates actively at the process of bone replacement and repair;
- the spongy bone is more rapid vascularized than the cortical bone;
- the osteocytes of the autotransplant disappear after 6 hours of transplantation.

It is very important to consider all factors that may influence the biology of the grafted bone [9], namely:

- the general state of the body;
- the patient's age;
- the type of bone used for the graft, that may be:
  - o cortical;
  - o spongy;
  - o cortical- spongy.
- the area of origin of the bone graft, which should be quite close to the functional structure, that of the receiver bone bed;
- the state of the receiver bone bed (spongy, spongiolized, cortical);
- the degree of vascularization of the receiver bone bed;
- the degree of adaptation of the bone graft on the surface of the receiver bone bed etc.

In a first stage, between transplant and recipient bone bed, are forming a hematoma, graft around an inflammatory process elements appear more or less obvious, when the bone of autotransplant inhibition it feeds through, only a certain percentage. This is possible because the adhesive and capillary forces can not ensure the fluid flow, only with great difficulty in intertrabecular spaces of spongy bone and the very small distances [10, 11].

In terms of bone lamella, the canalicular mechanism is inefficient as making the transplant osteocytes reach a critical