

# Evaluation of two socket preservation materials osseointegration in small diameter bone cavities. An in vivo lab rats study

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**Keywords:** , bone graft, histological osseointegration, Optical Coherence Tomography

## Abstract.

The present study aimed to evaluate the osseointegration in small diameter rat bone cavities of two socket preservation materials Alveoprotect and Ossceram Nano (Bredent, Selden, Germany). For the assessment at several levels of these socket preservation materials we decided to use a protocol consisting of three evaluation methods to provide a comprehensive image about the behaviour of the used materials [1].

For this study we made three study groups, each of them consisting of twelve laboratory Whistar rats. For the first study group the cavities were augmented with the collagen fleece material *Alveoprotect* (Bredent Medical, Senden, Germany). For the second study group we used for the augmentation the synthetic bone graft *Ossceram nano* (Bredent Medical, Senden, Germany). The third group was the control group to which the experimental cavities were left unaugmented the healing being achieved without any external intervention.

For each study group, six laboratory rats were sacrificed after two months, and the other six after four months in order to evaluate the bone wound healing.

The first method was a direct macroscopic examination performed immediately after rats euthanasia during the samples preparation. For evaluating the surface and subsurface of the new-formed bone tissue we used Optical Coherence Tomography (OCT). Finally, the obtained samples were submitted to the classical phases necessary to the histological study.

As also other studies stated [2], the total amount of augmentation was significantly greater in the augmented groups than in the control group. Macroscopic examination of the evolution of augmented bone wound healing with Alveoprotect offered spectacular results especially in the cavities prepared in the calvaria. Thus, two months after inserting the material into cavities from the calvaria, they were already occupied by a bone tissue, even if it was less dense than neighboring structures. In the maxilla case, the Alveoprotect integration speed appears to have been lower than in the calvaria. Macroscopic examination of the evolution of healing bone wounds augmented with OssceramNano always highlighted the presence of synthetic material residual particles.

The quality of bone grafting was already evaluated in other studies [3] and validated by using micr-CT. For the collagen-based material Alveoprotect, the OCT evaluation highlighted the degree of filling of the defect through the lack of refractivity of this socket preservation material. The surface and subsurface evaluation by optical coherence tomography of the new bone formed within the experimental cavities filled with Ossceram Nano synthetic material allowed some spectacular observations due to the higher refractive index of the synthetic material than the adjacent bone structures one.

In the literature histological examination revealed extensive variations in the treatment protocols and biomaterials used to evaluate extraction socket healing [4]. On the histological samples from the first study group, filled with the Alveoprotect material, we generally have observed the filling of

the experimental bone defects with repairing connective tissue with various bone extensions from the surrounding bone tissue. The histological assessment of the Ossceram nano augmented cavities showed firstly the presence of synthetic material residual particles surrounded by a newly formed connective tissue in early stages or a young bone tissue with many osteoblasts in the advanced stages of osseointegration.

## References

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