

Dental and Maxillo-Facial reconstructions adopting innovative customized biomaterial

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Introduction

Biomaterials for bone tissue engineering should ensure both adequate strength and volumetric maintenance. Moreover, their intimate structure should have an interconnected porous network for cell proliferation, while also providing specific signals for bone remodelling and regeneration [1, 2].

Results and Discussion

An innovative composite solution, bearing cues from both mineral components and polymeric ones, was here followed to develop a new three-dimensional bone scaffold, SmartBone[®] (SB): a bovine derived mineral matrix is used to provide adequate solid structure and porosity, while resorbable polymers are used to reinforce it. RGD-exposing collagen fragments are finally added to promote cell colonization. Previously published results indicate that SB is osteoconductive and osteoinductive, promoting remodelling to mature bone formation in about 8-12 months [3].

High performances of this biomaterial allowed developing custom-made products (SmartBone[®] On Demand[™], SBoD), solving single specific cases of bone reconstruction: starting from CT scan, personalized grafts can be provided for every kind of defects.

SmartBone[®] technology was successfully applied for more than 55.000 cases.

Conclusions

CT scans after 8 months showed impressive osteointegration and massive volume stability (>95%). SBoD custom made bone grafting technique allows complete restoration of wide defects. Histological analysis indicates that SmartBone is osteoconductive, promotes fast bone regeneration, leading to mature bone formation in about 8 months.

References:

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