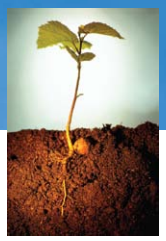

OsteoBiol® by Tecnoss

Nano-hydroxyapatite vs. xenografts: synthesis, characterization, and in vitro behavior

LABORATORY TESTS

231

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ABSTRACT

It is well known that bone defects require to be managed and rehabilitated mainly in order to avoid severe alveolar bone resorption, thus preventing the failure of dental implant placement. Xenografts have been used for more than thirty years and are still being used with good clinical results, osteoconductive features, very good biocompatibility, high availability (size and quantity), and low cost. Year by year, natural sources for biological apatite synthesis have been extended and one of the most promising approaches is hydroxyapatite synthesis from hen egg-shell sources due to the mimetic composition and structure of the carbonated apatite obtained compared with human bone. In this paper, the authors compared three categories of biomaterials obtained from natural sources: Bio-Oss® (bovine bone, Geistlich Pharma AG, Wolhusen, Switzerland); OsteoBiol® *Gen-Os*® (porcine bone, Tecnoss®, Giaveno, Italy); and biomimetic synthetic hydroxyapatite from egg-shells (HA1), synthesized by the microwave-assisted hydrothermal technique (HT-MW). The tested materials were characterized by Fourier-transform infrared spectroscopy (FTIR), X-ray diffraction (XRD), scanning electron microscopy (SEM), energy-dispersive X-ray analysis (EDAX), transmission electron microscopy (TEM), X-ray fluorescence spectroscopy (XRF), and cytotoxicity assay in contact with amniotic fluid stem cell (AFSC) cultures. In this way, it was possible to reveal the compositional and structural similarities or differences between HA1, Bio-Oss®, and OsteoBiol® *Gen-Os*®. In the evaluations, HA1 demonstrated a mimetic composition, morphology, and structure with the commercial xenografts Bio-Oss® and OsteoBiol® *Gen-Os*®. The HA1 sample proved to have a very high meso-porosity and this could be associated with an improved biomolecule adhesion and a potential increased osteoconductivity, and could be the cause for the good results of this sample at all in vitro cytotoxicity assays.

CONCLUSIONS

Based on the evaluation performed, the authors concluded that the presented preliminary biocompatibility results are promising for bone tissue regeneration applications of HA1, and the study will continue with further tests on osteoblast differentiation and mineralization.

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Material tested

BONE SUBSTITUTE
OsteoBiol® *Gen-Os*®

LAB