OSTEOCONDUCTIVE PROPERTIES OF TWO DIFFERENT BIOACTIVE GLASS FORMS (POWDER AND FIBER) COMBINED WITH COLLAGEN

Renno, A.M.(1);
(1) UNIFESP;

Bioactive Glasses (BG) is a group of synthetic silica-based materials with the unique ability to bond to living bone and can be used in bone repair. Although the osteogenic potential of BG, this material may have not present sufficient osteoconductive and osteoinductive properties to allow bone regeneration, especially in compromised situations. In order to overcome this limitation, it was proposed the combination of BG in two forms (powder and fiber) with collagen type I (COL-1). The aim of this study was to evaluate the BG/COL-based materials in terms of morphological characteristics, physicochemical features and mineralization. Additionally, the second objective was to investigate and compare the osteoconductive properties of two different bioactive glass forms (powder and fiber) enriched or not with collagen using a tibial bone defect model in rats. For this, four different formulations (BG powder - BGp, BG powder enriched with collagen - BGp/Col, BG fibers - BGf and BGp fibers enriched with collagen - BGp/Col) were developed. The physicochemical and morphological modifications were analyzed by SEM, FTIR, calcium assay and pH measurement. For in vivo evaluations, histopathology, morphometrical and immunohistochemistry were performed in a tibial defect in rats. The FTIR analysis indicated that BGp and BGf maintained the characteristic peaks for this class of material. Furthermore, the calcium assay showed an increased Ca uptake in the BG fibers. The pH measurements revealed that BGp (with or without collagen) presented higher pH values compared to BGf. In addition, the histological analysis demonstrated no inflammation for all groups at the site of the injury, besides a faster material degradation and higher bone ingrowth for groups with BG in powder (with or without collagen). The immunohistochemistry analysis demonstrated Runx-2 and Rank-L expression for all the groups. Those findings support that BGp can be a promising alternative for treating fracture of difficult consolidation.