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IN VIVO BIOLOGICAL EFFECTS OF MARINE BIOSILICA ON A TIBIAL BONE DEFECT IN RATS

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Research on biomaterials of natural origin has gained prominence in the literature. In this context, the use of bioactive compounds extracted from marine sponges is very promising strategy to be used for bone tissue engineering proposals. One of the most prominent components of the sponges is the biosilica (BS), which present an osteogenic potential and is able of increasing osteoblastic activity. Although all the in vitro evidences, there is a lack of information about the in vivo effects of BS on the process of bone healing. Thus, the aim of the present study was to evaluate the morphological and chemical characteristics of BS in through scanning electron microscopy (SEM) and energy dispersive x-ray spectroscopy (EDX). In addition histopathological, histomorphometric, immunohistochemical analysis (IHQ) and mechanical test were used to evaluate the effects of BS on bone healing in an experimental model of tibial bone defect 15 days post-implantation. SEM and EDX demonstrated the successful extraction of BS. Histology demonstrated that control group presented a higher amount of newly formed bone compared to Bioglass (BG) and BS treated animals. Moreover, in the BS treated animals, it was observed degradation of the material and bone defect filled with granulation tissue, with absence of inflammatory process. Histomorphometry showed a higher bone formation in the BG treated animals. IHQ demonstrated positive VEGF and TGF- β immunostaining for GC, BS and BG. In Three Bending test no significant differences were found. The present results demonstrate that BS was biocompatible and had a good interaction with bone tissue. However, the amount of newly formed bone was higher of BG treated animals. Further confirmation is necessary regarding long-term in vivo studies, which also have to be performed under compromised wound healing conditions