World Academy of Science, Engineering and Technology
International Journal of Mathematical and Computational Sciences
Vol:14, No:12, 2020

In Vivo Response of Scaffolds of Bioactive Glass-Ceramic

Authors : Ana Claudia Muniz Rennó, Karina Nogueira

Abstract : This study aimed to investigate the in vivo tissue response of the introduction of the bioactive mesh (BM) scaffolds using a model of tibial bone defect implants in rats. Although a previous in vivo study demonstrated a highly positive response of particulate bioactive materials in the morphological and biomechanical properties of the bone callus, the effects of material with superior bioactivity, present in form of meshes have not been studied yet. Eighty male Wistar rats with 3 mm tibial defects were used. Animals were divided into four groups: intact group (IG) – tibia without any injury; bone defect day zero (0dD) – bone defects, sacrificed immediately after injury; bone defect control group (CG) – bone defects without any filler and bone defect filled with BM scaffold. The animals of BM and CG groups were sacrificed 15, 30 and 45 days post-injury to compare the temporal-special effects of the scaffolds on bone healing. The histological analysis revealed an organized newly formed bone at 30 and 45 days post-surgery in the BM. Also, this group presented an increased COX-2 expression on days 15 and 30 post-surgery. Furthermore, the immunohistochemistry analysis revealed that, BM presented a positive immunoexpression of RUNX-2 during all periods evaluated. The biomechanical analysis revealed that at 15 day after surgery, no significant statistically difference was observed between BM and CG and both groups had significantly higher values of maximal load compared to 0dG and significantly lower values than IG. On days 30 and 45 post-surgery, BM presented statistically lower values of maximal load compared to the CG. Nevertheless, at the same periods, BM did not show statistically significant difference compared to the IG maximal load values (p > 0, 05). Our results revealed that the implantation of the BM scaffolds was effective in stimulating newly bone formation.

Keywords : bone, biomaterials, scaffolds, cartilage
Conference Title : ICSRD 2020 : International Conference on Scientific Research and Development
Conference Location : Chicago, United States
Conference Dates : December 12-13, 2020