Research Project Proposal
Academic year 2021-2022

Project Nº 21

Title: *Optimization of cellular and biological treatments by composite fabrication and controlled release from mimetic periosteum scaffolds*

Department/ Laboratory Laboratory where the project will be carried out indicating Department, Area, Faculty, CUN, CIMA etc.
Cell Therapy and Regenerative Medicine Department, Experimental Orthopaedics Laboratory, CIMA

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Summary:

The regenerative capacity of bone tissue can be compromised in an important percentage of fractures, resulting in fracture nonunion, a major cause of chronic pain and disability. Autografts are the most important therapeutic option, but its availability is limited. Using tissue engineering strategies, we are developing mimetic autografts by combining biomaterials as scaffolds (poly caprolactone, PCL) functionalized with progenitor cells and morphogens. In this project we will fabricate a mimetic periosteum by melt electrowriting and determine its therapeutic potential for the delivery of rhBMP-2 after functionalization with different strategies including, Fibronectin/Poly ethyl acrylate modification (PEA/FN), covalent modification with microparticles of Poly Lactic Glycolic Acid (PLGA) and deposition of nanoparticles of Hydroxyapatite (nHA). Each strategy will be evaluated in its capacity for rhBMP-2 deliver and retention *in vitro* as well as its therapeutic potential *in vivo* using a bone critical size defect of the femur in rats. Efficacy of treatment will be evaluated by micro computed tomography, histology and immunohistochemistry

yes	X	Does the project include the possibility of supervised animal manipulation to complete the training for animal manipulator?
no		