



MASTER'S DEGREE IN BIOMEDICAL RESEARCH

Research Project Proposal

Academic year 2023-2024

Project Nº 32

Title: Mimetic periosteum for controlled release of antibiotics and osteogenic growth factors in the treatment and prevention of osteomyelitis

Department/ Laboratory Experimental Orthopedics (1.01), Biomedical Engineering program, CIMA

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Summary

The good capacity of bone tissue can be impaired by different factors. High energy fractures, large bone defects in oncologic patients, patients with endocrinological or vascular pathologies, or the presence of a bacterial infection (osteomyelitis), and combinations of these causes, could induce the appearance of delayed fracture healing and nonunion. One challenge in orthopaedic surgery is the treatment of fracture nonunion, especially when concurs, or is originated, by a bacterial infection and there are not clear signs of local infection. In this cases diagnosis and optimal treatment will be delayed. We work with the hypothesis that the local treatment with low dose of antibiotics and rhBMP-2 we could prevent osteomyelitis and the associated fracture nonunion. Based in this hypothesis our objective is to develop an efficient method of synthesise microparticles loaded with antibiotics and design a strategy for local delivery from 3D printed synthetic/mimetic periosteum structures.

Goals:

- 1- Develop protocols for encapsulation of broad-spectrum antibiotics into microparticles (Gentamicin, Vancomycin).
- 2- Design and printing of 3D mimetic periosteum by MEW
- 3- 3D scaffolds functionalization with rhBMP-2 and microparticles and characterization.

yes	X
no	

Does the project include the possibility of supervised animal manipulation to complete the training for animal manipulator?