Research Project Proposal
Academic year 2018-2019

Project Nº 12

Title: *Novel 3D hydrogel-hybrid systems in cardiac tissue engineering with human induced pluripotent stem cells*

Department/ Laboratory *Regenerative Medicine Program, Lab. 101*

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Summary Being the number one killer worldwide, cardiovascular diseases have been the subject of intense research under novel regenerative therapies. With cell therapy failing to provide the formation of new healthy tissue, material science has gained a pole position to solve the issue. Tissue engineering has already highlighted the importance of the match in physical properties and applied mechanical forces between the tissue to be mimicked and those of the candidate biomaterial. However, in spite of creating a perfect environment, the choice of a proper cell population remains a roadblock, with only human induced pluripotent stem cells (hiPSC) being a reliable source of cardiomyocytes.

The present project aims to test different types of 3D hydrogel-fiber hybrid systems to engineer cardiac tissues. For this, the candidate will use state-of-the-art procedures. On the material side, novel myocardium-mimicking gelatin-based hydrogels will be employed, reinforced with 3D printed melt electrospinning writing PCL fibers. On the cell side, a Wnt-modulation cardiac differentiation using hiPSC will be implemented. The candidate will gain knowledge on how to prepare the substrates, culture and differentiate the cells, generate the engineered tissues and apply different types of mechanical load. For this last end, purpose built devices will be employed, fabricated by our collaborators from TECNUN (San Sebastian). The candidate will obtain practical expertise in hiPSC culture and differentiation, tissue engineering, as well as staining, RNA extraction-real time qPCR, and cardiac function assessment amongst others

We strongly believe this multidisciplinary and appealing project is the basis for the successful recruitment of a potential PhD candidate.

yes	
no	**x**

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