



**MÁSTER EN INVESTIGACIÓN BIOMÉDICA**

**Research Project Proposal**

Academic year 2022-2023

<b>Project Nº 37</b>	
<b>Title: 3D biomaterials and miRNAs for cardiac repair after myocardial infarction</b>	
<b>Department/ Laboratory</b> <i>Laboratory where the project will be carried out indicating Department, Area, Faculty, CUN, CIMA etc.</i> Department of Pharmaceutical Technology and Chemistry, School of Pharmacy and Nutrition, University of Navarra	
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<b>Summary</b>  Cardiovascular diseases, such as myocardial infarction (MI), are the leading cause of death. Current therapies have improved patient survival but are unable to regenerate the damaged tissue. Nowadays, paracrine signalling via miRNAs has come into focus. Several studies have demonstrated their capability to mediate cardioprotection and increase heart regenerative capacity. However, miRNA-therapeutics have some limitations, including short circulation time and off-target effects. In this light, recent progress highlights the importance of biomaterials in biomolecule delivery. Among them, hydrogels (HG) are the most suitable for this application as they closely simulate native tissue and they can be administered through minimally invasive techniques.  In this project, we hypothesise that the development of advanced biomaterials based on nanostructured HGs loaded with cardioprotective/cardioregenerative miRNAs will be able to contribute to cardiac repair.  The <b>main objective</b> is the <b>development of an advanced multifunctional biomaterial loaded with cardioprotective/cardioregenerative miRNAs for the treatment of MI</b> . The project addresses the development of an injectable nanostructured HG embedding nanoencapsulated miRNA to promote cardiomyocyte proliferation and regeneration after MI. The nanoreinforcement will provide mechanical support and better replication of the cardiac tissue structure and miRNA controlled release. The nanostructured HG will have morphological, mechanical and functional properties similar to the heart.  The work plan includes the development of an injectable nanostructured HG embedding nanoencapsulated miRNA, the <i>in vitro</i> characterization of the physicochemical, morphological and mechanical properties of the cardiac biomaterial-based therapy and the assessment of the <i>in vitro</i> cytotoxicity and cardiac compatibility of the developed system on cardiac cells.	
yes	<input type="checkbox"/>
no	<input checked="" type="checkbox"/>
Does the project include the possibility of supervised animal manipulation to complete the training for animal manipulator?	