Universidad de Navarra
Facultad de Ciencias

MÁSTER EN INVESTIGACIÓN BIOMÉDICA
Research Project Proposal
Academic year 2026-2027

Project Nº 52

Title: *Development of a vascularized 3D cardiac model using iPSC-derived cardiomyocytes*

Department/ Laboratory
CIMA, Grupo de Ingeniería de Tejidos Cardíaca

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Summary

Cardiovascular diseases remain the leading cause of mortality worldwide, highlighting the need for advanced human-relevant in vitro models for disease modelling and therapeutic development. The aim of this project is to establish a biomimetic 3D cardiac model combining human induced pluripotent stem cell-derived cardiomyocytes (iPSC-CMs) with endothelial microvascular structures for applications in cardiovascular research and tissue engineering.

The student will participate in the differentiation and maintenance of human iPSCs into cardiomyocytes and their integration into hydrogel-based 3D culture systems. In parallel, the project will explore endothelial cell organization and microvascular network formation within the engineered microenvironment, inspired by recent advances in 3D angiogenesis and vascularized tissue models. Different extracellular matrix conditions and co-culture strategies will be evaluated to optimize cell viability, structural organization, and tissue maturation.

The methodology will include stem cell culture and differentiation, preparation of biomaterial-based hydrogels, 3D cell culture, immunofluorescence and confocal microscopy, image analysis, and quantitative assessment of cardiac and vascular markers. Depending on the progress of the project, functional assays related to tissue organization and cellular interactions may also be performed.

This project aims to contribute to the development of physiologically relevant in vitro cardiac platforms with potential applications in disease modelling, drug screening, and regenerative medicine.

yes	
no	X

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