Universidad de Navarra

Facultad de Ciencias

MÁSTER EN INVESTIGACIÓN BIOMÉDICA

Research Project Proposal

Academic year 2026-2027

Project Nº 65

Title: Advanced bioengineering approaches to study transthyretin amyloid cardiomyopathy (ATTR-CM).

Department/ Laboratory

Biomedical Engineering Program/ Cardiac Tissue Engineering Group, Laboratory 1.01, CIMA

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Summary

Transthyretin (TTR) amyloid cardiomyopathy (ATTR-CM) is a disease caused by the abnormal production of misfolded transthyretin protein by liver cells, which is then released systemically and its amyloid deposition in other organs has important disease implications. Specifically, aggregates of these misfolded or misassembled cross-beta-sheet amyloid fibrils in the heart is linked to cardiac toxicity and progression towards heart failure. Presenting itself in 2 forms, aggregates of wild-type (TTR) are found in approximately 25% of the over-80s, whilst the familial form is associated to a more aggressive cardiomyopathic phenotype. Our lack of deep understanding of the mechanisms driving disease render a poor prognosis for patients, with survival after diagnosis currently set around 5-15 years. Intensive research, which includes the development of new and relevant models for disease investigation and therapeutic discovery, are needed. In the present project, we aim to develop an integrated tissue engineered-based model of ATTR-CM using state-of-the-art biofabrication (3D printing) technologies and advanced transcriptome analysis. This will include the use of human induced pluripotent stem cells (hiPSCs)-derived cardiac cells from ATTR-CM patients to fabricate 3D cardiac tissues, which will be seeded with TTR fibrils, providing a human *in vitro* disease model to accurately replicate disease-specific conditions. These tissues will enable the identification of early disease mechanisms through single-cell sequencing, faithfully mimicking the earliest stages of cardiac pathology. This platform will provide a unique opportunity to uncover novel therapeutic targets and support personalised drug development.

yes	
no	X

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