Universidad de Navarra
Facultad de Ciencias

MÁSTER EN INVESTIGACIÓN BIOMÉDICA
Research Project Proposal
Academic year 2022-2023

Project Nº 30

Title: *Creation and characterization of cellularized patches for the treatment of myocardial infarction*

Department/ Laboratory *Cardiovascular diseases/ CIMA*

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Summary

The cardiovascular diseases constitute the greatest health risk in the occidental countries. In Europe alone, cardiac events, mainly myocardial infarction (MI), take the lives of 4 million people per year[1].
In order to find novel therapies for MI, we have previously created therapeutic cardiopatches by combining collagen scaffolds with adipose-derived mesenchymal stem cells (ADSC). A functional improvement was found after treatment of rat and pig models of MII with them[2-4]. Now, we will create a 2.0 version of the cardiopatch by functionalizing the scaffolds with growth factors (IGF/HGF) and/or seeding them with genetically modified cells. Overexpression of miRNA-145 and/or FGF2 and Apelin-Lentiviral transduction will greatly improve ADSC pro-angiogenic capacity, which could greatly enhance their benefit.
Thus, the main aim of this project will be to determine in vitro and in vivo the pro-angiogenic capacity of our novel created cardiopatch and therefore, its therapeutic benefit. Patches will be created by seeding them with different populations of genetically modified cells by using a bioreactor specially designed for that. Cells adhesion and viability will be tested by standard colorimetric tests and VEGF secretion measured by ELISA. Patches will be also tested in vivo by echocardiography and histological studies performed in order to determine the mechanisms involved in such improvement.
The results obtained from these studies will be of great relevance not only for better understanding the mechanisms of heart repair but also to develop future therapeutic strategies.

References:
[1] Timmis A et al. 2019. European Heart Journal. 2020;41:12-85.
[2] Araña M et al. Acta Biomaterialia. 2013;9:6075-83.
[3] Araña M et al. Biomaterials. 2014;35:143-51.
[4] López-Díaz de Cerio A et al. Pharmaceutics. 2021 Aug 17;13(8):1269.

(Possibility of PhD (grant required)).*

yes	x
no	

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