UMC Utrecht

ESC First Contact Initiative Grant

Date April 4th 2022
Subject ESC First Contact Initiative Grant Report

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Dear ESC Council on Basic Cardiovascular Science,

Firstly, I would like to thank the ESC Council on Basic Cardiovascular Science for awarding me with the 2021 ESC First Contact Initiative Grant. With the support of this grant, I was able to initiate a collaboration between the Walter-Brendel-Centre of Experimental Medicine (Professor Dr. Andreas Dendorfer) at the Ludwig Maximilian University of Munich, Germany and the Laboratory of Experimental Cardiology (Dr. Linda van Laake and Professor Dr. Joost Sluijter) at the UMC Utrecht, The Netherlands.

Background

The main focus of my postdoctoral work is to study the damage sustained by cardiac samples (*i.e.*, cells, tissues and whole hearts) during preservation and to develop strategies to minimize such damage, potentiating longer and more efficient conservation. In recent publications, we have discussed limitations and cornerstones for the preservation of cardiac samples and have referred to possible strategies to further optimize preservation efficiency and duration (Sampaio-Pinto et al., 2021; Tas et al., 2021).

Our experimental design consists of a multilevel approach where preservation strategies are tested at the cellular level, in human-induced pluripotent stem cell-derived cardiomyocytes (hiPSC-CMs), up to the organ level, using whole-hearts. Due to the lack of tridimensionality and extracellular matrix, hiPSC-CMs only partially recapitulate the challenges imposed by preservation of more complex cardiac samples. As such, we propose to evaluate the damage subjected to cardiac tissue engineered constructs, already available in our laboratory (Castilho et al., 2018), and native myocardial tissue during preservation, which better mimic the human myocardium.

The laboratory of Professor Dendorfer has an extensive experience with the preparation, culture and functional evaluation of live myocardial slices from human hearts (Fischer et al., 2019). As such, this model can represent an alternative platform to test the efficiency of novel preservation strategies, while closely monitoring the function of the preserved myocardium.

Hypothesis

The project aimed to determine whether live myocardial slices can detect the damage imposed by hypothermic preservation and therefore validate the use of this model to gain mechanistic insights for the preservation of whole hearts.

Use of the grant and personal development

During my short-term stay in the laboratory of Professor Dendorfer, I have learned how to produce and culture live myocardial slices of human and porcine origin. Furthermore, I was introduced to the design, conduction and analysis of stimulation protocols to evaluate slices' physiological parameters. Such parameters can be used to evaluate the performance of myocardial tissue and represent a valuable tool to determine the efficiency of different preservation strategies/conditions.

With the support of the ESC First Contact Initiative grant, I could initiate the collaboration with the group of Professor Dendorfer, which was an important step for the implementation of this technique in my host laboratory, in the group of Dr. van Laake and Professor Sluijter.

The data and experience based on this grant will be pivotal for the continuation of my postdoctoral work as well as for the establishment of additional research lines within my laboratory that can benefit from such technique. Altogether, I am convinced that this experience will contribute to my career as a researcher and facilitate the application to additional funding schemes.

Finally, I would like to acknowledge Professor Dendorfer and his laboratory for providing and sharing the knowledge necessary for the production and characterization of live myocardial slices and the ESC Council on Basic Cardiovascular Science for granting me this opportunity.

Yours sincerely,

Vasco Sampaio Pinto, PhD

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