SFB1425 - Heterocellular Nature of Cardiac Lesions: Identities, Interactions, Implications

P13-2: PhD-Project

based at the

Institute of Biology II

Optogenetic Control of Heterocellular Contributions to Cardiac Excitation and Arrhythmogenesis

Background

In the heart, impaired electrical activation and/or conduction, such as in and around cardiac lesions, can cause arrhythmias with clinical symptoms ranging from mild palpitations to severe outcomes including stroke and sudden cardiac death. Recent studies by teams from our CRC have shown direct structural and functional coupling between cardiac myocytes and non-myocytes in healthy and lesioned myocardium. Their contributions to normal excitation and arrhythmogenesis are at the heart of this project.

Project Description

In order to perform optogenetic experiments to unravel the effects of different cardiac cell types on electrophysiological properties of healthy, injured and remodelled myocardium, we will first have to develop the most appropriate tools. You will compare different existing methods, but are welcome to engineer your own novel one as well. The idea is to control the expression of specific channels in the cells; we wish to focus on control of gene expression via a light-inducible Cre recombinase on the one hand and a light-inducible synthetic transcription factor on the other. While for first tests easy-to-handle cell lines will be used, at a second stage we wish to move into different cardiac cell types. Therefore, part of the project will deal with the optimization of the developed tools for specific cardiac cell types. Biophysical characterization of the different cell populations will be done in collaboration with the group of Franziska Schneider-Warme.

Qualifications and Requirements

- Strong motivation, passion for research, team spirit
- Experience with molecular cloning
- Excellent MSc in a field relevant for the proposed study
- English language proficiency at level B2 or higher

Research Areas

Optogenetics, Cell biology

Experimental Tasks

- Development of optogenetic tools to control gene expression in different cardiac cell types
- Development of methods for targeted gene delivery

Student Background

Biophysics, Biochemistry, Biology, (Molecular) Medicine, Biomedical Engineering (or related)

Starting Date

from 01/07-2020

PhD Advisor

Barbara Di Ventura, Institute of Biology II, Centers for Biological Signalling Studies BIOSS and CIBSS, University of Freiburg
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Joint project with Franziska Schneider-Warme, IEKM

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Applications via

SGBM portal

Submission window: 08-30/06-2020

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