FOR6051 - The Interstitium: a Key Determinant of Cardiac Function

P2-2: PhD-Project at Institute for Experimental Cardiovascular Medicine, University of Freiburg

Structural and functional determinants of neuron–cardiomyocyte crosstalk at nano-scale

Background

The intracardiac nervous system plays a fundamental role in the fine-tuned regulation of cardiac function. The efficiency and precision of neuro–cardiac communication are thought to be critically determined by the ultrastructural geometry of the interface between neurons and cardiomyocytes. This specialised microdomain – referred to as the neuro–cardiac junction – is believed to spatially and temporarily integrate pre-synaptic, synaptic, and post-synaptic events. Despite its functional importance, the nano-scale architecture and dynamic organisation of the neuro–cardiac junction remain poorly understood.

Project Description

The project will explore the structural organisation and functional properties of the neuro–cardiac junction at the nano-scale. This will be achieved using human induced pluripotent stem cell (hiPSC)-based *in vitro* neuron–cardiomyocyte co-cultures, combined with advanced high-resolution light and electron microscopy, and live-cell functional studies. These studies will be complemented by analyses of intact cardiac tissue, and be closely integrated with organ-level investigation carried out by a PhD student at the partner team at the Institute.

Qualifications and Requirements

- High motivation to work on a state-of-the-art research topic in a highly dynamic, interdisciplinary and supportive environment
- Solid background in cellular signalling and hiPSC biology
- Prior experience in advanced imaging approaches would be desirable
- Excellent MSc in a field relevant for the proposed study
- English language proficiency at level B2 or higher

Research Areas

Cell Signalling, Advanced Imaging

Experimental Tasks

- *in vitro* experimental research using in-house derived hiPSC co-cultures
- method development and use of advanced imaging approaches

Student Background

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

Starting Date

from 01 July 2026

PhD Advisor

Eva Rog-Zielinska,
Institute for Experimental Cardiovascular Medicine,
University of Freiburg
eva.rog-zielinska@uniklinik-freiburg.de

Contact

FOR6051@mail.uni-freiburg.de

Applications via

SGBM portal
open until 07 June 2026

universität freiburg

UNIVERSITÄTS KLINIKUM FREIBURG

UNIVERSITÄTS FREIBURG · BAD KROZINGEN HERZZENTRUM