

**Dr. Franziska Schneider-Warme**

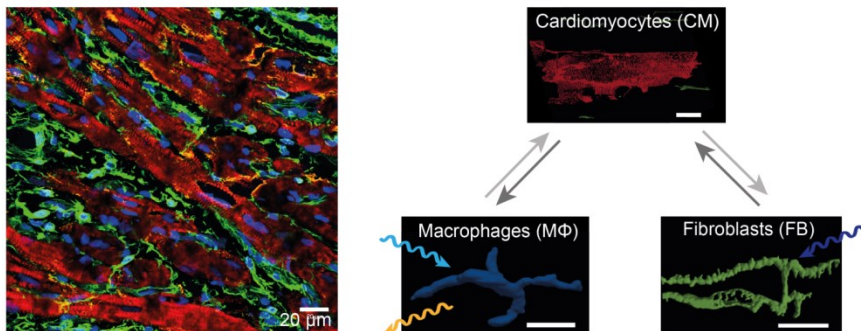
Universitätsherzzentrum Freiburg

**Using light to study heterocellular interactions in the heart**

Cardiac function relies on complex interactions of diverse cell populations. While cardiomyocytes are the key cell type responsible for the electromechanical activity of the heart, they are embedded within an extensive and intricate network of non-myocytes, including cardiac interstitial cells, mainly fibroblasts, and resident myeloid cells, mainly macrophages. During cardiac remodeling, for example following myocardial infarction, non-myocytes proliferate and change their phenotype, a process with fundamental relevance for cardiomyocyte activity. Understanding biophysical interactions between cardiac myocyte and non-myocyte populations is crucial for assessing structural and functional mechanisms underlying cardiac homeostasis and disease progression.

Optogenetics is a powerful technology that can unravel cell-specific behavior in complex biological networks. Light-activated proteins, so-called optogenetic actuators, and fluorescent sensor proteins can be genetically targeted to cells of interest to optically modulate and/or monitor their electrical behavior. While thus far applied primarily for probing the role of individual neurons in complex brain circuits, optogenetic approaches are starting to be employed in the cardiovascular field. Using optogenetics, electrotonic coupling between cardiomyocytes and non-myocytes of a scar-border zone, and between cardiomyocytes and resident macrophages has recently been shown in situ and suggested to be of functional importance on a beat-by-beat basis, especially in the context of myocardial scarring.

In the present project, we combine state-of-art electrophysiological and structural methods with newly developed optogenetic interrogations to unravel heterocellular interactions in native murine myocardium, with a focus on cardiomyocytes, fibroblasts and cardiac macrophages.



**Heterocellular interactions in native myocardium.**

Left: Image showing porcine right atrial tissue with immunolabelling of cardiomyocytes in red, non-myocytes in green, nuclei in blue and Connexin-43 in yellow. Right: 3D reconstructions of cell types of interest.

**Time:** Monday 8th April, 17:15h  
**Location:** Raum VKL 4.1.29  
Institut für Physiologie  
Universität Regensburg

The seminar is video transmitted to:  
Pathologie Universitätsklinikum Erlangen  
Krankenhausstr. 8-10  
Oberer Hörsaal, Raum A 2.150