

Internship Title:

Developing human living myocardial slices as an ischemia-reperfusion model

Duration:

3–6 months (flexible upon consultation)

Eligibility:

Open to Bachelor's and Master's students enrolled in Biomedical Sciences, Medical biology, Biology, Medicine, or a related field (other disciplines upon consultation)

Internship Period:

Start date to be agreed upon, available from October 2025

Location and Flexibility:

The experiments will be performed at Erasmus MC in Rotterdam. However, if you are located far from Rotterdam, we can agree on a flexible arrangement, where you will only need to be in Rotterdam for the experimental work and can complete other tasks remotely. Alternatively, a flexible schedule can be arranged to accommodate your needs while ensuring the goals of the project are met.

Background:

Ischemia-reperfusion (IR) injury occurs when blood flow returns to heart tissue after a period of ischemia, leading to oxidative stress, inflammation, and cellular damage. This process is a major concern during elective cardiac surgeries such as coronary artery bypass grafting (CABG)—the most commonly performed cardiac procedure in the Netherlands. Despite its routine nature, CABG carries a significant risk of IR-related complications, which are directly linked to increased postoperative complications and longer hospital stays.

Understanding the mechanisms of IR injury is crucial for improving surgical outcomes and patient recovery. However, traditional research models often fail to replicate human cardiac physiology accurately.

Living myocardial slices represent a novel *ex vivo* model that enables the study of human heart tissue in a highly physiological and clinically relevant context. These ultra-thin, precision-cut slices are derived from explanted hearts of patients undergoing heart transplantation. What makes this model unique is its ability to preserve the native structure, cell composition, and contractile function of the human myocardium. Unlike conventional cell cultures or animal models, living myocardial slices maintain the three-dimensional architecture and multicellular environment of the human heart, including cardiomyocytes, fibroblasts, endothelial cells, and extracellular matrix. This makes them a promising platform for investigating ischemia-reperfusion (IR) injury in a setting that closely mimics the clinical situation.

This project aims to further optimize the use of living myocardial slices as a model for IR injury and to explore their potential to advance research in cardiac surgery and cardioprotection.

Description internship:

This internship offers a unique opportunity to work with a novel ex vivo model—human living myocardial slices. The project will focus on the preparation and culture of these slices, the simulation of ischemia-reperfusion (IR) injury, and the assessment of resulting tissue damage. To evaluate tissue injury, a range of methods will be used, including the Oroboros technology for high-resolution respirometry for mitochondrial function analysis, histological staining to assess structural changes, and gene expression assays to investigate molecular responses.

Tasks:

- Participate in the preparation and maintenance of human myocardial tissue slices
- Perform IR injury simulations in the experimental models by applying appropriate methods (e.g., oxygen deprivation and reperfusion).
- Evaluate cellular/tissue damage using various methods such as histological staining, mitochondrial function assays (e.g., using the Oroboros technology), and gene expression analysis.
- Analyze results and present in a clear and organized manner.

For more information, please contact
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