Project Description | Master Thesis

Electrophysiological Characterization of Human iPSC-derived Neurons

Figure 1: Images of human iPSC-derived neurons. Figure 2: HD-MEA system and neurons.

Background
Induced pluripotent stem cell (iPSC) technology is revolutionizing biomedical research by enabling the generation of any cell type from adult cells. Human neurons can be obtained by iPSC technology from healthy individuals and patients. Therefore, human neurological disease models can be grown and studied in vitro. High-density microelectrode arrays (HD-MEAs) enable to study physiological activity in neural networks. In our lab, we developed a cutting-edge HD-MEA featuring 26'400 platinum electrodes at 17.5 µm pitch, which is particularly suited to study neural populations. The goal of this thesis is to combine HD-MEA technology and human iPSC-derived neurons in order to extract relevant electrophysiological features from human neurons. The project is multidisciplinary and involves cell handling, experiments with HD-MEA, data analysis and cell imaging.

Required Skills
- Basics of cell culture
- Basics of neuroscience
- Basics of cell imaging
- Basics of programming (Matlab)
- Self-motivated and organized

You will learn
- Conducting biological experiments
- Measuring signals from neuronal networks using microelectrode arrays
- Cell imaging
- Data analysis
- Working with cutting edge technology in an interdisciplinary research environment between neuroscience, electrical engineering and computer science

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