Thesis Project Form

Title (tentative): Chemical stimulation of 2D and 3D neuronal networks derived from human induced pluripotent stem cells coupled to micro-electrode arrays and high-density devices

Thesis advisor(s): Martinoia Sergio, , Giulia Parodi

E-mail: Sergio.Martinoia@unige.it

Address:

Phone: (+39) 010 33 52980

Description

Motivation and application domain

The neuronal networks derived from human induced pluripotent stem cells (hiPSCs) opened new perspectives in the neuroscience and neuroengineering fields. The quantitative study of networks responses to several drugs provides rich information and a solid baseline for future exploitation of in vitro human-derived experimental models in the field of personalized medicine.

General objectives and main activities

The goal is to investigate the response to chemical stimulation of 2D and 3D neuronal networks derived from hiPSCs. In particular, the aim is to characterize the drug perfusion times and effective doses to evoke a response, analyzing differences between 2D and 3D model.

The activities involve the implementation of cell culture protocols for the realization of 2D and 3D homogeneous and heterogeneous models and the maintenance of such neuronal cultures on long-term. Moreover, the activities include the definition and execution of experimental protocols for the chemical stimulation of the neural networks, the acquisition, and the analysis of the electrophysiological activity.

Training Objectives (technical/analytical tools, experimental methodologies)

Data acquisition platforms (MCS and 3Brain)
2D neuronal culture maintenance
3D neuronal culture maintenance
Chemical stimulation methodologies
Software tools for data analysis

Place(s) where the thesis work will be carried out: DIBRIS - LisTech Lab San Martino Hospital

Additional information

Maximum number of students: 1