



Thesis Project Form

Title (tentative): Role of astrocytes on electrophysiological activity of neuronal networks derived from human induced pluripotent stem cells.

Thesis advisor(s): Frega Monica, Sergio Martinoia

E-mail: Monica.Frega@unige.it

Address:

Phone: (+39) 010 33 52144

Description

Motivation and application domain

Astrocytes regulate brain electrophysiological activity by modulating synaptic transmission and ionic homeostasis, playing a key role in neuronal pathologies such as epilepsy and neurodegenerative diseases. Given their crucial function, understanding their effect on the electrophysiology of in vitro models, as well as their maturation and proliferation processes, is essential for gaining deeper insights into their impact on brain functions and pathologies.

General objectives and main activities

The goal is to investigate the role of astrocytes on the electrophysiology of 2D neuronal networks derived from hiPSCs. In particular, the aim is to characterize the activity of networks with different ratio of astrocytes and to evaluate the proliferative progression of astrocytes understanding the final proportion between neurons and astrocytes when the experiments are performed.

The activities involve the implementation of cell culture protocols for the realization of 2D models and the maintenance of such neuronal cultures on long-term. Moreover, the activities include the definition and execution of experimental protocols for immunocytochemistry, acquisition and analysis of the electrophysiological activity and images.

Training Objectives (technical/analytical tools, experimental methodologies)

Data acquisition platforms (MCS)
2D neuronal culture generation and maintenance
Immunocytochemistry methodologies
Software tools for electrophysiological recordings
Software tools for data analysis

Place(s) where the thesis work will be carried out: Bioengineering Lab (DIBRIS)

Additional information

Maximum number of students: 1