Chemical and electrical stimulation in cortical assemblies coupled to Micro-Electrode Arrays

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Motivation and application domain

Micro-Electrode Arrays (MEAs) system enable simultaneous extracellular recordings from multiple sites in neural networks and thereby provide a robust measure of network activity. A typical application is understanding the effect of chemical compounds on the network activity. However, all the works in the literature deal with the ongoing activity which is more susceptible to the spontaneous variability.

General objectives and main activities

Goal of this work is to characterize the effects of chemical compounds delivered to mature neuronal networks in conjunction with a low-frequency electrical stimulation. The main activities will be:
- Perform experiments with different neuro/non-neuro toxic chemicals in conjunction with electrical stimulation
- Develop programs in Matlab environment for analyzing the stimulus-evoked activity modulated by drugs at different concentrations

Training Objectives (technical/analytical tools, experimental methodologies)

The activities of the thesis will require the use of an experimental set-up which allows to simultaneously record of the electrophysiological activity of microelectrodes and develop Matlab scripts for processing the performed experiments.

Place(s) where the thesis work will be carried out: NBT Lab, Via Opera Pia 13, floor -1

Pre-requisite abilities/skills: Neuroengineering and Computational Neuroscience

Maximum number of students: 1