



POSTER PRESENTATION

B523 Validation of a high-density microelectrode array for acute brain slice recordings

E. FERREA¹, L. MEDRIHAN¹, A. MACCIONE¹, P. BALDELLI^{1,2}, D. GHEZZI¹, F. BENFENATI^{1,2} & L. BERDONDINI¹

¹*Italian Institute of Technology (IIT), Neuroscience and Brain Technology Department, Genova, Italy,* ²*Università di Genova, Department of Experimental Medicine, Genova, Italy*

Microelectrode arrays (MEAs) are employed to study extracellular electrical activity in neuronal tissues. Nevertheless, commercially available MEAs provide a limited number of recording sites and do not allow a precise identification of the spatio-temporal characterization of the recorded signal. To overcome this limitation, high density MEAs (HDMEA), based on CMOS technology, were recently developed and validated on dissociated preparations. The platform enables extracellular electrophysiological recordings from 4096 electrodes arranged in a squared area of 2.7 mm x 2.7 mm with inter-electrode distance of 21 μ m at a sampling rate of 7.7 kHz/electrode.

Here, we demonstrate the performances of this HDMEA platform for the acquisition of electrophysiological activity from acute brain slices.

The unique recording performances and the large recording area of the chip permit the observation of fast propagating activities involving multiple areas. In our experimental paradigm, epileptic-like discharges were induced by treating hippocampal slices with 4-aminopyridine and/or bicuculline. The HDMEA allowed us to clearly identify epileptic foci and to describe the involvement of cortical and hippocampal circuitries in the generation of the epileptiform activity.

Furthermore, the HDMEA can be coupled with conventional extracellular electrodes for both stimulation and recording, giving the opportunity to perform standard short- and long-term plasticity protocols. We also show that HDMEA can be used in combination with fluorescence live imaging techniques such as Voltage Sensitive Dye recordings. The combination of complementary methodologies supports the HDMEA platform validation and paves the way to detailed electrophysiological studies.

Session Details

Session Title: 19. Neuroelectronics & neurorobotic interfaces

Session Date: Saturday, July 16
