VALIDATING SILICON POLYTRODES WITH PAIRED JUXTACELLULAR RECORDINGS: METHOD AND DATASET

Joana P. Neto¹,²,⁵, Gonçalo Lopes¹, João Frazão¹, Joana Nogueira¹, Pedro Lacerda¹, Pedro Baião¹, Arno Aarts⁴, Alexandru Andrei³, Silke Musa³, Elvira Fortunato², Pedro Barquinha² & Adam R. Kampff¹,⁵

¹Champalimaud Neuroscience Programme, Champalimaud Centre for the Unknown, Lisbon, PT; ²Departamento de Ciência dos Materiais, CENIMAT/I3N and CEMOP/Uninova, Caparica, PT; ³IMEC, Belgium; ⁴ATLAS Neuroengineering ⁵Sainsbury Wellcome Centre, University College London, London, UK

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Objectives: Extracellular recording is unique in its ability to record populations deep in the brain with sub-millisecond resolution. It also poses particularly daunting challenges for analysis. Cross-validating new methods for recording neural activity is necessary to accurately interpret and compare the signals they measure.

Method: Here we describe a procedure for precisely aligning two probes for in vivo “paired-recordings” such that the spiking activity of a single neuron is monitored with both a dense extracellular silicon polytrode and a juxtacellular micro-pipette.

Results: Our new method allows for efficient, reliable, and automated guidance of both probes to the same neural structure with micron resolution. We also describe a new dataset of paired-recordings, which is available online (http://www.kampff-lab.org/validating-electrodes/).

Conclusion: We propose that our novel targeting system, and ever expanding cross-validation dataset, will be vital to the development of new algorithms for automatically detecting/sorting single-units, characterizing new electrode materials/designs, and resolving nagging questions regarding the origin and nature of extracellular neural signals.