Seminar/Talk

Neuroscience Seminar Series - Rafael Yuste

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Host: Neuroscience Students and Postdocs

The design of neural circuits, with large numbers of neurons interconnected in vast networks, strongly suggest that they are specifically build to generate emergent functional properties (1). To explore this hypothesis, we have developed two-photon holographic methods to selective image and manipulate the activity of neuronal populations in 3D in vivo (2). Using them we find that groups of synchronous neurons (neuronal ensembles) dominate the evoked and spontaneous activity of mouse primary visual cortex (3). Ensembles can be optogenetically imprinted for several days and some of their neurons trigger the entire ensemble (4). By activating these pattern completion cells in ensembles involved in visual discrimination paradigms, we can bi-directionally alter behavioral choices (5). Our results demonstrate that ensembles are necessary and sufficient for visual perception and are consistent with the possibility that neuronal ensembles are the functional building blocks of cortical circuits. 1. R. Yuste, From the neuron doctrine to neural networks. Nat Rev Neurosci 16, 487-497 (2015).2. L. Carrillo-Reid, W. Yang, J. E. Kang Miller, D. S. Peterka, R. Yuste, Imaging and Optically Manipulating Neuronal Ensembles. Annu Rev Biophys, 46: 271-293 (2017). 3. J. E. Miller, I. Ayzenshtat, L. Carrillo-Reid, R. Yuste, Visual stimuli recruit intrinsically generated cortical ensembles. Proceedings of the National Academy of Sciences of the United States of America 111, E4053-4061 (2014).4. L. Carrillo-Reid, W. Yang, Y. Bando, D. S. Peterka, R. Yuste, Imprinting and recalling cortical ensembles. Science 353, 691-694 (2016).5. L. Carrillo-Reid, S. Han, W. Yang, A. Akrouh, R. Yuste, (2019). Controlling visually-guided behavior by holographic recalling of cortical ensembles. Cell 178, 447-457. DOI:https://doi.org/10.1016/j.cell.2019.05.045.

Tuesday, May 12, 2020 02:00pm - 03:00pm

https://istaustria.zoom.us/j/99213372643?pwd=TjQvRDhzTUZnQkQwM0p0bld4c1BPUT09

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