

Abstract

Our everyday life entails a multitude of choices, and a great proportion of them is based on personal preference. Choosing between options based on subjective value is a cognitive process known as economic decision making. In the neuroeconomics, a pivotal observation found correlation between three functional groups of neurons (in the orbitofrontal cortex) and the choice behavior. These groups capture both the input and output of the decision. For this reason, in the last decade, a relevant number of experiments operated under the theoretical framework that these neurons form the decision circuit. However, to date there is no direct biological evidence that such a circuit exists. This issue is of primary importance for the neuroeconomic. To test it, six years ago, I joined Dr. Padoa-Schioppa laboratory, I started developing in vivo two-photon calcium imaging of orbitofrontal cortex, combined with gradient index lens during economic choices. We proved that: (i) the preparation is a viable model to study choices, (ii) neurons have stable functional encoding of decision variables, and (iii) different groups of neurons populate different layers, supporting the idea of a decision circuit. Leveraging this preparation and the new WUCCI microscope in the Neuroscience Research Building, I want to perform imaging during optogenetic stimulation with a single cell resolution. This approach will test the existence of the decision circuit, and establish the causal links between the functional groups of neurons in orbitofrontal cortex and choices.