Information Processing and Neuronal Coordination in Sensory Neocortex
(1R01MH073245-01-FY04)
Kenneth D. Harris
Rutgers, The State University of New Jersey, New Brunswick

This project will study the activity of neuronal populations in sensory neocortex, and investigate how neuronal assembly activity is disrupted in the dissociative anesthetic (PCP) model of schizophrenia. Experimental investigation of this question will require recording large numbers of cells in functioning neural circuits, and the development of computational and statistical machinery needed to draw meaningful conclusions from this data. The project will rely on two techniques we have developed over the last years: large-scale neuronal recordings using silicon microelectrodes; and the data analysis method of peer prediction. The use of silicon probes will allow for estimation of the location of recorded cells, identification of monosynaptic connections between cell pairs, and characterization of neurons as pyramidal cells or interneurons. Experimentally identified assembly structure will be interpreted in the context of this circuit-level information. We will investigate the hypothesis that psychotomimetic effects of low doses of dissociative anesthetics are caused by a partial distortion in assembly organization, whereas larger doses cause a more complete distortion resulting anesthesia.

Project Website

http://qneuro.rutgers.edu

Publications

Harris, K.D. (2005). Neural signatures of cell assembly organization. Nature Reviews Neuroscience, in press.

Schmitzer-Torbert, N., Jackson, J., Henze, D., Harris, K.D., Redish, A.D. (2005) Quantitative measures of cluster quality for use in extracellular recordings. Neuroscience, 131,1-11

Bartho, P., Hirase, H., Monconduit, L., Zugaro, M., Harris, K.D., Buzsaki, G. (2004). Identification of neocortical principal cells and interneurons by extracellular features. J Neurophysiol. 92:600-608.