



PROGRESS IN NEUROSCIENCE PINS

Seminar Series of the
Brain & Mind Research Institute
Weill Cornell Medical College (WCMC)
&

The Graduate Program in Neuroscience of
WCMC and Sloan Kettering Institute



Thursday, 10/30/14, 4 PM, coffee at 3:45 PM
Weill Auditorium

Towards Understanding the Human Brain: Imaging Function and Connectivity from Cortical Columns to Whole Brain

Kamil Ugurbil, Ph.D.

Director, Center for Magnetic Resonance Research (CMRR), McKnight Presidential Chair Professor
Professor, Departments of Radiology, Neurosciences and Medicine, University of Minnesota

Abstract:



Since the introduction of functional brain imaging (fMRI) approximately two decades ago, there has been a revolution in the ability to image brain function going from early experiments demonstrating relatively coarse images of activity in the visual cortex to mapping columnar organizations with laminar differentiation. These developments have relied on ever increasing magnetic fields, new imaging and image reconstruction methods, and a rigorous, albeit as of yet incomplete, understanding of the mechanisms underlying the functional mapping signals. These functional studies have been complemented with imaging of morphology, providing increasingly detailed depictions of axonal fibers, cerebral blood vessels, myelin distribution etc.

The latest application of these methodological developments target comprehensive description of the connections among gray matter locations in the human brain at the millimeter scale, under support from the Human Connectome Project (HCP). Exploiting the recent advances in instrumentation and imaging methods, studies undertaken in the HCP provide data on whole-brain connectivity with previously unavailable resolution and insights through systematic studies of large population of twins and their non-twin siblings.

Recent relevant publications:

1. Ugurbil K. Magnetic resonance imaging at ultrahigh fields. IEEE Trans Biomed Eng 2014;61(5):1364-1379.
2. Ugurbil, K, Xu, J., Auerbach, E.J., Moeller, S., Vu, A.T., Duarte-Carvajalino, J.M., Lenglet, C., Wu, X., Schmitter, S., Van de Moortele, et al. Pushing spatial and temporal resolution for functional and diffusion MRI in the Human Connectome Project. Neuroimage 2013. 80, 80-104.
3. Yacoub, E., N. Harel, and K. Ugurbil, High-field fMRI unveils orientation columns in humans. Proc Natl Acad Sci U S A, 2008. 105(30): p. 10607-12.



Weill Cornell Medical College

