

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, 9/22/16, 4 PM, coffee at 3:45 PM Weill Auditorium

"Does Connectomics Make Sense?"

Jeff W. Lichtman, M.D., Ph.D., Jeremy R. Knowles Professor of Molecular and Cellular Biology Santiago Ramón y Cajal Professor of Arts and Sciences, Harvard University

Abstract:



Lichtman's research focuses on the study of neural connectivity and how it changes as animals develop and age. With his colleagues he has developed a number of tools that permit synaptic level analysis of neural connections. These include activity dependent uptake of fluorescent dyes, transgenic approaches to label individual nerve cells, and "combinatoric" methods (e.g., DiOlistics, Brainbow, and NPS) to label many nerve cells in the same tissue. In addition, he has helped develop automated electron microscopy approaches for large scale neural circuit reconstruction. These connectomic methods seek to make it routine to acquire neural circuit data in any nervous system. The central focus of his work is to describe the ways in which developing nervous systems change to accommodate information that is acquired by experience. Much of this work has centered on the mammalian peripheral nervous system which undergoes profound activitydependent circuit reorganizations in early life. These alterations allow axons to prune most of their synaptic branches while strengthening a small subset of synapses in a competitive process called synapse elimination. Study of the dynamic changes that occur in circuits has required not only describing circuits in great detail at single time points but also visualizing how connections change over minutes, months and even years using in situ imaging approaches in living animals.

Recent Relevant Publications:

- 1. Kasthuri N, Hayworth KJ, Berger DR, Schalek RL, Conchello JA, Knowles-Barley S, Lee D, Vázguez Reina A, Kavnig V, Jones TR, Roberts M, Morgan JL, Tapia JC, Seung HS, Roncal WG, Vogelstein JT, Burns R, Sussman DL, Priebe CE, Pfister H, Lichtman JW. 2015. Saturated reconstruction of a small volume of neocortex. Cell. 2015 July 30;162(3): 648-661. doi: 10:1016/j.cell.2015.06.054. PMID: 26232230.
- 2. Morgan JL, Berger DR, Wetzel AW, Lichtman JW (2016) The Fuzzy logic of network connectivity in the mouse visual thalamus. Cell. 2016 March 24;165(1): 192-206. doi: 10.1016/j.cell.2016.02.033. PMID: 27015312



