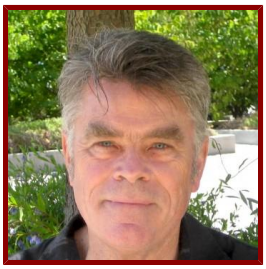
Stanford



Stephen J Smith

Professor of Molecular and Cellular Physiology, Emeritus

Molecular & Cellular Physiology

NIH Biosketch available Online Curriculum Vitae available Online

Bio

ACADEMIC APPOINTMENTS

- Emeritus Faculty, Acad Council, Molecular & Cellular Physiology
- Member, Bio-X
- Member, Stanford Neurosciences Institute

LINKS

- Smith Laboratory Site: http://smithlab.stanford.edu

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Prof. Smith's laboratory explores the development, structure, function and disorders of the brain's neural circuitry. The lab's experimental approach has typically begun with the invention of a new optical imaging method followed by applications of that method to attack important but previous untractable experimental challenges. Early on, Smith invented a novel fiber-optic spectrometer for calcium sensing that enabled the first detection and measurement of calcium transients in vertebrate neurons, the first quantitative measurements of presynaptic Ca transients, and the extraordinarily significant discovery of Ca influx through NMDA receptor channels. Later Smith lab imaging inventions led to numerous significant neuroscience discoveries, including retrograde actin flow within neuronal growth cones, intracellular Ca waves in astrocytes, the active role of dendritic filopodia in synaptogenesis, and the packeted delivery of synaptic protein components during synaptogenesis, and to the first optical measurements of single synaptic vesicle release, the first in vivo imaging of synaptotropic dendrite growth, and the first in vivo functional imaging measurements of visual receptive field development in a vertebrate animal. Most recently, they have invented a unique high-resolution proteomic imaging method called "array tomography", and are now working to apply this novel method to explore the molecular architecture of cortical microcircuits in mouse and human. This work is currently focused on efforts to identify the circuit loci of the specific changes in synaptic connectivity associated with specific memory traces, i.e. the physical "engrams" of experience. This work is referenced more fully in the Smith "Biosketch" and "CV" documents to be found on this web page.

Teaching

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Biophysics (Phd Program)
- Molecular and Cellular Physiology (Phd Program)
- Neurosciences (Phd Program)

Publications

PUBLICATIONS

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- **Automated Analysis of a Diverse Synapse Population** *PLOS COMPUTATIONAL BIOLOGY*
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  2013; 9 (3)

- **Sub-diffraction Limit Localization of Proteins in Volumetric Space Using Bayesian Restoration of Fluorescence Images from Ultrathin Specimens** *PLOS COMPUTATIONAL BIOLOGY*
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