Curriculum Vitae

Jeff Gauthier

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Education

September 2002 to present: U of California-San Diego, Computational Neurobiology Ph.D. program. Cum GPA: 3.9

September 1998 to June 2002: University of Chicago., B.S. in Mathematics, departmental and general honors. Also completed concentration requirements in biology. Advanced coursework in analysis, algebra, probability & statistics, neurobiology, and computational/mathematical neuroscience. Cum GPA: 3.6.

September 1995 to June 1998: Lincoln High School, Manitowoc, WI.

Research Experience

July 2003 to present: Work towards Ph.D. thesis in lab of E.J. Chichilnisky, Salk Institute. Description below.

September 2002 to June 2003: Research rotations for UCSD Computational Neurobiology graduate program, quarter long projects in prospective thesis labs.

With David Kleinfeld: Implement spectral analysis (FFT, WOSA, multitaper) in Labview "from scratch".
With William Kristan: Optimize the loading of a new voltage-sensitive dye in the isolated leech ganglion.
With EJ Chichilnisky: Develop a method to load calcium-sensitive dye into retinal ganglion cells of mice and rats.

June 2000 to August 2002: Research Assistant at Brain Research Imaging Center (BRIC, University of Chicago Hospitals) with mentor Steven L Small. Under Dr. Small's supervision I conceived, designed, and carried out a functional magnetic resonance imaging experiment to study long term motor and sensory plasticity in violin players. When I left the BRIC to attend graduate school, the experimental and analysis protocols were complete, but we didn't have enough data to publish.

Awards and Honors

2003	NSF Grad. Res. Fellowship, Hon. Mention
2002-03	MASEM Graduate Scholarship, UCSD
2002	Induction into Sigma Xi
1999-2002	U of Chicago Dean's List.

Current Research Project

The anatomy and physiology of retinal ganglion cells have long been studied in the adult retina, but rarely have both been observed simultaneously. Still today fierce debates rage over how the anatomical classification scheme aligns with the physiological. I aim to understand how the light sensitivity of retinal ganglion cells (RGCs) is produced by anatomical connections in the retina, in particular how the expanse and lamination of the dendritic tree determine which photoreceptors influence the cell.

My lab uses multielectrode extracellular arrays to simultaneously record spikes from hundreds of ganglion cells in an in vitro preparation of the adult retina, typically from rats, guinea pigs, or macaque monkeys.

Currently I'm developing a technique to completely fill the dendritic trees of RGCs with fluorescent dye (e.g. rhodamine, DiI) in order to resolve the three dimensional dendritic branching. Once a reliable technique is established, the next step will be to match filled cells with spikes recorded on the electrodes. I'm working on this matching problem with my advisor and our collaborators.

RGC physiology has many subtleties that deviate from a simple linear filter. Knowing more about the supporting anatomy will not only give a reductionist explanation, but the mechanism can suggest new ideas about what the RGC signals mean to the brain, as well as guide the design of novel experiments to test those predictions.

No publications or abstracts