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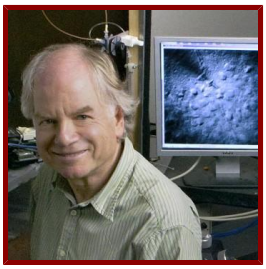

Shaul Hestrin, PhD

Professor of Comparative Medicine

CONTACT INFORMATION

- **Alternate Contact**

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Bio

ACADEMIC APPOINTMENTS

- Professor, Comparative Medicine
- Member, Bio-X
- Member, Wu Tsai Neurosciences Institute

LINKS

- Hestrin Lab: https://web.stanford.edu/~shestrin/

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Cellular activity in neocortical circuits and behavior

The main interest of my lab is to understand how the properties of neocortical neurons, the circuits they form and the inputs they receive give rise to neuronal activity and behavior. Our approach includes behavioral studies, two-photon calcium imaging, in vivo whole cell recording in behaving animals and optogenetic methods to modulate activity of cortical neurons.

The neocortex represents about 80% of the human brain and is associated with wide range of functions including sensory perception, motor movement, memory and higher aspects of cognition. In the neocortex a major synaptic input originates from local cortical neurons. In addition, thalamic inputs, together with distant corticortical inputs and neuromodulator inputs play critical role. How these diverse inputs combine at the cellular and circuit level to generate neuronal activity and behavior is the focus of our studies.

We have developed methods to define cell types using genetics and other means. In vitro approach allowed us to characterize the wiring pattern of microcircuits and the synaptic properties of specific connections. To investigate how neuronal properties and interactions generate neuronal activity under physiological conditions we study cortical neurons in vivo in behaving mice. By combining whole cell recordings, calcium imaging and optogenetics we study the subthreshold activity and

circuit activity that drive spike generation in cortical neurons. Importantly, by studying and manipulating neuronal responses as well as behavioral performance we can investigate the relation between neuronal activity and animal perception.

Teaching

COURSES

2023-24

- Cellullar/Molecular Neuroscience Laboratory: NEPR 288 (Sum)
- One Health Journal Club: COMPMED 200 (Aut, Win)

2022-23

- One Health Journal Club: COMPMED 200 (Aut, Win)

2021-22

- One Health Journal Club: COMPMED 200 (Aut, Win)

2020-21

- One Health Journal Club: COMPMED 200 (Aut, Win)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Javier Weddington

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Neurosciences (Phd Program)

Publications

PUBLICATIONS

- **Motivation and Engagement during Visually Guided Behavior.** *Cell reports*
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- **Correlation of Synaptic Inputs in the Visual Cortex of Awake, Behaving Mice.** *Neuron*
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- **Feature-Specific Organization of Feedback Pathways in Mouse Visual Cortex** *CURRENT BIOLOGY*
  Huh, C. L., Peach, J. P., Bennett, C., Vega, R. M., Hestrin, S.
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- **Controlling brain states.** *Neuron*
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- **Synaptogenesis of Electrical and GABAergic Synapses of Fast-Spiking Inhibitory Neurons in the Neocortex** *JOURNAL OF NEUROSCIENCE*
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- **Cell-type identity: a key to unlocking the function of neocortical circuits** *CURRENT OPINION IN NEUROBIOLOGY*
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- **Intracortical circuits of pyramidal neurons reflect their long-range axonal targets** *NATURE*
  Brown, S. P., Hestrin, S.
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- **Cannabinoid sensitivity and synaptic properties of 2 GABAergic networks in the neocortex** *CEREBRAL CORTEX*
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  Hestrin, S., Galarreta, M
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- **Electrical synapses define networks of neocortical GABAergic neurons** *Trends in Neurosciences*
  Hestrin, S., Galarreta, M.
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- **Electrical coupling among irregular-spiking GABAergic interneurons expressing cannabinoid receptors** *JOURNAL OF NEUROSCIENCE*
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- **MECHANISMS GENERATING THE TIME COURSE OF DUAL COMPONENT EXCITATORY SYNAPTIC CURRENTS RECORDED IN HIPPOCAMPAL SLICES** *NEURON*
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