Lecture 1: October 27th 10 am

Prof. Stephen D. Liberles
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Education and Training

1991-1994 B.A., Harvard University, major: Chemistry, summa cum laude
1994-1999 Ph.D., Harvard University, Department of Chemistry and Chemical Biology
Thesis advisor: Stuart L. Schreiber
2000-2007 Post-doctoral fellow, Harvard Medical School, Department of Neurobiology (2000-2002), Fred Hutchinson Cancer Research Center (2002-2007)
Postdoctoral advisor: Linda B. Buck

Selected Awards and Honors

2013 John and Virginia Kaneb Fellowship, Harvard Medical School
2016 HHMI Faculty Scholar Award
2016 NIH Director's Pioneer Award
2018 HHMI Investigator
2020 Peter Maloney Lectureship, Johns Hopkins University, Department of Physiology

"Neuronal mechanisms of interoception"

The brain receives sensory inputs from internal organs throughout the body, and uses that information to control vital functions like breathing, heart rate, blood pressure, and gut motility, instinctive reflexes like cough and swallowing, and survival behaviors like feeding, drinking, and sickness responses. The vagus nerve is one major conduit between body and brain that controls autonomic physiology, yet vagal sensory mechanisms, despite their fundamental importance, are largely unresolved. We charted cell types and receptors of the vagus nerve, and generated a genetic toolkit for anatomical mapping, in vivo imaging, optogenetics and targeted ablation of vagal neuron subtypes. We characterized a myriad of sensory neurons that innervate the lungs, stomach, intestine, heart, arteries, and larynx, and control breathing, protect airway integrity, detect blood pressure changes, and monitor meal volume and content. In a collaborative effort, we identified a critical role for Piezo mechanoreceptors in the sensation of airway stretch and neuronal sensation of blood pressure underlying the baroreceptor reflex. We also used similar approaches to chart brainstem neurons that mediate nausea-related behaviors. Identifying neurons and receptors that control autonomic physiology builds an essential foundation for mechanistic study and therapy design.