



## **Organization of Activity Dynamics in Hippocampal Inhibitory Microcircuits**

Ivan Soltesz, PhD, Professor  
Neurosurgery Department  
Stanford University, California

Basket cells and axo-axonic chandelier cells are key GABAergic inhibitory interneurons that target the perisomatic region of principal cells, enabling efficient control of the timing and rate of spiking of their postsynaptic targets. In all cortical circuits, there are two major types of basket cell that exhibit striking developmental, molecular, anatomical, and physiological differences. In this talk, I will first discuss recent results that reveal the tightly coupled complementarity of these two key microcircuit regulatory modules, demonstrating a novel form of brain-state-specific segregation of inhibition during spontaneous behavior, with implications for the assessment of dysregulated inhibition in epilepsy. In addition, I will summarize new advances in our understanding of the GABAergic control of axon initial segments during ongoing spontaneous behaviors *in vivo*. Finally, I will highlight new insights into the regulation of long distance-projecting hippocampal GABA cells that show unique selectivity of activity dynamics for certain brain states.