

The Graduate Program in Biomedical Sciences  
is proud to announce the



**Ph.D. Dissertation Defense of**  
**LAURA DOVEK**

Biomedical Sciences Ph.D. Candidate  
in the Santhakumar Lab

Dr. Viji Santhakumar, Chairperson

**“Cellular and Circuit Mechanisms of Hippocampal Dentate  
Engram Formation and Seizure-Induced Alterations”**

Neuronal circuits maintain a delicate balance of excitatory drive and inhibitory regulation to execute high order functions, such as learning and memory, and maintain network stability which is severely compromised in temporal lobe epilepsy (TLE). The hippocampal dentate gyrus acts as a functional gate into the hippocampal trisynaptic circuit and plays a key role in learning and memory. Formation of memories is believed to be coded by activity of a distinct collection of neurons known as an engram. Sparse activity in dentate granule cells (GCs) has been shown to be involved in engram formation; however, the circuit mechanisms that underlie formation of these neuronal activity patterns are not fully understood. A sparse subtype of dentate projection neurons, semilunar granule cell (SGC) are preferentially recruited in engrams. However, circuit connectivity and functional effects of SGCs are not known. The objective of this dissertation is to better understand SGC's role in the dentate circuit, their role in memory as well as alterations to their synaptic inputs in epilepsy. My findings indicate that SGCs have more frequent excitatory inputs, with higher inputs from the medial entorhinal cortex (known to contain spatial information). SGCs are reliably recruited as part of a spatial engram due to its heightened excitability compared to GCs. GCs and SGCs adapt differently in response to pilocarpine induced epilepsy and epileptic mice are unable to use a spatial search strategy in our spatial behavior paradigm. These studies provide novel fundamental insights into dentate circuit function and memory processing.

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Friday, February 16th, 2024

10:00AM (PST)

School of Medicine Education Building II, Rm. 106

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