Announcing the Final Examination of Dhruvil Patel for the degree of Master of Science in Biotechnology

Dissertation Title: Mechanosensitive Piezo channels in the stomach: An anatomical focus on Piezo1 and Piezo2, mapping expression and localization across the stomach wall and sensory neurons.

Date: Tuesday 16th June 2026

Time: 2:30 PM - 4:00 PM

Zoom Meeting link:

https://ucfmed.zoom.us/j/92591554210?pwd=akDwT6NS6mWqA9vgkab7xhVkdinO7r.1&from=addon

Abstract

As a highly mechanical organ, the stomach relies on mechanosensors to detect physical forces such as filling, contraction, and wall tension to coordinate essential functions like accommodation, peristalsis, and satiety signaling. While PIEZO1 and PIEZO2 were previously identified as the primary mechanically activated ion channels and molecular force sensors in mammals, a protein-level map of these channels within the gastric muscular wall was previously unavailable. This thesis addresses this gap by utilizing immunohistochemistry on flat-mount preparations of the mouse stomach muscularis propria, alongside cryosections of the nodose and dorsal root ganglia (DRG), to map the expression of PIEZO1 and PIEZO2 within the gastric wall and its extrinsic sensory innervation. PIEZO1 was found to localize within three specific compartments: varicose nerve fiber terminals in the circular muscle with a morphology consistent with intramuscular array (IMA) vagal afferent terminals structures resembling intramuscular interstitial cells of Cajal (ICC-IM), and bright fibers that envelop PIEZO1-negative myenteric neuron somata. Robust PIEZO1 expression was also observed in nodose ganglia neurons, with intense signals in the vagal trunk confirming active anterograde transport. In contrast, PIEZO2 exhibited a distinct distribution, with the expression occurring in connective tissue fibers; confocal microscopy revealed these signals at fibril-level resolution, a finding not previously documented in gastrointestinal tissue. Notably, myenteric neuron somata tested negative for both channels. These findings indicate that PIEZO1 facilitates the neural stretch-sensing system. This combination of a soma-negative intrinsic pattern and soma-positive extrinsic ganglia offers the first anatomical evidence that PIEZO-immunoreactive structures in the gastric wall originate from extrinsic afferent terminals, establishing a framework for future functional research into gastric mechanosensation.

Dissertation Committee:
Dr. Zixi (Jack) Cheng (Committee Chair)
Dr. Jihe Zhao
Dr. Shadab Siddiqi

Approved for distribution by Dr. Zixi Cheng, Committee Chair.

The public is welcome to attend.