Title: How do we sense heat and coolness? Activation mechanisms of TRPV1 and TRPM8.

Abstract
Thermosensitive Transient Receptor Potential (thermoTRP) sensory receptor ion channels, which themselves detect various stimuli. ThermoTRPs are unique among sensory receptors as they are polymodal, integrating multiple sensory signals at the receptor level. These receptors can be activated by temperature changes, chemical irritants, and even natural compounds like capsaicin (from chili peppers) or menthol (from mint), hence our perception of these compounds as “hot” or “cold”. Lipids and other signaling pathways add to the complexity of thermoTRP regulation. All of these factors contribute significantly to injury- or inflammation- induced pain hypersensitivity and chronic pain. Our lab seeks a molecular-level understanding of somatosensation and nociception through thermoTRPs, as well as their broader contextualization. Not only are these fundamental questions, but modulations of these processes have been extensively exploited by academic and industrial laboratories for the development of non-opioid analgesics. We employ cryo-electron microscopy (cryo-EM) to visualize high-resolution, three-dimensional images of proteins in action, perform biochemical and biophysical methods to test hypotheses generated from structural insights, and apply the knowledge gained to exploit the therapeutic potential in humans. In my talk, I will describe how our cryo-EM studies of TRP channels have led to a better understanding of heat and capsaicin sensing by TRPV1 and cooling compound (e.g. menthol) and lipid sensing by TRPM8 in human: two key questions in human sensory transduction.