

MERI Visiting Scholar Lecture

Date: Wednesday, Oct. 21st

Time: 12:00 pm

Location: HSLC 1244 (750

Highland Ave, Madison, WI



Molecular Mechanisms Regulating Development and Remodeling in Cone-Dominant Retinas

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Abstract: Cone photoreceptors populating the human central retina are essential for high-acuity daylight and color vision. The degeneration of these critical neurons drives numerous debilitating and irreversible retinal degenerative diseases (RDDs), most notably age-related macular degeneration. The ultimate goal of our research is to uncover the molecular mechanisms controlling the development and disease-related cellular remodeling of human macular cones using innovative model systems and technical approaches. To better model the human central retina, we use the long-lived, diurnal, cone-dominant 13-lined ground squirrel (from the nation's unique UWO squirrel colony resource) together with the primate-like tree shrew, both of which circumvent the limitations of the mammalian 'nocturnal bottleneck'. We also leverage the ground squirrel's hibernation cycle to investigate remarkably rapid, natural changes of retinal degeneration and regeneration. By performing single-cell multiomics during retinal development in both of these cone-dominant species, as well as in the hibernating ground squirrel, we have identified novel regulatory pathways and factors of cone genesis and naturally occurring metabolic adaptations. Altogether, our ongoing studies focus on establishing a robust translational pipeline for developing advanced therapeutic interventions, including macula-emulating retinal organoids to model and treat human RDDs.

