OPHTHALMOLOGY
COLLEGE OF MEDICINE

SUMMER RESEARCH OPPORTUNITIES FOR UNDERGRADUATE students

FOR APPLICATION YEAR: 2025

PROJECT TITLE: Circadian Rhythm Exploration in Mice Animal Models

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Project Description

Our lab focuses on investigating circadian rhythm functionality in response to light patterns, using mice as our preferred animal model. Animals are influenced by environmental factors, particularly sunlight, to maintain an internal representation of time (endogenous circadian rhythm). Our current projects aim to uncover and manipulate the behavioral processes associated with external time cues by subjecting mice to various light protocols meant to reflect different environmental conditions. These include shifting light cycles, irregular light cycles, or constant light or dark cycles. We examine changes in brain anatomy and gene expression across various mouse genotypes in response to these environmental manipulations. The varying genetic components of mice are utilized to isolate specific genes responsible for cell expression within the brain and driving behaviors. Specific brain regions of interest include the central pacemaker of the body, the suprachiasmatic nucleus (SCN), as well as the Basolateral and Central Amygdala (BLA and CEA). While prior work has established the SCN’s role in light-driven circadian rhythm responses, our ongoing research aims to investigate the roles of the BLA and CEA in these processes. In summary, our goal is to reveal how the brain processes light cues, which in turn generate an internal circadian representation, and subsequently manifest as changes in behavior.