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CIRCADIAN EXPRESSION IN HUMAN TRACHEAL EPITHELIAL CELL

Meaghan Kenfield

Mentors: Jeff Haspel and Erik Herzog

Circadian rhythms are 24-hr oscillations in both behavior and physiology. These rhythms are internally generated by cell-autonomous clocks that depend on clock genes including Period2 (Per2) and Bmal1 to generate rhythms and to entrain to the daily environmental cycle. These clocks modulate events including cerebral activity, heart rate and blood pressure, plasma flow, urine production, electrolyte and water homeostasis, production and secretion of hormones, metabolism, and body temperature with time of day. In health, these clocks are synchronized to each other to produce coordinate daily rhythms in the body. Abnormalities in circadian rhythmicity can result in sleep disorders, such as insomnia, or lead to other conditions such as obesity, diabetes, depression, bipolar disorder, and seasonal affective disorder.

The goal of this project is to conduct and analyze real-time bioluminescent recordings of clock gene expression of human tracheal epithelial cells (hTECs) *in vitro*. Cells from donors with asthma, COPD and normal airway functioning were studied. In order to produce bioluminescent recordings, I made and transduced cells with Luciferase knockin reporter gene lentiviruses of two clock genes, Period2 and Bmal1. In order to ensure synchrony of plated cells, each plate was pulsed with dexamethasone prior to bioluminescent recording using a photo multiplier tube (PMT) in a light-tight, temperature-controlled incubator. Preliminary results reveal rhythmic expression of both Period2 and Bmal1 in hTECs from both wild-type and asthmatic donors.