

## **BCHM 421/422 Project – 2023-24**

**Project Outline:** The primary cilium, a tubulin-based signaling organelle expressed by most cells, acts as an autonomous signaling hub to integrate multiple extracellular signals distinctly from what occurs in the bulk cellular environment. In this project, the student will use a cilium-specific FRET-based probe to measure cAMP levels in this compartment in cells. Briefly, a cilia-targeted FRET-based probe (Arl13b-H187) will be expressed in pre-adipose cell types (3T3-L1 and human mesenchymal stem cells) and used to measure cAMP changes specifically within this cellular compartment. The rationale for these experiments relates to the critical role played by cAMP-signaling in adipogenesis and our desire to regulate this process therapeutically.

**Supervisor:** Professor Donald Maurice

**Project Title:** The Primary Cilium: A Hyper-localized Compartment for cAMP Signaling

**Project Goals:** Measure hyper-localized changes in cAMP in the primary cilium

**Experimental Approaches:** Microscopy, transient transfection, protein expression

**References:**

- 1) Maurice et al., Nature Reviews Drug Discovery, 2014, 13, 290-314
- 2) Hilgendorf et al., Cell, 2019, 179:1289
- 3) Erdelsky, MR, Groves, SA, Shah, C, Delios, SB, Umana, MB, Maurice, DH, 2024, Phosphodiesterase 4 activity uniquely regulates ciliary cAMP-dependent 3T3-L1 adipogenesis. Cellular Signaling (in press)