**Regulation of Lung Ion Transport**

Faculty: O’Grady, Ingbar

This theme developed from our original NIH SCOR in Acute Lung Injury addressing the molecular basis of ion transport in lung epithelial cells and lung alveolar solute and solvent flux during lung development and after lung injury; and the biochemical regulation of transport proteins. Dr Doug Wangsteen, Professor of Physiology, assists in measurements of transport in intact lungs and in living animals.

**David Ingbar, M.D.** Professor of Medicine, Pediatrics and Integrative Biology & Physiology

**Molecular Regulation of Alveolar Epithelial Ion Transport & Function:** We study the regulation of alveolar epithelial function during lung development, injury and repair. Most studies focus on Na,K-ATPase and other ion transport proteins, with additional interest in epithelial migration, matrix interactions, and apoptosis. A major goal is to develop therapeutic strategies to upregulate: (i) sodium pump function and/or (ii) cell migration to reform the epithelial barrier and increase alveolar fluid resorption. Current studies utilize hormones (glucocorticoids, T3), to stimulate Na,K-ATPase in vitro and in vivo. We also examine the type II cell response to hypoxia and hyperoxia at the translatome and transcriptome levels. With Dr. O’Grady, we found that CFTR Cl channel is required for beta agonist stimulation of alveolar fluid clearance.

**Scott O’Grady, Ph.D.,** Professor of Animal Science and Integrative Biology & Physiology

**Epithelial Ion Transport Mechanisms:** My laboratory seeks to understand the basic mechanisms of transepithelial ion transport. We utilize several electrophysiological techniques (including patch clamp, two electrode voltage clamp, epithelial voltage clamp), imaging technology and molecular approaches to investigate mechanisms and regulation of electrolyte transport across airway and alveolar epithelial cells. We also study aspects of innate immune function of the airway epithelium related to allergic responses to environmental allergens and the pathogenesis of asthma.