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Biochemistry and Molecular Biology Brown Bag Series

Bryan Mayville

Ph.D. Student

"A NOVEL APPROACH TO INVESTIGATE THE MOLECULAR INTERACTION BETWEEN INHALATION HAZARDS AND THE HUMAN PULMONARY SURFACTANT SYSTEM"

Tuesday, November 28, 2023

11:00 AM

135 Oelman Hall

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https://science-math.wright.edu/biochemistry-and-molecular-biology

Abstract:

A NOVEL APPROACH TO INVESTIGATE THE MOLECULAR INTERACTION BETWEEN INHALATION HAZARDS AND THE HUMAN PULMONARY SURFACTANT SYSTEM

Particles less than 10 µm in diameter have been shown to penetrate the distal alveoli of the lungs, thus increasing the potential for these substances to interact with lung surfactant fluid. This results in the adsorption of surfactant lipids and proteins to the particle surface, subsequently forming a lipid/protein corona. This removal of lipids and proteins from the surfactant monolayer impairs lung surfactant function, reducing lung compliance, and potentially leading to lung distress. Lung cells (such as A549 cultures, an adenocarcinoma cell line derived from type II pneumocytes) have been used as a tool to mimic the production of surfactants in an *in vivo system.* Long-term cultivation of these cells grown at an air-liquid interface (ALI) results in the secretion of surfactant at the apical surface of cultured cells along with reduced proliferation and increased type II alveolar cell phenotypic characteristics. Such characteristics include phospholipid synthesis, lamellar body production, and apical microvilli, which our lab has recently been able to reproduce. The surfactant produced by A549 cells, however, has not been adequately characterized, leaving significant gaps in our current understanding of this alternative cell-based surfactant manufacturing system. The purpose of this study is to characterize the surfactant produced by this cell-based in vitro system and create a more predictive and complex *in-vitro* model that better imitates human alveolar biology and the complexities of surfactant secretion. We will then use this system to look at the molecular interaction between occupationally relevant inhalation hazards and the human pulmonary surfactant system.