FALL 2022

Biochemistry and Molecular Biology Brown Bag Series

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Research Scientist

"Integration of Cellular and Acellular Lung Model for Rapid Identification of Hazardous Inhalational Exposure Scenarios for Chemicals and Particulates"

Tuesday, September 27, 2022

11:00 AM

135 Oelman Hall

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

Abstract

Integration of Cellular and Acellular Lung Model for Rapid Identification of Hazardous Inhalational Exposure Scenarios for Chemicals and Particulates

Biological fluids are physiologically relevant because they are inherent to all living organisms and play a vital role in toxicodynamic processes. Lung surfactant is a complex mixture of lipids and proteins that serves to maintain lung compliance and function. Inhaled chemicals and particles can interact with lung cells as well as lung surfactant, thus potentially leading tissue and/or organ dysfunction. A small drop of pharmaceutical lung surfactant was exposed to chemicals and particulates using a modified constrained drop surfactometer and assessed for changes in drop surface tension. After exposure, aerosols of serum albumin, colloidal silica, and diesel exhaust particulate significantly elevated surface tension. A549 cells, a model of type II pneumocytes, were exposed to a subset of the particulates assessed using the surfactometer to assess the effect of particulates directly on lung surfactant-producing cells. Of the particulates tested, copper oxide, chromic oxide, and zinc oxide were cytotoxic in a dose-dependent manner. Integrating multiple data streams composed of acellular model-derived data and cellular models with machine learning-based predictive analytics can assist in furthering the risk assessment framework to enhance informed decision making and more confidently identify potentially hazardous exposure scenarios.