Establishment of Aerosol Sampling Protocols Using Scanning Electron Microscopy (SEM) and Passive Air Sampler (PAS)

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Aerosol exposure assessment is important for the overall assessment of health risks to various work populations, including health care workers (HCW). Inhalation or skin contact with aerosols generated during cleaning procedures in health care environments, particularly from disinfectants and cleaning agents have been linked to a variety of health effects. While studies have been conducted to address exposure of HCWs to airborne particulate hazards, there is a need for developing a reliable sampling protocol, which would adequately account for the environmental factors and the workplace specifics of health care settings. A new protocol utilizing the scanning electron microscopy (SEM) and the passive air sampler (PAS) will be developed in the proposed pilot study. A sampling setup will include an SEM stub with Formvar sticky carbon for passive sampling of aerosol particles. It will be placed in a temperature and humidity controlled chamber. Saline, one of the most widely used solutions in the health care settings will be aerosolized in the chamber and collected by the PAC. The samples will be analyzed by environmental SEM under low-vac conditions for the particle distribution, their size and shape and composition. To confirm that the sampling protocol is adequate, the control samples with 0.1 M NaCl concentrations dispersed on the stubs will be analyzed on environmental SEM for particle distribution, size, shape and composition and compared to the aerosolized sample. Upon validation of the new protocol, it will be used for a grant application on the field assessment of exposure of HCWs to chemical and biological aerosol hazards. The proposed effort combining a novel approach (using SEM stubs as PAS with a proven particle morphology determination (SEM/EDS), will lead to the development of aerosol sampling protocol for HCWs. It will be further utilized for field exposure assessment of HCWs in hospitals and home health care environments.

The overall goal of this project is to develop reliable aerosol sampling protocol that is transferrable to other aerosols relevant to the health care by focusing on the use of SEM stubs as PAS and environmental SEM.

Hypothesis: PAS and experimental setup provides adequate data to develop reliable aerosol sampling protocol.

University of Cincinnati
18th Annual
Pilot Research Project
Symposium
October 5-6, 2017

Pilot Research Training Program (PRP) Overview

Welcome to the University of Cincinnati Education and Research Center's (ERC) 18th Annual Pilot Research Project (PRP) Symposium on October 5-6, 2017, held in the Medical Sciences Building Kresge Auditorium. The purpose of the PRP is to increase the research capacity of research trainees and young investigators in occupational health and safety and to encourage those in related disciplines to pursue occupational health and safety research.

Under the administrative direction of Dr. Amit Bhattacharya, research proposals are solicited and peer-reviewed annually by qualifying faculty and graduate students from the University of Cincinnati and the following PRP partnering institutions – Air Force Institute of Technology, Bowling Green State University, University of Toledo – Health Science Campus, Central State University, Purdue University, University of Kentucky, Western Kentucky University, Eastern Kentucky University, Murray State University, Ohio University and Kentucky State University.

At this symposium, the 2016-17 awardees will be presenting the results of their research and the 2017-18 awardees will make poster presentations of their proposed work. The keynote speaker on Thursday, October 5, 2017 is Dr. Carri Casteel from the University of Iowa College of Public Health, presenting on "Public Health Approach to Workplace Violence Prevention in Small Businesses."

The University of Cincinnati's Education and Research Center is one of 18 such centers funded by the National Institute for Occupational Safety and Health (NIOSH) nationally. Dr. Tiina Reponen serves as the director of the ERC, which is based in the University's Department of Environmental Health within the College of Medicine. The purpose of the ERC is to train professionals in the didactic and research skills necessary to lead the occupational safety and health disciplines. Results of research are translated into action through an outreach program and shared with professionals and practitioners in the region via continuing education.

Since 1999, the PRP program has allocated over $1.3 million to support 230 pilot research projects. These projects have served as a catalyst in bringing over $39 million in additional research support to the region from sources independent of the PRP program, such as, the National Institute for Occupational Safety and Health (NIOSH), National Institutes of Health (NIH), United States Department of Agriculture (USDA), National Science Foundation (NSF), and the Centers for Disease Control and Prevention (CDC). Additionally, the PRP has brought 51 new investigators from other fields of expertise to the area of occupational safety and health research.

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Hosted by: The University of Cincinnati Education and Research Center
Supported by: The National Institute for Occupational Safety and Health. (NIOSH) Grant #: T42-OH008432

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