

Immunotoxicity of PFCs (Perfluoroalkyl Compounds) Found in Fire-Fighting Foams

Alison Pecquet (PI), Jagit Yadav, and Andrew Maier

University of Cincinnati, Environmental Health

Corresponding Author: Alison Pecquet at Alison.Pecquet@uc.edu

The overall objective of this project is to investigate the immunotoxicity from perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) in highly exposed occupational populations. PFOA and PFOS are used in fire-fighting foams, and exposures of fire fighters occur during foam application, or from the burning and breakdown of various consumer products that contain PFOA/PFOS during a fire. Fire fighters have high body burdens of PFOA and PFOS in the serum, alongside other occupations such as PFC manufacturing. Increased risk estimates were found in firefighters for the immune-cell related cancers multiple myeloma and non-Hodgkin lymphoma. PFOA and PFOS are “presumed to be an immune hazard to humans” by the National Toxicology Program based on multiple alterations to the immune system in both experimental animals and humans. Mechanisms related to PFOS-induced cytokine inhibition were related to disruption of cell signaling (NF- κ B) activation pathways. PFOA induced aspects of cellular immune responses related to inflammatory pathways (IL-1 β , NF- κ B, MyD88), which have been implemented in disease development.

However, these responses were conflicted in the literature, suggesting further research is needed to identify the impacts of pathway perturbation at doses relevant to human exposures. The complexities of dose- response behavior may reflect competing roles of different regulators of receptor pathways, as shown for estrogenic chemicals. A potential modifier of this response could be through receptor activation (peroxisome proliferator-activated receptor - PPAR), as PFOA and PFOS are known PPAR ligands and modulate inflammatory immune pathways. We hypothesize that competing pathways are modulating the initial innate inflammatory response from PFOA/PFOS exposure in a dose- and chemical-dependent manner. The role of each pathway in modulating the innate immune response will be tested and dose-response data will be generated in two specific aims:

1. Expose human cell lines to PFOA and PFOS at a range of doses of human-relevance and identify significant alterations in pro-inflammatory gene expression (IL-1 β , NF- κ B, MyD88), including the role of PPAR in modulating the immune response.
2. In cells exposed as part of Aim 1, we will investigate PFOA- and PFOS-induced global gene perturbation using RNASeq and identify any novel immune-gene pathways that are altered from exposure.



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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Symposium
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