Project Title: Assessing the capability of silver nanoparticles to trigger the dysbiosis-inflammation cycle in the context of Adverse Outcome Pathways
Principle Investigator: Elaine Faustman, PhD
Graduate Student Investigator: Tyler Nicholas

Abstract

Introduction

Engineered nanomaterials (ENMs) are a large group of materials including silver nanoparticles (AgNPs), for which there is concern about potential impacts to occupational health. AgNPs have experienced pervasive integration within consumer and medical products due to their antimicrobial properties, and inhalation exposures to aerosolized AgNPs during primary manufacturing may pose a risk to working populations.

Approach

This project will assess the capability of AgNPs to trigger the dysbiosis-inflammation cycle (a novel mechanism relating lung microbiome dysbiosis to exacerbations of inflammatory lung diseases) and associated adverse outcomes using dose-response relationships in the context of Adverse Outcome Pathways (AOPs).

Expected Results, Outcomes and Output

AOPs are important tools for evaluating the safety of ENMs and understanding their implications to occupational health. This project is designed to inform AOPs and is anticipated to produce recommendations for early regulatory actions to protect the health and safety of nanotechnology workers in Washington State, mechanistic toxicological data for use in future risk assessments of AgNPs, three manuscripts to be submitted for publication in peer-reviewed journals as well as poster presentations for Society of Toxicology Annual Meetings.

Relevance to MA/AF Mission

There are 35 nanotechnology companies and organizations in Washington State, with several in the Seattle metropolitan area using AgNPs in their products. Dose-response relationships form the basis for occupational exposure limits and worker protection standards, and in the context of AOPs, they serve as important tools for evaluating the safety of ENMs and understanding their implications to occupational health. Integrated in vivo and in vitro data are recognized on the national level as essential for prioritizing actions on potentially toxic ENMs and to protect workers before harm has occurred. This project will produce such integrated data, which will be used to inform recommendations for early regulatory actions to protect the health and safety of nanotechnology workers in Washington State.