

# Pulmonary Responses to Sub-Acute Cadmium Sulfide Nanoparticle Inhalation

Nathaniel J. Parizek<sup>1,2</sup>, Benjamin R. Steines<sup>2</sup>, Andrea Adamcakova-Dodd<sup>2</sup>, Peter S. Thorne<sup>1,2</sup>

<sup>1</sup>Interdisciplinary Graduate Program in Human Toxicology, Graduate College, University of Iowa;

<sup>2</sup>Department of Occupational and Environmental Health, College of Public Health, University of Iowa

## Conclusion:

Subacute inhalation of cadmium sulfide nanoparticles resulted in pulmonary cellular infiltration, lipid peroxidation, and inflammatory cytokine/chemokine production all of which persisted 3 weeks past cessation of exposure.

## Background:

Engineered nanomaterials (ENMs) are being implemented into consumer goods, pharmaceuticals, and industrial processes at an extraordinary rate. One such nanomaterial is cadmium sulfide (CdS). Currently, CdS ENM exposure occurs most prevalently in occupational settings during production of CdS quantum dots. CdS quantum dots are used in the manufacturing of some photovoltaic solar cells, light emitting diodes (LEDs), and specialty lasers. Being that materials occupying the nanoscale are easily aerosolized, it is paramount that the toxicological endpoints that occur as a result of CdS ENM inhalation are examined in order to address the health and well being of exposed workers.

## Methods:

To examine the adverse health outcomes that manifest as a result of CdS ENM inhalation we used a murine model of C57BL/6J mice that was exposed to CdS ENM aerosol *via* a nose-only exposure system for 10 days over two working weeks for 4-hours per day. Upon the completion of exposure, the mice were split into two necropsy groups: (1) immediate necropsy following completion of exposure regimen and (2) necropsy after three weeks of non-exposure rest. During necropsy mice underwent assessment of pulmonary mechanics parameters, collection of bronchoalveolar lavage (BAL) fluid, and harvesting of other tissues and organs. Results of completed bioassays can be found in the toxicological assessment section.

## Exposure:

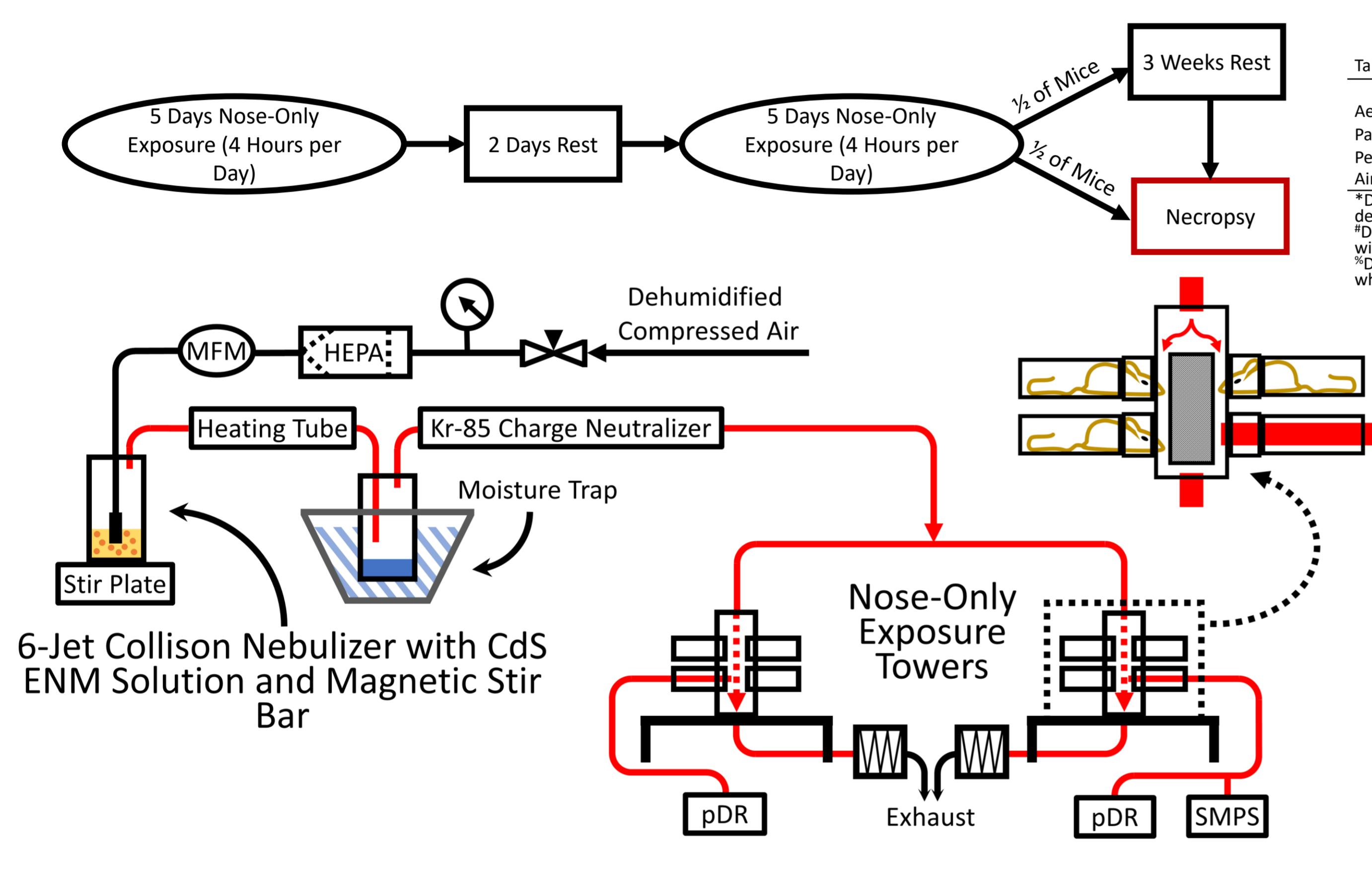


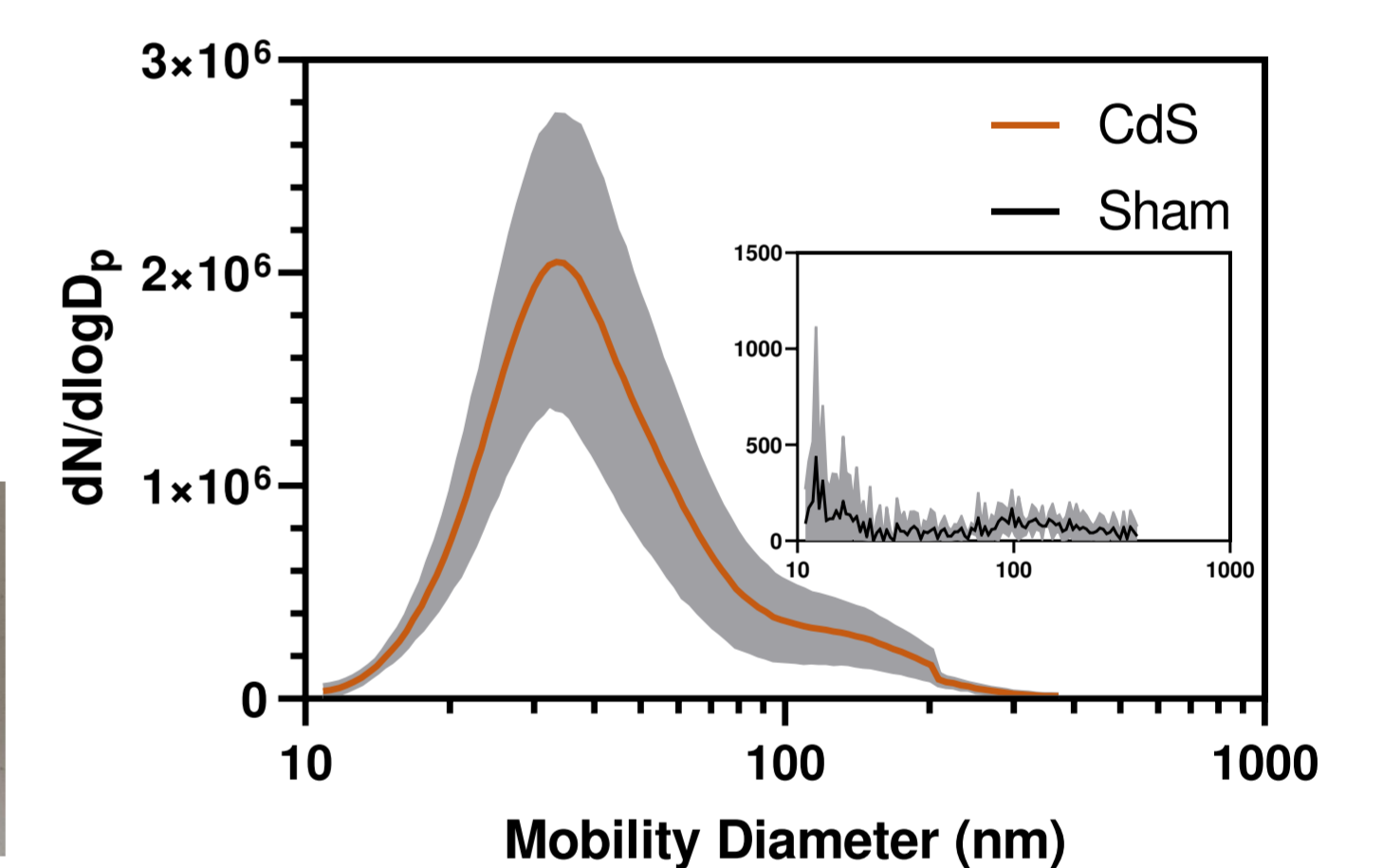
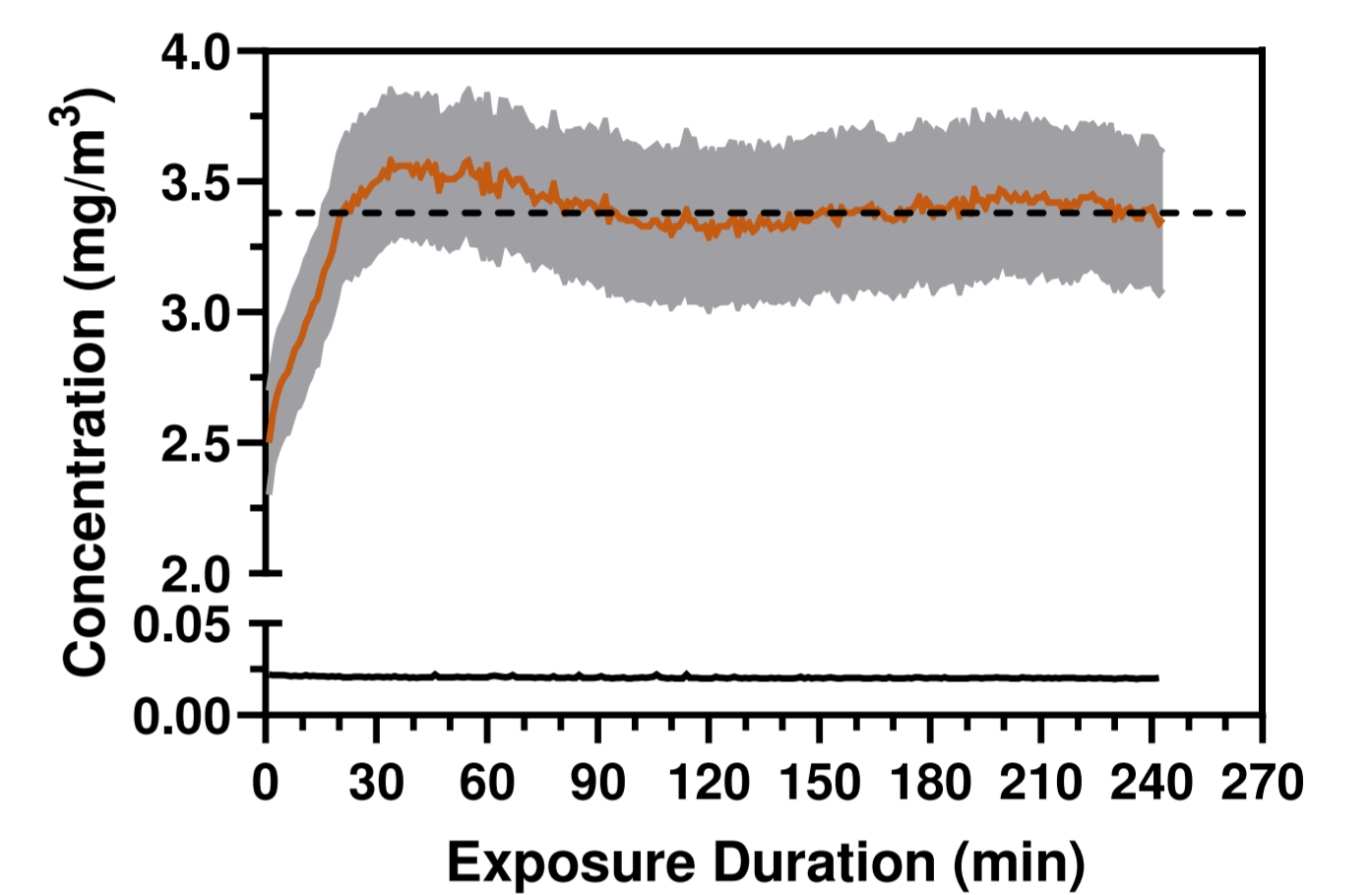
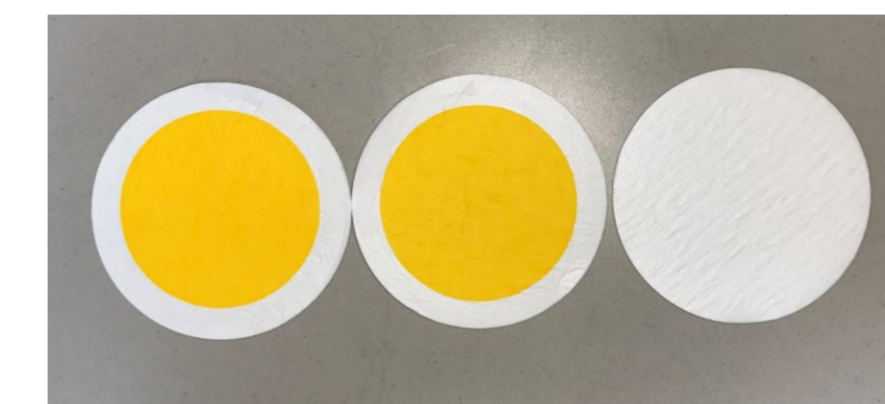
Table 1: Exposure Comparison

	CdS Exposed	Sham Exposed
Aerosol Concentration*	3.49 (0.45) mg/m <sup>3</sup>	10 (3) µg/m <sup>3</sup>
Particle Size*	41.3 (1.8)	49.4 (3.0)
Peak Particle Count*	2,052,304 (33.4)	434 (12.6)
Airflow to Towers (L/min)	6 per Tower	6 per Tower

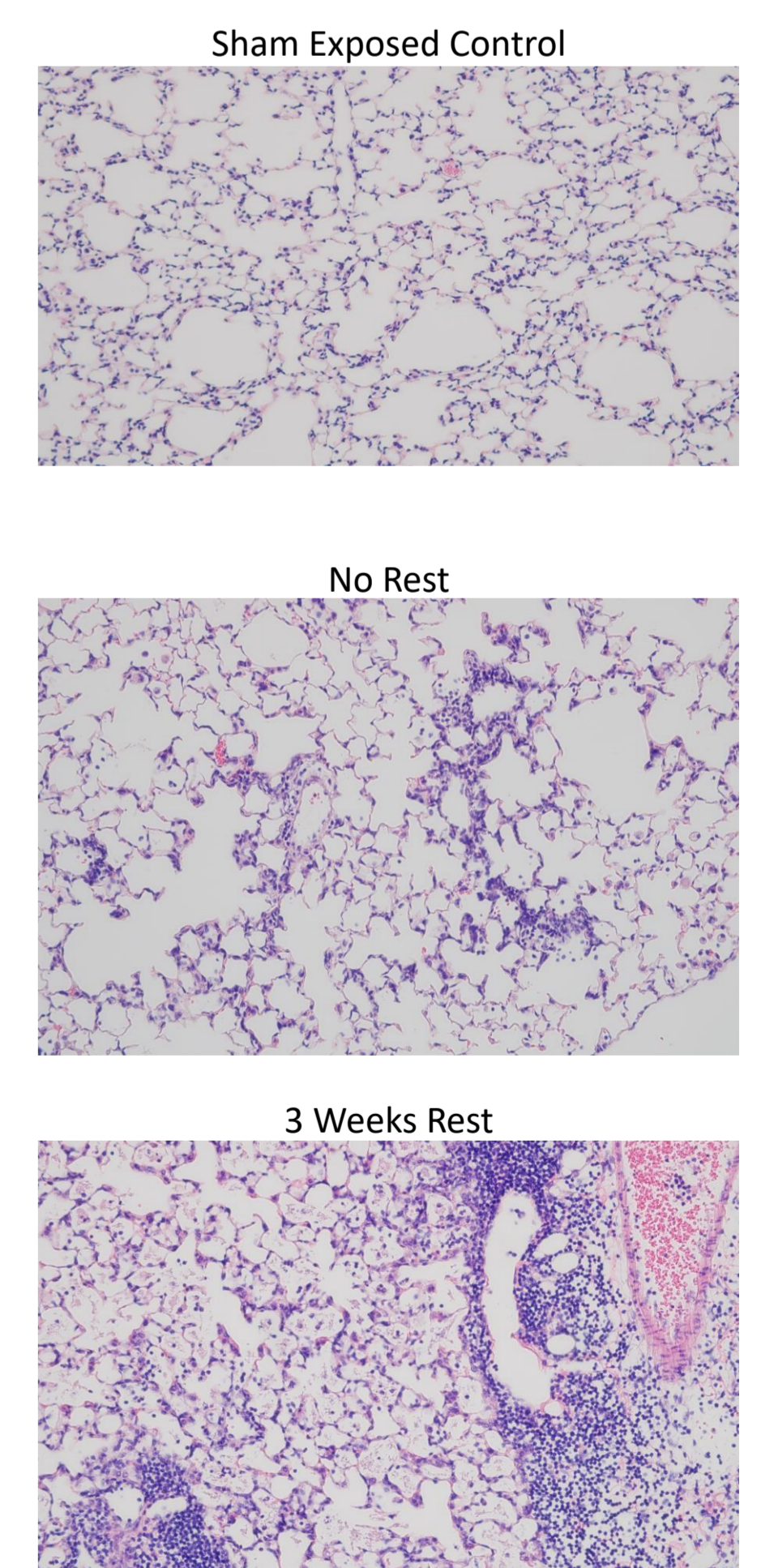
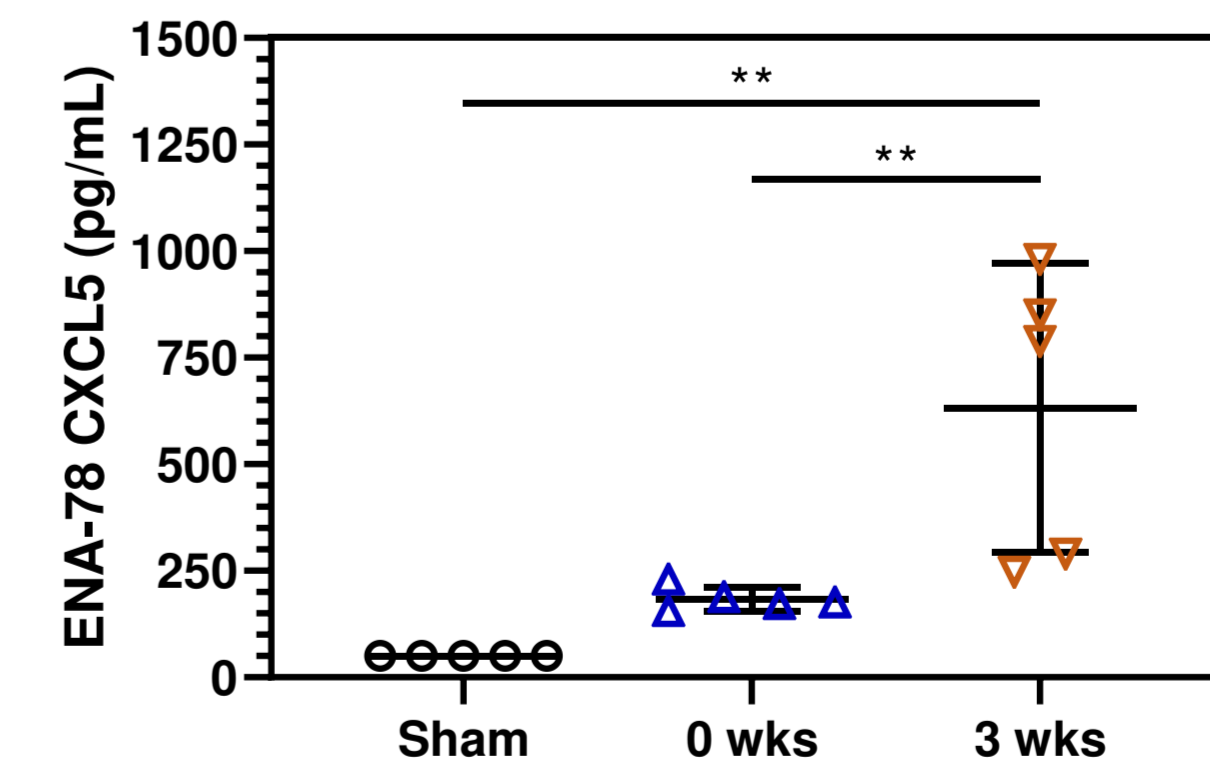
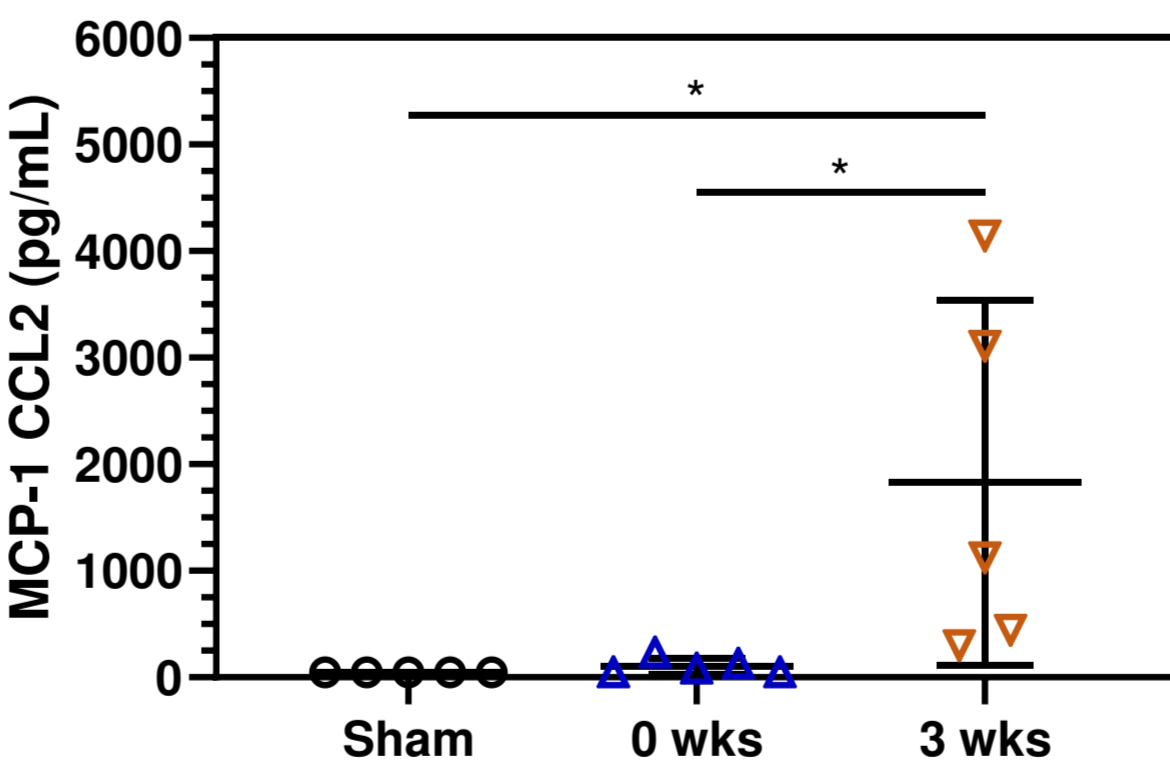
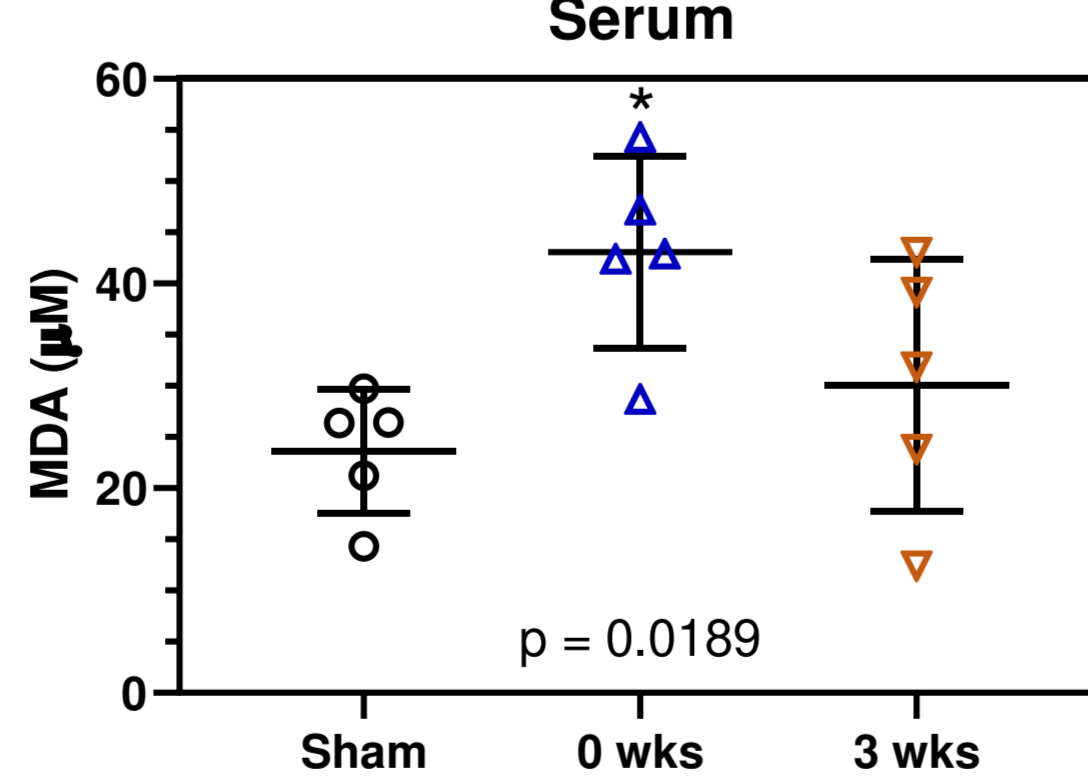
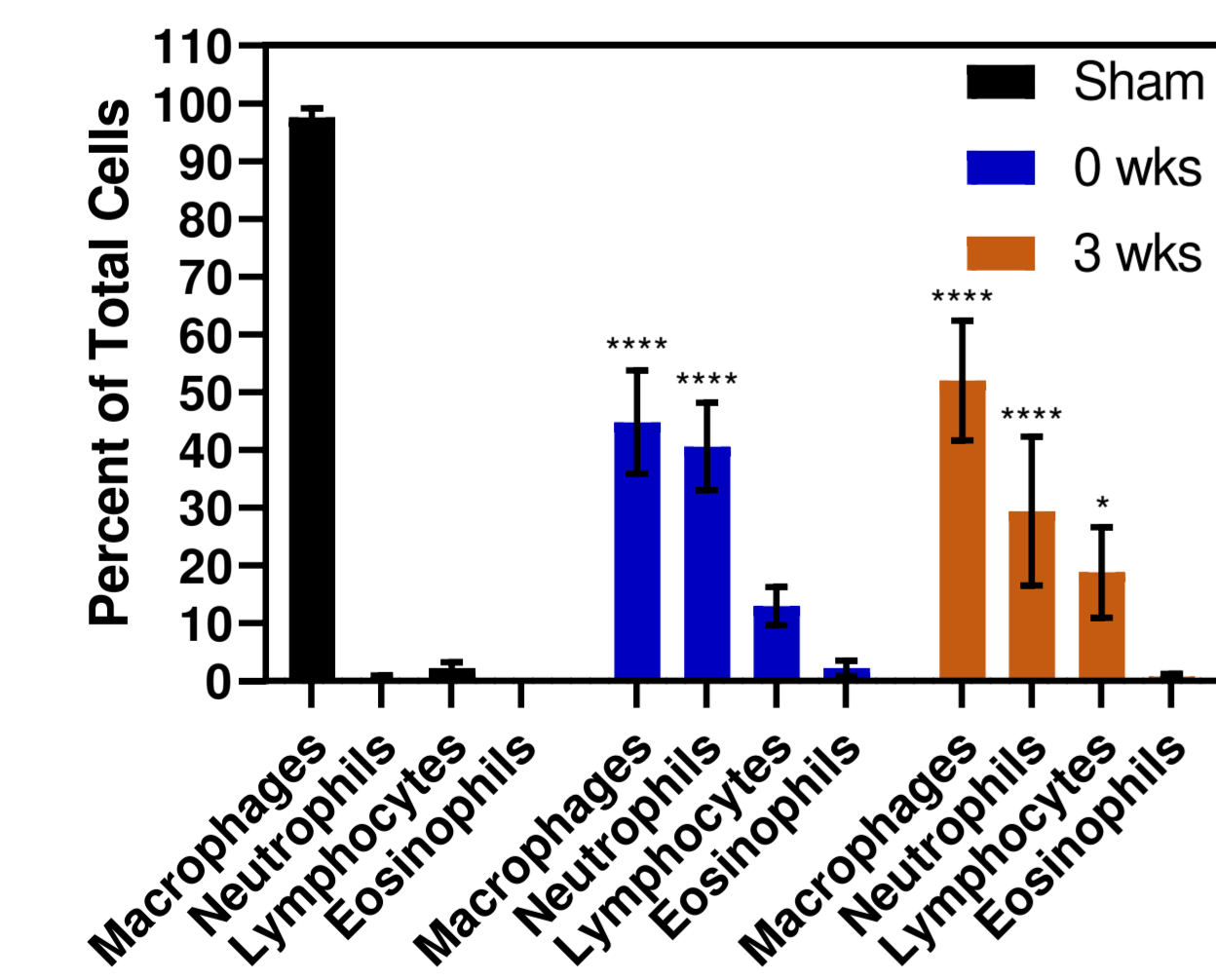
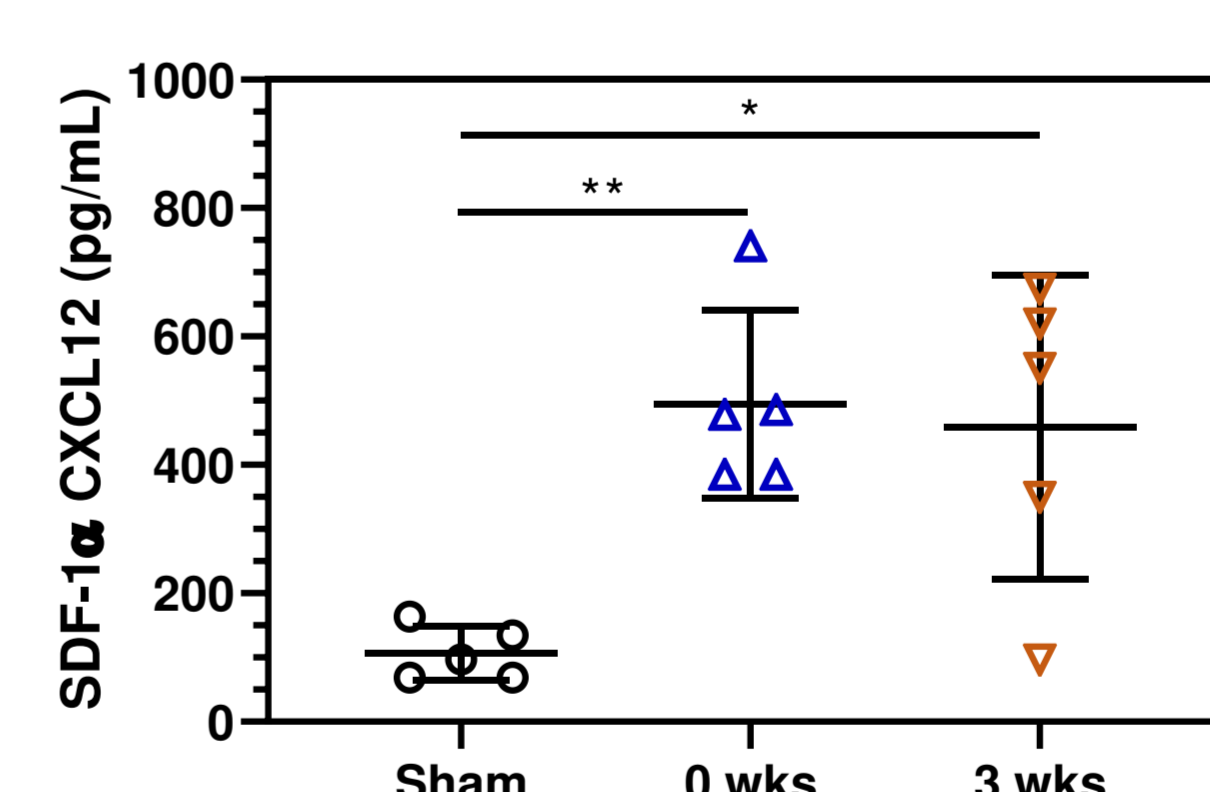
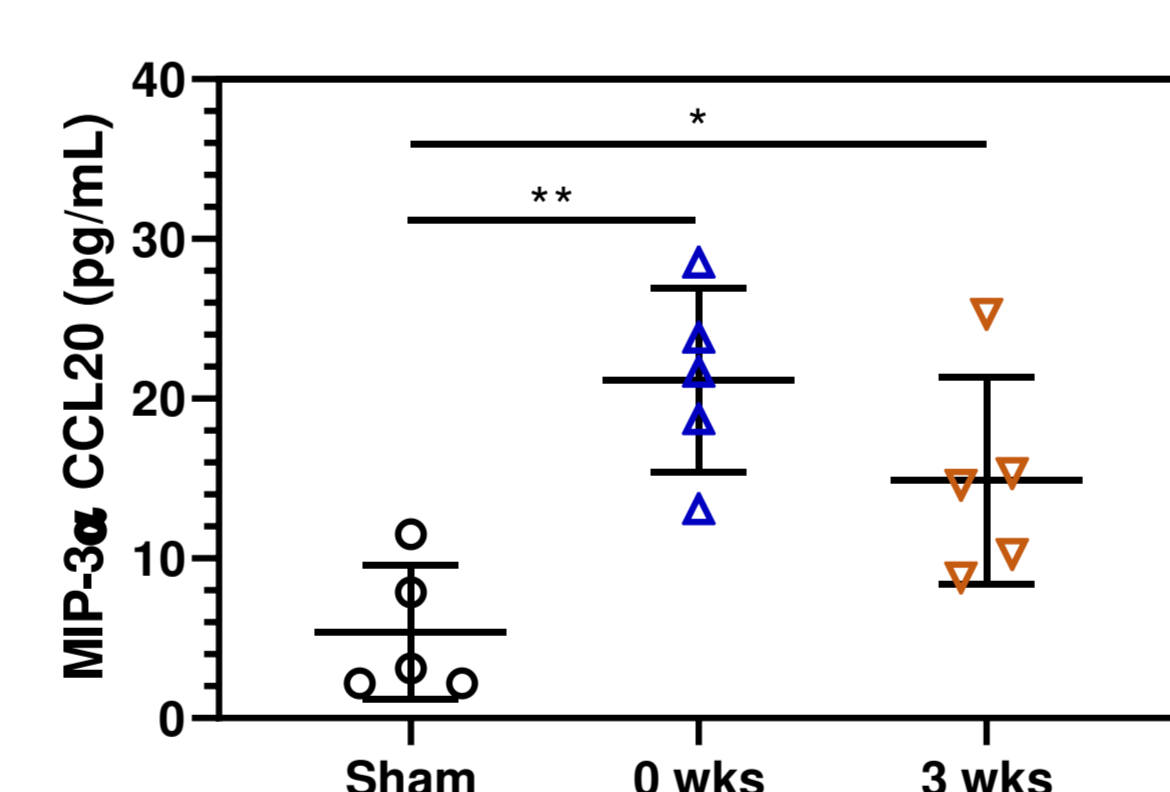
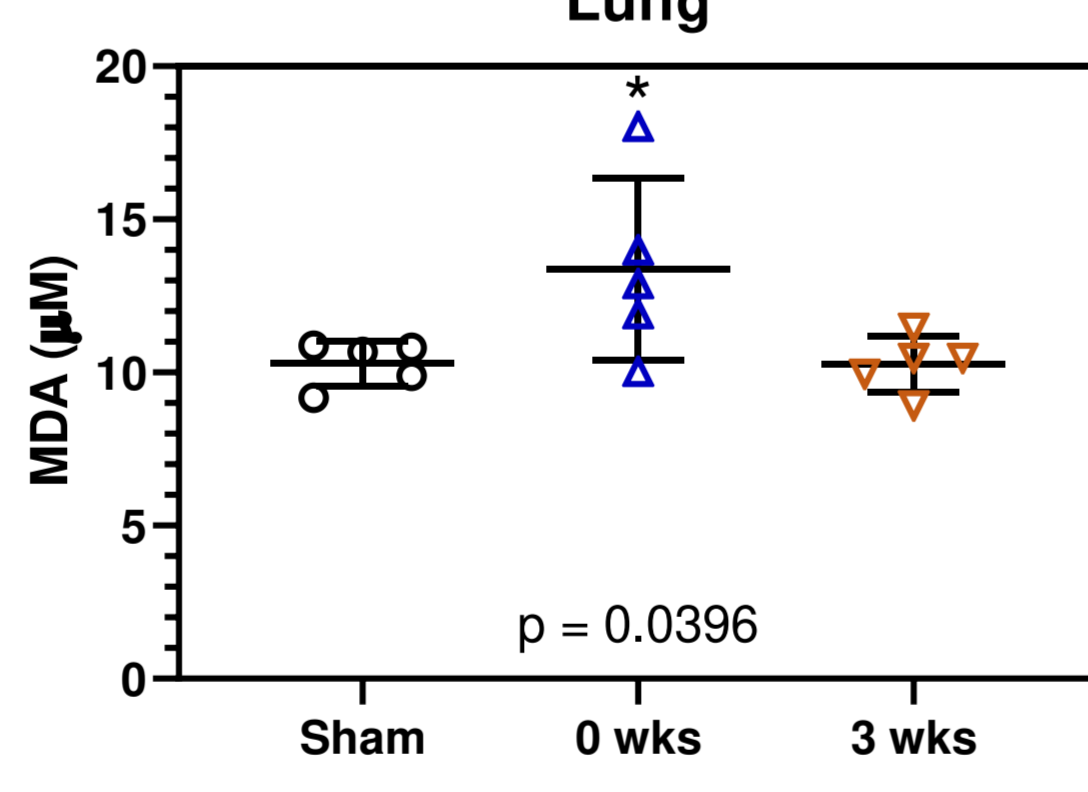
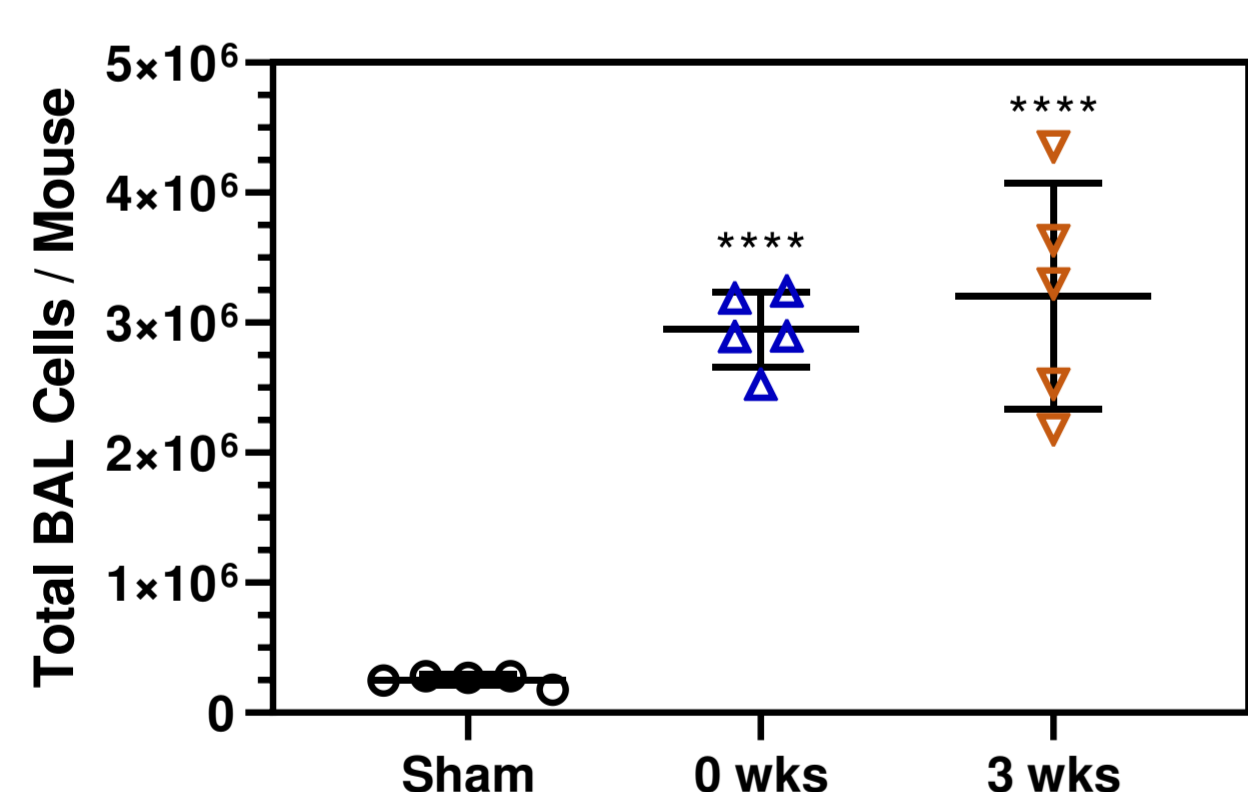
\*Data are expressed as 10-day time weighted average with standard deviation in parentheses

†Data are expressed as geometric mean of aerosol mobility diameter with geometric standard deviation in parentheses

‡Data are expressed as dN/dlogDp, with SMPS channel midpoint for which the count occurred in nm in parentheses



## Toxicological Assessment:



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