Dataset for “Peracetic acid effects on human bronchial cells in an air liquid interface.”

## 1. Overview of the project

Peracetic acid (PAA) is utilized as an industrial disinfectant for cleaning and sterilization of water infrastructure, food-safe machinery, surgical implements, and more. PAA typically exists as a mixture with hydrogen peroxide, acetic acid, water, and oxygen. These PAA cleaning solutions have been increasingly implemented in occupational settings due to their environmentally friendly decomposition products but the strong oxidative potential that allows them to effectively sanitize surfaces also underlies their ability to damage human airways. PAA mixtures are regarded as an asthmagen and occupational exposure has been associated with acute asthma-like symptoms such as airway and mucosal irritation, cough, wheeze, and shortness of breath. To evaluate the broad effects of PAA vapor exposure to human bronchial cells in vitro, normal human bronchial epithelial (NHBE) cells were cultured at the air-liquid interface (ALI) and exposures were conducted to PAA vapors during a four-hour exposure window at four concentrations: 0, 3, 12, and 24 ppm. Cells were allowed to recover for four and twenty-four hours to capture a spectrum of post-exposure response. Data was gathered for cytotoxicity, viability, cell layer integrity (via transepithelial electrical resistance measurements and qualitative histological observations), and protein response for proinflammatory mediators Endothelin-1 (ET-1), Interleukin-6 (IL-6), and Interleukin-8 (IL-8).

*Methods collection:*

- Normal Human Bronchial epithelial cells were seeded first in submerged culture before being detached, seeded along a transwell membrane, and then the apical surface exposed to the air to prompt differentiation into a pseudo-stratified layer.
- PAA exposures were conducted in triplicate (n=3) in the NIOSH Morgantown inhalation facility. Cell cultures were exposed to PAA vapors (3, 12, and 24 ppm) at the air liquid interface for 3.5 hours of active, monitored exposures with an additional 30 minutes of ventilation before retrieval (4 hours total). Experimental controls were exposed to HEPA-filtered air for 4 hours. Cells were allowed to rest for 4- or 24-hours before analysis.
- Culture viability was assessed through the MTT assay by measuring metabolic capacity for the formation and colorimetric reduction of formazan crystals in culture.
- Cytotoxicity was measured by lactate dehydrogenase activity in culture supernatant. Enzymatic reduction of NAD+ created a colorimetric shift in assay medium that was quantified by plate reader. High and low controls allowed for the calculation of percent cytotoxicity.
- Transepithelial Electrical resistance measurements assessed epithelial barrier integrity. A Evom2 STX2 chopstick probe measured resistance (Ohms) between apical and basal chambers to quantify electrical resistance provided by the cultured epithelial layer. Blank measurements were taken using an uncolonized transwell membrane.
- Cell cultures were fixed in 4% paraformaldehyde before paraffin embedding and cross sectioning. Sections were stained with hematoxylin and eosin to detect cellular structure and organization as well as periodic acid-Schiff stain to highlight mucosubstances.
- Sandwich ELISA assays were used to quantify protein concentrations of secreted Endothelin-1, Interleukin-6, and Interleukin-8. Cell culture medium was incubated with primary and secondary antibodies, consecutively, and then quantified via plate reader.

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*Contact Point for Further Information*: NIOSH/HELD/PPRB, 1000 Frederick Ln, Morgantown, WV 26505