**Name:** Michaela Smith

**Institution:** Woolcock Institute of Medical Research, University of Technology Sydney

**Contact phone number:** 0406811130

**Email address:** Michaela.smith@student.uts.edu.au

**Abstract Title:** Lunar Dust Induces Minimal Pulmonary Toxicity Compared to Earth Dust

**Abstract Authors (First and Last Names):** Michaela B. Smith, Dia Xenaki, Brian G.G. Oliver

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### Lunar Dust Induces Minimal Pulmonary Toxicity Compared to Earth Dust

Authors: Michaela Smith1,2, Dia Xenaki1, Brian G.G Oliver1,2

1. *Respiratory Cell and Molecular Biology Group, Woolcock Institute of Medical Research, Macquarie Park, NSW, Australia*
2. *School of Life Science, University of Technology Sydney, Ultimo, NSW, Australia*

**Keywords:** lunar dust, toxicity, inflammation, moon, epithelial cells

**Career Stage:** PhD student

**Introduction**: Humans are returning to the moon for the first time in over 50 years. Apollo mission reports indicate that lunar dust poses great inhalation toxicity risks. In vivo exposure to previous generations of lunar dust simulants resulted in tissue and cellular damage in the lung and pulmonary inflammation. However, there are limited studies on the toxicity of the new lunar dust simulants LMS-1 and LHS-1, and their toxicity on the epithelial cells of the lung. Currently, there is no comparison between the effects of Earth dust or air pollution exposure which is known to have adverse health effects, and dust exposure on the moon.

**Objective**: This study aims to compare the toxic effects of lunar dust simulants and Earth dust on bronchial and alveolar epithelial cells.

**Methods and Results**: LMS-1 and LHS-1 were ground with a pestle and mortar and filtered through Whatman filter paper to isolate particles ≤2.5µm. BEAS-2B and A549 cells were treated with ≤2.5µm LMS-1, LHS-1, and Earth dust (10µg/ml, 50µg/ml, and 100µg/ml) for 48 and 72 hours. ELISA was used to measure IL-8 and IL-6 release and trypan blue exclusion test was conducted for cell viability. Earth dust was significantly more potent in inducing IL-8 and IL-6 release by BEAS-2B cells. Compared to lunar dust simulants, Earth dust significantly reduced the cell viability of BEAS-2B cells indicative of increased toxicity. A549 cells exhibited similar responses to the lunar dust simulants and Earth dust, suggesting relatively equal toxicities. n=4, P < 0.05.

**Conclusions**: LMS-1 and LHS-1 induced time and concentration dependent pro-inflammatory cytokine release and decreased the cell viability of BEAS-2B and A549 cells. However, Earth dust was more toxic than lunar dust simulants suggesting that the lunar dust simulants are not highly toxic dusts, but rather a physical irritant.