

Name of the Dataset: Pulmonary and Systemic Responses in Rats Following Intratracheal Instillation of Engineered Stone Dusts, Granite, and Silica

Dataset Number:

Brief Description of the Data (General Audience): This dataset contains information about how the lungs and bodies of laboratory rats responded after being exposed to dust from different types of engineered stone countertops, natural granite, and pure silica (a known hazardous material). Researchers looked at signs of inflammation, cell damage, and scarring (fibrosis) in the lungs, as well as changes in blood cell counts and chemistry, at different time points after a single exposure. The study found that engineered stone dust, especially types with high silica content, caused significant and lasting lung inflammation and damage, similar to the effects of pure silica. This helps us understand the potential health risks for workers who cut, grind, or install engineered stone countertops.

General Description of Data Collection Methods: Male Sprague-Dawley rats were administered a single dose (10 mg) of dust suspended in saline directly into their windpipe (intratracheal instillation). The dust types included three different engineered stones (with varying silica content), granite, pure silica (MIN-U-SIL 5 as a positive control), or saline solution (as a negative control). Data were collected at 1, 21, and 84 days after the exposure. Methods included:

- **Bronchoalveolar Lavage Fluid (BALF) Analysis:** Fluid was washed into and collected from the lungs to count different types of immune cells (lymphocytes, macrophages, neutrophils) and measure markers of cell damage (LDH) and inflammation (cytokines like TNF- α , IL-6, IL-1 β , etc.).
- **Lung Histopathology:** Lung tissue was preserved, sectioned, stained (H&E, Picrosirius red), and examined under a microscope by a veterinary pathologist to assess inflammation, cell changes (e.g., epithelial hypertrophy/hyperplasia), lipoproteinosis, the presence of foreign material, and fibrosis (scarring). Associated lymph nodes were also examined. Findings were graded for severity and distribution.
- **Hematology and Blood Chemistry:** Blood samples were analyzed for complete blood counts (CBC - including white blood cells, red blood cells, platelets) and various serum chemistry parameters (e.g., liver enzymes like ALT, kidney function markers like BUN, glucose, proteins, electrolytes).
- **Dust Characterization:** The physical (size, morphology via FE-SEM) and chemical (elemental composition via ICP-OES, crystalline silica content) characteristics of the dust samples were determined.

Formatted Citations of Publications Using These Data:

1. Mandler, W. K., Qi, C., Thompson, D., Hubbs, A. F., Knepp, A. K., Keeley, S., Service, S., Battelli, L. A., Friend, S. A., Antonini, J. M., & Qian, Y. (Manuscript under review/preparation, April 2025). Pulmonary inflammation and fibrogenic responses in rats following intratracheal instillation of dusts from natural and engineered stones.

Acknowledgments: The data were generated by researchers at the Health Effects Laboratory Division, National Institute for Occupational Safety and Health (NIOSH), Morgantown, WV. The dust samples were generated and characterized as part of related NIOSH research.

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