

Signaling Pathways Involved in Lunar Dust Induced Cytotoxicity

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ABSTRACT

The Moon's surface is covered by a layer of fine, reactive dust. Lunar dust contain about 1-2% of very fine dust (< 3 µm), that is respirable. The habitable area of any lunar landing vehicle and outpost would inevitably be contaminated with lunar dust that could pose a health risk. The purpose of the study is to evaluate the toxicity of Apollo moon dust in rodents to assess the health risk of dust exposures to humans. One of the particular interests in the study is to evaluate dust-induced changes of the expression of fibrosis-related genes, and to identify specific signaling pathways involved in lunar dust-induced toxicity.

F344 rats were exposed for 4 weeks (6h/d; 5d/wk) in nose-only inhalation chambers to concentrations of 0 (control air), 2.1, 6.1, 21, and 61 mg/m³ of lunar dust. Five rats per group were euthanized 1 day, 1 week, 1 month, and 3 months after the last inhalation exposure. The total RNAs were isolated from the blood or lung tissue after being lavaged, using the Qigen RNeasy kit. The Rat Fibrosis RT² Profile PCR Array was used to profile the expression of 84 genes relevant to fibrosis. The genes with significant expression changes are identified and the gene expression data were further analyzed using IPA pathway analysis tool to determine the signaling pathways with significant changes.