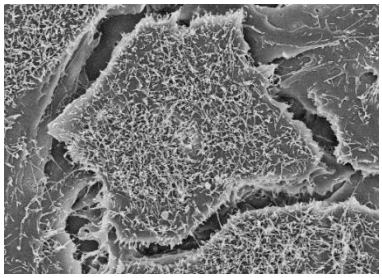
Healthy Lung Cells



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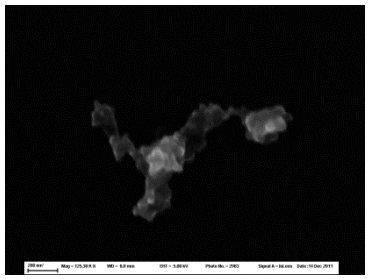
Airborne Particulates



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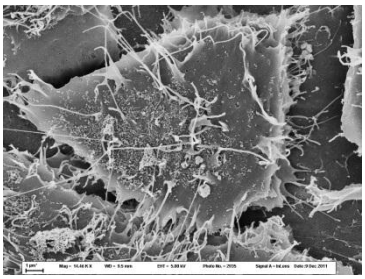
Damaged Lung Cells



Mimicking the Lungs: Developing New in vitro Technology for Studying the Toxicity of Air Pollution

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Wednesday, February 6, 2013
0001 Michael Hooker Research Center
12:00 - 12:50 p.m.

Abstract

According to the World Health Organization, more than two million premature deaths each year can be attributed to air pollution and particulate matter (PM) in the air is responsible for about 0.8 million of these. Particle size is one of the most important factors that determine where particles can deposit in human airways. The ideal method to study PM toxicity is through controlled *in vivo* exposure studies of both human and animals. Ethical considerations, however, limit the type and magnitude of pollutants used for exposure. Alternatively, *in vitro* studies, which are relatively inexpensive, use biological tissues as a surrogate for biological responses allowing for rapid screening of pollutants and genetic sensitivity testing. A major limitation of conventional *in vitro* methods is the difficulty in exposing cells in a manner that mimics *in vivo* exposures. What is needed is new *in vitro* technology that can quantify the dynamic changes in the toxicity of particles while maintaining their size, composition, and interaction with other gases. A new *in vitro* system that uses electrostatics to deposit particles onto the cells at the air-liquid interface (ALI) has been developed. Exposure of cells at ALI is the most realistic approach to emulate *in vivo* exposures. The new system, named the Gillings Sampler, provides a viable environment within its electric field for cultured human lung cells grown on permeable membrane supports. This method enables an efficient and effective way to expose cells to particles without prior collection and subsequent resuspension in a liquid medium. The Gillings Sampler provides researchers with a solution that will allow *in vitro* studies to better correlate with the adverse health effects observed in humans.