

1.055 Establishing Connections between Aerosol Chemical Composition and Possible Health Effects.

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Abstract:

Exposure to ambient air pollution is the 4th highest-ranking risk factor for death globally. Most health effects measures and regulations use particulate mass (PM) as the indicator for the health effects due to exposure to ambient particles. However, atmospheric chemistry and chemical composition may play crucial roles in determining the biological and health-related effects due to exposure to PM from different sources. In addition, atmospheric aging and photochemistry change the chemical composition and may drive health effects. We will describe several direct examples where aerosol chemical composition can be linked to observed biological effects in in vivo and in vitro models. Specifically, we will show that seasonal variations in the chemical composition of aerosols from Beijing, poly-aromatic hydrocarbons (PAH and oxy-PAH) from coal and biomass burning during the winter months, lead to damage in the liver, a secondary organ of exposure. We will show that dissolved metals in resuspended urban dust drive oxidative stress and inflammation. Data from the new global SPARTAN network show that metals comprise an important component of the global aerosol composition. Finally, we will provide evidence that minor biological components found in desert dust, can induce mitochondrial dysfunction and cell death. These examples show that atmospheric chemistry and the specific chemical composition, and not only the mass, must be studied together with health effects in order to improve our understanding of how exposure to PM affects people's health.