Title *

Chemical composition and toxicological properties of ambient particles ($PM_{0.25}$) from near-airport and urban road traffic sites

Abstract *

Very little is known about the health impacts of exposure to ultrafine particles ($PM_{0.25}$) emitted from airports versus those emitted from road traffic. Airborne $PM_{0.25}$ were collected at 2 selected locations, one near the LAX airport and the other in central Los Angeles, downwind of the I-110 freeway. In addition source specific UFP was collected from a diesel and turbine engine. Redox activity and pro-inflammatory properties of the PM samples were measured by a variety of cellular and molecular in vitro assays, including an alveolar macrophage assay that quantifies the formation of reactive oxygen species (ROS) in cells, the ability of PM to deplete antioxidants such as ascorbic acid (AA) as well as the ability of PM to induce pro-inflammatory IL-8 on human bronchial cells. We applied a molecular marker-based chemical mass balance (MM-CMB) model to estimate the relative contributions of mobile sources (combined gasoline and diesel vehicles), wood smoke, vegetative detritus, road dust and ship emissions to PM mass. Aircraft contribution to PM mass was estimated from un-apportioned primary OC in the MM-CMB model ("other primary OC") after accounting for the contribution of secondary organic carbon (SOC) to OC. Overall, ROS, AA and IL-8 activity levels showed little spatial variability, with no statistically significant difference between the averages observed at LAX and central Los Angeles, suggesting similar levels of inhalation exposure to redox active species of $PM_{0.25}$.

Moreover significant contributions of both aircraft and vehicle exhaust emissions to the overall oxidative potential of UFP was observed.

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