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Design of a Unique Atmosphere-Mimicking Exposure Device for Investigating Oxidative Stress, Inflammatory and Cardio-metabolic effects of nanosized pollutants in rodents

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Molecular & Cell Biology-2018

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Theme 411: Model Organisms and Disease Models

Title: Design of a Unique Atmosphere-Mimicking Exposure Device for Investigating Oxidative Stress, Inflammatory and Cardio-metabolic effects of nanosized pollutants in rodents

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Abstract

Epidemiological studies have linked peak exposures of air pollutants to increased susceptibility to cardiovascular and pulmonary diseases and the effects on public health of acute intoxication with high levels of pesticides, carbon or metal derivatives found in air, soils and water are well documented. Yet there is a growing consensus that chronic exposure to lower levels of fine and/or ultrafine aerial particulate matter (PM) may cause impaired glucose regulation, endocrine disruption, hepatosteatosis and obesity. However the fact that ambient air particles may represent a new risk factor for insulin resistance and progression of diabetes mellitus remains difficult to quantitate due to the lack of reliable experimental models of controlled atmospheres allowing realistic PM inhalation. The presentation will cover the design of a new device for studying oxidative stress, inflammation, cardiac and metabolic dysfunction induced by sub-chronic and chronic inhalation of size-selected ultrafine particles aerosols in animals. Aerosols, controlled in size and concentration of particles, were prepared from several atmospheric relevant organic compounds and delivered up to 5 months (1-2 hours/day) to normal and transgenic rodents under non-stress conditions. The data evidenced that irreversible time-related cardio metabolic disorders and reduced insulin sensitivity were triggered by long-term aerosols inhalation in realistic situation.