NANOTOXICOLOGY APPROACHES WITH EMPHASIS ON TOXICITY ASSESSMENT OF AIRBORNE PARTICULATE MATTER

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Abstract
Nanotoxicology is a new branch of toxicology addressing the gaps in knowledge related to the adverse health effects likely to be caused by nanomaterials. List of nanoparticles (NPs) includes not only various nanomaterials produced by industry, but also airborne contaminants (airborne ultrafine fraction). The latter group consists of NPs of different chemical composition and chemical contaminants adsorbed on NPs. Currently, the information on toxic effects of airborne NPs and associated chemical contaminants is still limited. Genotoxicity, oxidative stress and immune system disruption, as well as dioxin-like toxicity, are among the major toxic modes of action of airborne particles and chemicals adsorbed onto their surface. Polycyclic aromatic hydrocarbons (PAHs) are major toxicants associated with airborne NPs. As the existing studies focusing on NPs are inconsistent in their findings and contribution of ultrafine NPs to overall airborne particle toxicity has not been sufficiently determined, our primary focus was on the assessment of toxicity potencies of PAHs present in ultrafine NPs and microparticles. Airborne samples were collected in highly industrialized polluted area of Ostrava city; chemical analysis was then combined with in vitro bioassays to assess their genotoxicity and dioxin-like activity. The fraction of ultrafine particles of various ambient air samples was significant, but not a major contributor to their genotoxicity and dioxin-like activity.

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