

TOXICITY OF THE SIZE-FRACTIONATED AIRBORNE PARTICULATE MATTER IN A549 CELLS

LÍBALOVÁ Helena, KRČKOVÁ Simona, MACHALA Miroslav, KULICH Pavel, PLOCKOVÁ Jana,
EL YAMANI Naouale, DUŠÍNSKÁ Mária, TOPINKA Jan

Institute of Experimental Medicine AS CR, v.v.i., Prague, Czech Republic, EU

Abstract

Many recent studies demonstrated the toxicity of air particles occurring as pollutants in ambient air. In the present study, we investigated the effect of size-fractionated airborne particulate matter (PM) collected in polluted areas of the Czech Republic (Ostrava and Prague city), in human lung A549 cells. We focused on the potency of four PM fractions with different aerodynamic diameters (1 - 10 μm ; 0.5 - 1 μm ; 0.17 - 0.5 μm and < 0.17 μm) to induce genotoxic effects and oxidative stress as well as characterization of their morphology and cellular uptake using electron microscopy techniques. The size distribution of different PM fractions detected by NanoSight was surprisingly similar suggesting predominant presence of small particles in all fractions (about 100 nm) probably due to the dispersion of aggregates constituting coarse and fine particle fractions. For toxicity testing, A549 cells were incubated with different concentrations of PM suspensions (0.1 - 50 ng/cm^2) for 24h. After the exposure to particle suspensions, A549 cells showed a concentration-dependent decrease in viability. Similarly, the effects on DNA (DNA breaks formation and oxidative damage) was observed in dose-dependent manner as well. We also studied a cellular uptake of different nanoparticle fractions by A549 cells using TEM and observed the ability of all size particle fractions to penetrate and reside in A549 cell. Our results suggest the similar toxic effects of PM fractions with different aerodynamic diameters in A549 cells. Supported by EU grant QualityNano.

Keywords: Size-fractionated particulate matter, A549, genotoxicity

Author did not supply full text of the paper/poster.