

DNA DAMAGE AND ACTIVATION OF P53 PROTEIN IN LUNG ALVEOLAR EPITHELIAL CELLS LINE (A549 CELLS) EXPOSED TO URBAN DUST AND CARBON NANOPARTICLES.

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Air pollution, a mixture of tiny dust-like particles and substances in the air called particulate matter (PM), is a cause of lung cancer, but the mechanism is not fully understood. The aim of our study was to examine the effect of coarse carbon black (CB), standardized urban dust (UD), nanoparticle carbon black (NPCB) and NPCB + benzo(a)pyrene (NPCB-BaP) on DNA damage in alveolar epithelial cell line (A549 cells). A549 cells were grown for 24 hours with 100 microg/mL PM and their DNA integrity was assessed by propidium iodide (PI) staining and flow cytometry determination of subdiploid cell fractions, by agarose comet assay and by fluorescence microscopy using differential nuclear staining (DNS; Hoechst 33342 and PI.) assay. Moreover, p53 protein activation (phosphorylation at Ser15, 20, 46 and 392) was quantified using flow cytometry and WB. As a positive control, a DNA damaging drug - cisplatin, and a strong prooxidant tert-butyl hydroperoxide were used. All particles, except for CB altered cell cycle kinetics, produced aneuploidy and increased subdiploid cell numbers. UD caused both single- and double-strand DNA breaks, while NPCB and NPCB and NPCB-BaP caused only single-strand DNA breaks. Patterns of p53 protein phosphorylation were also significantly affected and p53 protein activation was detected, especially in cells treated with UD. Our data indicate that PM particles, possibly via oxidative stress, play a role in disruption of mechanisms that regulate cell-cycle kinetics, DNA stability and induce DNA repair processes.