

ADAPTIVE RESPONSE TO HIGH EXPOSURE OF CARCINOGENIC POLYCYCLIC AROMATIC HYDROCARBONS

Radim J. Sram, Institute of Experimental Medicine AS CR, Czech Republic
Pavel Rossner, Jr., Institute of Experimental Medicine AS CR, Czech Republic
Olena Beskid, Institute of Experimental Medicine AS CR, Czech Republic
Alena Milcova, Institute of Experimental Medicine AS CR, Czech Republic
Andrea Rossnerova, Institute of Experimental Medicine AS CR, Czech Republic
Jana Schmuczerova, Institute of Experimental Medicine AS CR, Czech Republic
Ivo Solansky, Institute of Experimental Medicine AS CR, Czech Republic
Vlasta Svecova, Institute of Experimental Medicine AS CR, Czech Republic
Jan Topinka, Institute of Experimental Medicine AS CR, Czech Republic
Katerina Uhlirova, Institute of Experimental Medicine AS CR, Czech Republic

Background and Aims: Ostrava Region in the Northern Moravia (Silesia) is the most polluted region in the Czech Republic by carcinogenic polycyclic aromatic hydrocarbons (c-PAHs) as benzo[a]pyrene (B[a]P). The aim of the study is to gain new knowledge on the mechanisms of the effects of complex mixtures bound on dust particles (c-PAHs) in the ambient air on biomarkers of exposure and effect during the period of inversion.

Methods: In the Ostrava City were selected 78 volunteers- working in the office, as controls were city policemen from Prague (N=65). All volunteers were nonsmokers. The personal monitoring to c-PAHs was carried on in January-February 2010. The determined concentration of B[a]P was in the Ostrava region vs. Prague 14.8 ± 13.3 vs. 2.80 ± 1.87 ng/ m³. The impact of these concentration to biomarkers as DNA adducts, chromosomal aberrations, 8-oxodG, lipid peroxidation, and gene expression profiles are followed. DNA adducts were analysed in lymphocytes by ³²P-postlabeling assay, chromosomal aberrations by fluorescent in situ hybridization (FISH) by whole chromosome painting #1 and #4, and by the determination of micronuclei, oxidative damage as 8-oxodG and 15-F2t-IsoP.

Results: Obtained results indicate no differences between the level of biomarkers determined in the Ostrava region and Prague. Multivariate analyses revealed that subjects living in Ostrava had increased odds of having above-median levels of XRCC5 expression (OR; 95% CI: 3.33; 1.03-10.8; q=0.046). Above-median levels of 8-oxodG were associated with decreased levels of vitamins C (OR; 95% CI: 0.37; 0.16-0.83; p=0.016) and E (OR; 95% CI: 0.25; 0.08-0.75; p=0.013), which were elevated in subjects from Ostrava.

Conclusions: We may speculate, that high environmental exposure to B[a]P does not correspond to DNA damage according to dose effect relationship in a population affected by these concentrations for years, probably due to a possible adaptive response.

Supported by the Czech Ministry of Environment (SP/1b3/8/08) and the Czech Ministry Education (2B08005).