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Particulate Matter: Research and Management

Abstracts of Keynote Invited Lectures and Contributed Papers

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ABSTRACTS OF KEYNOTE INVITED LECTURES AND CONTRIBUTED PAPERS

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2.6. BIOMONITORING OF WILDFIRE EMISSIONS EXPOSURE AMONG FIREFIGHTERS DURING ACTIVE FIRE MISSIONS

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The aim of this study was to conduct a multidisciplinary biomonitoring assessment of the exposure and health impacts of wildfire emissions on firefighters from the Northern Portugal, one of the regions most affected by wildfires. Firefighters from fourteen fire stations participated in pre- and post-exposure sampling campaigns during two consecutive years. Self-reporting biometric characteristics, lifestyle, clinical information, career years, environmental/occupational exposure along with urinary biomarkers of polycyclic aromatic hydrocarbons metabolites (OHPAHs), metal(loid)s [from the priority pollutant lists compiled by the Agency for Toxic Substances and Disease Registry – 14, United States Environmental Protection Agency – 11, and the Human Biomonitoring for Europe Initiative priority – 4], lung injury, lipid peroxidation, DNA damage, blood pressure, cardiac frequency, and hemogram were evaluated (Barros et al., 2025; Esteves et al., 2025; Paiva et al., 2024a; Paiva et al., 2024b). Stronger correlations were found between OHPAHs and metal(loid) levels and effect biomarkers after wildfire combat in comparison to pre-exposure. Wildfire exposure increased urinary concentrations of ΣOHPAHs, lithium, zinc, antimony, and lead, especially among non-smokers. For the latter, copper, cadmium and barium ions correlated with lung injury; antimony and cadmium correlated with lipid peroxidation; DNA oxidation correlated with antimony, cadmium, copper, lead, zinc, selenium, and rubidium levels. Moreover, arsenic, antimony, lead, and copper induced lipid peroxidation, and lead was linked with DNA oxidation among wildfire-exposed smokers. Significant positive correlations were found for age and/or career length with cadmium, lead, barium, strontium, and mercury, and for body mass index with arsenic. These results point to an increased risk of health effects both in non-smoking and smoking firefighters because of their occupation, highlighting the necessity to strengthen prevention strategies.

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