CHILDREN´S HEALTH AND AIR POLLUTION AROUND INDUSTRIAL HOT SPOTS IN NORTH RHINE-WESTPHALIA, GERMANY

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Objective: Evaluating exposure and health of children living in three highly industrialized districts (“hot-spots”) in the Ruhr-Area and one rural community in North Rhine-Westphalia.

Material and methods: Cross-sectional study comprising 968 preschool children was conducted in 2000. Exposure assessment based on ambient air quality data, small scale dispersion models and human biomonitoring, including measurement of PAH and heavy metals. Markers of early effects were DNA strand breaks measured by comet assay in lymphocytes. Health outcome were assessed by questionnaire, lung function and dermatological testing (RAST – radioallergosorbent test, patch, prick). Influence of exposure on biomarkers and health outcome was measured by multiple linear and logistic regression analysis.

Results: Children living close to a coke oven plant had increased levels of PAH metabolites in urine and DNA exposure was increased. Children exposed to elevated Cr/Ni ambient air levels from a steel mill revealed high prevalence of allergic symptoms. Sensitization against Ni was associated with internal Ni exposure and Ni in ambient air was positively associated with the frequency of allergic symptoms. Children from the hot spot areas had increased respiratory tract problems. Positive associations between external and internal exposure were found between benzo[a]pyrene in ambient air and 1-hydroxypyrene in urine and between lead in ambient air and in children’s blood.

Conclusions: Despite improved air quality during the last decades, living in industrialized districts results to some extend in increased internal contaminant exposure and in effects on health outcome. Ongoing studies are aimed to find out if increased PAH and DNA exposure of children had decreased after the coke oven plant had been shut down and if the striking results on the high prevalence of allergic sensitization can be confirmed by an expanded cross sectional study at other districts with increased Cr/Ni ambient air levels.

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