

CONCENTRATION-RISK RELATIONSHIP FOR VOLATILE ORGANIC COMPOUNDS IN INDOOR AIR AND RESPIRATORY HEALTH OF CHILDREN IN LEIPZIG, GERMANY

Uwe Schlink, *Helmholtz Centre for Environmental Research UFZ, Leipzig, Germany*

Carolin Rösch, *Helmholtz Centre for Environmental Research UFZ, Leipzig, Germany*

Ulrich Franck, *Helmholtz Centre for Environmental Research UFZ, Leipzig, Germany*

Stefan Röder, *Helmholtz Centre for Environmental Research UFZ, Leipzig, Germany*

Michael Borte, *Klinik für Kinder- und Jugendmedizin, Städtisches Klinikum St. Georg, Leipzig, Germany*

Olf Herbarth, *Institute of Environmental Medicine & Hygiene, Faculty of Medicine, University of Leipzig, Germany*

Irina Lehmann, *Helmholtz Centre for Environmental Research UFZ, Leipzig, Germany*

Background and Aims: To assess the form of associations between respiratory illness in young children and domestic exposure to volatile organic compounds (VOC) and to apply a novel approach to reduce exposure-misclassification.

Methods: Data were gathered in 2004/2005 from the Life style Immune System Allergy (LISA) birth cohort in Germany, which investigates the influence of life style and environmental factors on the maturation of the immune system and the allergy risk in childhood. The present analysis includes only healthy full-term neonates of German descent living in Leipzig. Selected items from parent-completed questionnaires of the health status of their child in the 4th year of life are combined with VOC measurements collected by passive samplers during a 4-weeks period starting 2 (\pm 1) weeks before the 3rd birthday.

Results: Rumchev et al. (2004) suggested an exponential concentration-risk relationship for the respiratory effects of VOC in children. This relationship is empirically validated in the present study by means of (i) a minimum-criterion approach and (ii) a generalized additive model, accounting for the confounding of gender, educational level, domestic animals, and atopic predisposition. 463 datasets were used for the statistical analysis. Associations between respiratory symptoms and VOC concentrations are significant, but only when the seasonal correction suggested by Schlink et al. (2004) was applied. Especially benzene and chloro-benzene are associated with adverse effects, such as wheezing (OR=1.5 per 1 μ g benzene / m³).

Conclusions: Our empirical results confirm the previously postulated exponential concentration-risk relationship and suggest that no thresholds can be observed that might be easily used for the definition of limit values for health protection. An important pre-processing of VOC data measured in Germany, which avoids exposure misclassification, is to adjust for the strong seasonal variation of indoor VOC concentrations. The occurrence of this seasonality, however, depends on the geographical region (Jia et al., 2008).

* Corresponding author: uwe.schlink@ufz.de, Helmholtz Centre for Environmental Research UFZ, Permoserstr. 15, 04318 Leipzig, Germany, Tel.: ++49-341-235-1554.