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Airborne outdoor and indoor particles – A bundle of epidemiological and exposure studies in Leipzig

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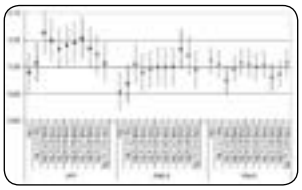
This bundle includes four studies, which demonstrate the following chain: Exposure to particles of different size fractions increases the risks for specific diseases in varying degrees. The contribution of airborne outdoor particles on indoor particle concentrations depends on their aerodynamic diameter. The measured indoor particle concentrations in different sizes fractions are predictors of airway diseases. Urban landscape metrics are related to ambient particle concentrations and may help to develop healthier city structures. Because hypertension is symptomatic for many pathogenic cardiovascular processes we investigated all 23,741 emergency service calls related to hypertensive crisis in the city of Leipzig within one year. Particle exposure was determined for the particle sizes <100 nm (UFP), <2.5 µm (PM2.5) and <10 µm (PM10). A significant effect was found for particles with a size of < 100 nm in diameter and starting with a lag of 2 days after exposure. No consistent influence could be observed for PM2.5 and PM10. Because people in Europe typically spend the majority of their time indoors we investigated the indoor/outdoor concentrations ratios in the absence of significant indoor sources. At closed windows, the indoor concentrations are always lower than the outdoor concentrations but concentration ratios strongly depend on particle size. There exists a time delay for correlation of indoor to outdoor concentrations and smaller outdoor particles are highest correlated with larger indoor particles. Measured indoor particle are predictors of bronchitis with and without fever in young children. The effect depends on particle size. Indoor smoking (outside the children's room and outside measuring time) and streets with dense traffic in front of the window of children's room contribute to indoor particle concentrations. Landscape measures of urban structure are correlated with particle exposure in city districts and may therefore help to improve exposure situation.



Recent Publications:

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Biography

Ulrich Franck main research areas are environmental epidemiology and health, human outdoor and indoor exposure with a special focus on airborne particulates and VOC, and urban exposures and environmental justice.

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