HEAPS Study Design: Health Effects of Air Pollution in Antwerp Schools

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The HEAPS study (Health Effects of Air Pollution in Antwerp Schools) was set up to evaluate the health impact of traffic related air pollution on school children in Flanders, Belgium. The study comprises the biomonitoring of 130 children (aged 6-12) from 2 schools and simultaneous air quality monitoring. All air quality and health measurements were performed in both spring and autumn 2011. One of the schools was located next to a busy road of 20,000 vehicles/day, the other school was located at an urban background location. Air quality measurements were performed at the schools (UFP, PM, BC, NOx, and O_3), at a selection of 40-50 home locations (BC, NO_2) and while in transport (UFP, BC). The measurements were translated into exposure estimates in different time frames: respectively evaluating acute health effects, subacute effects (1 to 10 days before sampling), and long term health effects. The land use regression technique was applied to estimate BC and NO_2 concentrations at unmeasured locations. In the exposure assessment, the time-activity pattern of the children and concentrations in different micro-environments were taken into account. Next to this, personal NO_2 samplers were carried by the children during one week. Health assessment consisted of measurements of fractional exhaled nitric oxide (FeNO), exhaled breath condensate (EBC) markers (pH, 8-isoprostane, cytokines), and urinary 8-oxo-2'-deoxyguanosine (8-oxodG). Additionally, allergic inflammation in the nose was assessed in spring with a Rhinostick, while in autumn the Rhinostick was used to analyze nasal concentrations of IL-8, eosinophilic cation protein (ECP), and tryptase. ISAAC-type questionnaires on asthma, rhinitis and eczema symptoms were distributed amongst all children attending one of the schools.

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