Abstract # 1490

**Indoor Air Quality: Influence on Health of Schoolchildren in Austria**

Hutter H,* Moshammer H,* Wallner P,† Hohenblum P,‡ Uhl M,‡ Scharf S,‡ Gundacker C,* Wittmann K,* Tappler P,§ Piegler B,* Kociper K,* Kundi M * **Medical University of Vienna, Vienna, Austria; †Medicine and Environmental Protection [mus], Vienna, Austria; ‡Federal Environmental Agency, Vienna, Austria; and §Danube University, Krems, Austria.*

**Background:** In industrialized countries people spend approximately 90% of their time indoors. Hence, indoor air quality could have a significant influence on health and productivity of humans. Especially young children should be protected from exposure to indoor chemicals because of their higher vulnerability to pollutants in comparison to adults. Poor indoor air quality (IAQ) can cause acute health symptoms and illnesses requiring absence from school. Furthermore, a person's ability to perform specific mental tasks, especially those that are cognitively demanding or that decrease performance while at school, can be reduced.

**Objective:** It should be tested weather differences in respiratory health, cognitive performance and concentration of contaminants in biological tissue of school children are associated with differences in indoor air quality. The project aimed at identifying sources of indoor pollution in schools. The project LuKi (Air and Children) is an Austrian contribution to the WHO CEHAPE (Children's Environment and Health Action Plan for Europe).

**Material and Methods:** Indoor air pollutants were continuously monitored for two 1-week periods in nine participating elementary schools. In addition, both house dust and air samples of particulates were investigated in order to cover the whole indoor air relevant matrices. The screening comprised of semivolatile compounds in particulate matter ($PM_{10}$, $PM_{2.5}$) and household dust (e.g. PAHs, PCBs, PBDP, trisphosphates phthalates, synthetic musks, pyrethroids, heavy metals). Moreover volatile organic compounds (VOCs) were measured in air samples and $NO_2$ was monitored. Indoor humidity, temperature, $CO_2$ concentration were also measured. These monitoring periods were accompanied by medical check-ups of pupils (aged 6-8 years) and by administering a parents' questionnaire on environmental and housing conditions and respiratory health of the children. Lung function was assessed by spirometry, cognitive performance by Standard Progressive Matrices (SPM). Furthermore, a biomonitoring for heavy metals in scalp hair samples and milk teeth was carried out. Woodlouses were collected and analyzed as bioindicators for heavy metals at school. Children were involved in the whole program in order to give them an impression of the complex relationship in their environment.

**Results:** 449 of 596 children parents answered a questionnaire. Spirometry was performed in 433, cognitive tests in 436, biomonitoring in 324 children. Significant differences in lung function (FEV, $FEV_1$, $MEF_{25}$) between the schools were found. Visible mould at home, smoking exposure in the households decreased lung function. History of breast feeding was associated with better values of spirometry. Boys showed (Pb 848 µg/kg; Cd 22 µg/kg) higher lead and cadmium concentrations in hair than girls (Pb 402 µg/kg; Cd 10 µg/kg). Concentration of mercury in hair samples correlates with fish consumption and higher education of parents. SPM Trisphosphates, PBDE and phthalates were found in higher amounts in all schools.

**Discussion:** Due to low background concentrations in Austria children showed low concentrations of heavy metals.

**Conclusions:** Schools should be designed, built, and maintained in ways to minimize and control sources of pollution. Environmental factors in the children's homes should be of concern too.