

**Health and personal  
exposure  
Breakout session**

# 1. Main findings

- VOCs exposure
  - Similar profile to some European cities, but higher concentrations
  - VOCs concentration decreases with the distance from the city
  - Exposure ranking is as followed: adults > children > apartments > schools.
  - Indoor exposure is higher than outdoor exposure
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- 1,3-Butadiene and Benzene monitoring
  - Area concentration and personal exposure at T0 and T1 were 3-4 times higher than in Sweden.
  - Concentrations ranged typically from 0.3 – 4  $\mu\text{g}/\text{m}^3$  and 2 – 10  $\mu\text{g}/\text{m}^3$  for 1,3-butadiene and benzene.
  - At some indoor places the 1,3-butadiene levels were high, may be by presence of cigarette smoke.

- POPs concentrations
  - PAH higher at T1-T2 (open fire?)
  - PCBs higher at T0
  - Chlordane higher at UK
  - HCB higher at Sweden
  - DDT higher at Sweden and T0

- PM2.5 monitoring
  - Indoor concentrations were higher than outdoors at T2 and T1.
  - Indoor and outdoor concentrations were similar at T0.
  - PM2.5 personal exposure was higher at T1 (66 ug/m<sup>3</sup>).

- Ozone monitoring

- Outdoor concentrations were higher at T2 than T0 (189 and 166 ppb). At indoors, were similar.
- At the T2 fixed site was observed the highest ozone concentrations (353 ppb).

- Ultrafine particles monitoring
  - Outdoor  $PM_{2.5}$  particles were higher at T0 and T1 than T2, while the indoor concentrations were similar.
  - Outdoor  $PM_1$  concentrations were higher than indoors in all sites
  - $PM_{0.5}$  concentrations were the same at outdoors and indoors
  - Outdoor  $PM_{0.25}$  were 3 times greater than indoors.
  - Outdoor and indoor  $PM_{<0.25}$  was the most abundant fraction in all the sites, T1 (50.67 vs. 23.74  $\mu\text{g}/\text{m}^3$ ).

- CO monitoring
  - Indoors concentrations were slightly higher than outdoors (2.87 vs. 2.36 ppm).
  - Personal CO exposure was higher at T1 (3.42 ppm) than T0 and T2 (2.55 y 2.41 ppm).
- Endotoxins
  - At indoors, the highest level was detected at T2 (67.5 UE/mg).
  - The highest concentration in personal samples was observed at T0 (6.45 EU/mg).
  - The highest number of fungi colonies at indoors was registered at T0 (1225 CFU) (56.9%).

- Oxidative stress markers in children
  - Children from T0, T1 and T2 showed induction of chronic oxidative stress markers such as PON-1 activity and higher concentration of carbonyl groups,
  - At T2 the deficient nutritional status probably enhanced an oxidative stress status by environmental contamination .

- Oxidative stress markers in adults
  - Increased presence of acute inflammation markers such as CRP, caeruloplasmin and nitric oxide.
  - Increased activity of anti-oxidant enzymes at T0, as acute response to the oxidants air pollutants in the area.

- Olfactory thresholds
  - Children from T0 have a poorer olfactory sensitivity.
  - Adverse effects of air pollution on the olfactory system start to appear early in life
  - The correlations between the olfactory thresholds of children and other exposures will be explored

## **2. Gaps and problems**

- Need of improve the communication and integration of the different researchers.
- Nee to involve the local health authorities.

- 2.1 Gaps on environmental assessment
  - Overview paper with information of the sites physical, demographics, pollution local sources characteristics, to facilitate the interpretation of the results.
  - Meteorology information.
  - Models information to correlate with GIS analysis
  - Detailed description of local sources, biomass burning and open fires around the sites.
  - Review of the endotoxins methodology and data analysis

- 2.2 Gaps on health assessment
  - Children nutritional and metabolic conditions
  - Pattern of exposure to pollution local sources.
  - More correlation analysis of health effects with specific air pollutants
  - Analysis of the effects of the exposure to other criteria contaminants.

# 3. Cross cutting issues

- Interaction with the researchers groups that have:
  - o Performed meteorology forecasting
  - o Models of air pollutants distribution.
  - o Analysis of VOCs and PM, to compare the results
  - o Identification of local biomass burning and open fires.

# 4. Possible publications

- POPs local concentrations -  
September
- 1,3Butadiene and Benzene exposure -  
October
- VOCs exposure -  
September
- Aerosols local concentrations -  
December
- PM2.5 and ozone personal -  
October
- Respiratory health effects -  
November

- PM2.5 endotoxins concentrations -  
October
- Oxidative stress in children -  
July
- Oxidative stress in adults -  
August
- Olfactory thresholds -  
October
- GIS analysis of exposure and health effects-  
November
- Ultrafine particles -  
January