

generation by carbonaceous particles following femtosecond pulsed illumination to screen the collected placentas for the presence of BC particles. This novel cutting-edge optical technique allows to screen placental tissue for the presence of BC particles in a biocompatible and label-free manner.

Results: BC was identified in all screened placentas, with an average (SD) particle count of 0.95×10^4 (0.66×10^4) and 2.09×10^4 (0.96×10^4) particles/mm³ for low and high exposed individuals, respectively. Furthermore, the placental BC load was positively associated with mother's residential BC exposure during the entire pregnancy ($n=20$; $r=0.55$; $p=0.012$). Each $0.5 \mu\text{g}/\text{m}^3$ increment in residential BC exposure during pregnancy resulted in 38.45% higher placental BC load. Moreover, the carbonaceous nature of those particulates and their placental embedment to preclude external contamination were confirmed.

Conclusions: Identification of BC particles on the fetal side of the placenta provides compelling evidence that ambient particulates can be transported towards the fetus and represents a plausible explanation for the observed detrimental health effects from early life onwards.

Oxidative Stress Profile of workers exposed to formaldehyde in the hospital

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TPS 792: Occupational health 2, Exhibition Hall, Ground floor, August 27, 2019, 3:00 PM - 4:30 PM

Background/Aim

Formaldehyde (FA) is still commonly used for fixing biologic specimens. Hospital workers are exposed to FA because of this practice, by pouring liquid FA in containers (3-5 litres) or using prefilled vials (50-100 ml). Since FA is known as a human carcinogen and an inducer of genotoxic and oxidant activity, the aim of this study was to analyse the intensity of an oxidative stress (OS) profile in correlation to FA exposure levels.

Methods

107 hospital workers of the Molinette hospital in Turin (Italy) variously exposed to FA were recruited. Each subject filled out a standardised questionnaire for general informations, wear a personal air-FA sampler for 1 working shift (8h) and provided a blood and urine sample for the quantifications of the OS profile biomarkers by means of isoprostane (15-F2t-Isop, malondialdehyde (MDA), oxidized glutathione (GSSG) and inflammatory mediators (MIP, VEGF, FGF, CD23, CD27, CD30, TNF, IL-6, IL-10).

Results

A positive correlation between FA level improvements and pro and anti-oxidants (15-F2t-Isop, MDA, GSSG, FGF2, LDH, VEGF, CD27, TNFR1) was found. A Multivariate analysis was calculated considering Ln FA as the dependent variable. The model was positively correlated with pro-oxidants (Ln 15-F2t-Isop $B=0.463$ $p<0.001$; Ln MDA $B=0.380$ $p<0.001$; Ln GSSG $B=0.374$ $p<0.001$) and inversely correlated with anti-oxidants (Ln LDH $B=-0.117$ $p=0.007$; Ln IL6 $B=-0.086$ $p=0.017$; Ln VEGF $B=-0.148$ $p=0.004$; Ln CD27 $B=-0.077$ $p=0.011$; Ln TNFR1 $B=-0.075$ $P=0.003$). Finally, a Risk Index (RI) was calculated for pro oxidants and anti-oxidants in a multivariate analysis with LnFA. Pro-oxidant RI increased 34% ($B=8.172$ $p<0.001$) while anti-oxidant RI decreased 8% ($B=-3.335$ $p=0.003$).

Conclusions

FA exposure influences OS profile. In particular, FA is confirmed as an inductor of oxidative stress and inflammation, simultaneously activating pro and anti-oxidant pathways. Moreover, FA stronger modulates the pro oxidants, with higher activation of 15-F2t-Isop, MDA and GSSG.

Oxidative stress induction in woodworkers exposed to wood dust and formaldehyde

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TPS 792: Occupational health 2, Exhibition Hall, Ground floor, August 27, 2019, 3:00 PM - 4:30 PM

Background / goal

Environmental quality may influence public health also in the workplaces. Many workers are exposed to wood dust (WD) and formaldehyde (FA), known for their potential carcinogenic activity, which are supposed to be oxidative stress-mediated. This study aims to assess exposure to WD and FA and its role in the induction of OS in a population of woodworkers.

Methods

Sample includes 128 woodworkers, enrolled in 4 manufactories, and 117 controls in Piedmont, Italy. Each subject received two personal air samplers (passive by FA, active for WD), completed a questionnaire and provided a urine sample to quantify the OS by 15-F2t-Isoprostane and 8-oxo-dG, and exposure to tobacco smoke by cotinine.

Results

WD and FA are higher in wood workers than controls ($p<0.001$), although no significant difference in OS biomarker levels were detected among exposed and controls. By splitting the dust exposure into tertiles, the levels of 15-F2t-Isop and 8-oxo-dG are higher in the 2nd tertile compared to the first ($p=0.001$ and $p=0.035$, respectively). 8-oxo-dG levels are positively correlated with WD exposure ($p=0.014$). The same result is observed for the concentrations of 15-F2t-Isop, only after adjustments of age and working years ($p=0.002$). Furthermore, 15-F2t-Isop is also correlated with cotinine levels ($p=0.001$). Finally, no significant correlations were found between biomarker levels and FA concentration.

Conclusions

Findings show a measurable effectiveness of prevention programs: environmental pollution does not seem sufficient to determine a significant alteration of OS biomarkers. The two biomarkers provide different results because they measure different aspects of the OS: 15-F2t-Isop reveals the exposure of the previous weeks; 8-oxo-dG shows an immediate effect. Data support the influence of both environmental quality and lifestyles in OS induction: indeed, lower WD concentrations do not necessarily imply lower OS levels, whereas TS significantly increases the levels of OS biomarkers.

Greenness effect on oxidative stress and respiratory flows in children

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PDS 70: Green space, Johan Friso Foyer, Floor 1, August 28, 2019, 1:30 PM - 3:00 PM

Background/Aim

The effect of urbanisation and greenness on children's health is still debated topic in Public Health. Exposure to natural or residential vegetation may benefit human health by reducing noise and air pollution, enhancing environmental biodiversity or promoting physical activity. The aim of this study is to evaluate the role of surrounding vegetation on lung function and oxidative stress (OS) induction.

Methods

381 children (10-14 yrs.) were recruited from three areas with different urbanisation in Piedmont region. Each subject filled out a standardised questionnaire collecting general information, performed a spirometry test and provided a urinary sample for the quantifications of OS and tobacco smoking (TS) exposure by means of isoprostane (15-F2t-Isop) and cotinine, respectively. The Regional Agency for the Protection of the Environment provided PM10 and NO2 annual measurements. Surrounding greenness was evaluated through NDVI calculation from remote sensing images, within fixed buffers around participants' home addresses.