

## Session: A. Exposure assessment I

## 1 EXPOSURE TO CCA TREATED WOOD AMONGST FOOD CATERERS AND RESIDENTS IN INFORMAL AREAS OF CAPE TOWN

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**Objectives** The study investigated if wood usage by street food caterers and household residents from informal settlements in Cape Town resulted in the absorption of Cr, Cu and As due to release of these metals from wood stocks treated with Chromated Copper Arsenate (CCA).

**Methods** Participants (n = 78) selected included an equal number of food caterers and household residents from two informal settlement, one each located in an urban and a peri-urban area. All participants answered an exposure questionnaire and were tested for urinary Cr, Cu and As, while the urines of 29 participants were also tested for toxic As [As (tox)].

**Results** Urinary Cr and As exceeded the environmental exposure limit in 12% and 30% of participants respectively. As (tox) was detected in 30% of samples and 20.7% of As (tox) levels exceeded the environmental exposure limit of 6.4 g/g creatinine. Urinary Cr, Cu, As and As (tox) levels were not significantly different in the two areas and amongst caterers and household residents after controlling for confounding (age, gender, education, smoking, eating fish and eating and drinking while cooking). The time spent on using wood as well as the quantity of wood used for catering and household use was weakly positively associated with urinary levels of As, Cr and the sum of As, Cr and Cu after controlling for confounding.

**Conclusions** This study provides evidence of Cr and As exposure amongst both street caterers and household residents and that usage of wood stocks likely to contain CCA treated timber as a fuel for food catering and household purposes may increase absorption of inorganic As and Cr.

## 2 PREDICTING FACTORS FOR LEAD ACCUMULATION IN MEXICAN LITHOGRAPHY PRESS WORKERS

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**Objectives** Bone lead level is a good indicator of cumulative exposure. Aim research paper was to characterize lead exposure and identify main predictors of bone lead in workers at a lithography press.

**Methods** The study population consisted of 90 active workers. Their bone lead levels were determined using the X - K fluorescent rays method. Measurements were in micrograms lead per gram mineral bone ( $\mu\text{gPb/gmb}$ ) in patella (PbP), tibia (PbT), blood (PbB), air (PbA), and lead present on hands before (PbBe) and after washing (PbAf). Two multiple linear regression models were constructed for each bone, because colinearity.

**Results** Mean, standard deviation (SD), and [range] were as follows. Age: 45 years (13) [20, 75]; seniority at the lithography press: 10.6 years, (9.3) [1, 40]; seniority at both printing presses:

20 years (15.5) [1, 65]; PbB: 12.3 mg/dL + 5.2, [3.4, 30.3]; PbP: 43.3  $\mu\text{gPb/gmb}$  + 28.5 [-4.82, 136.9], PbT: 25.9  $\mu\text{gPb/g}$  + 18.8 [-20.1, 74.2]; PbA 0.54 (mg/m<sup>3</sup>). GM (geometric mean): PbBe: 848.1 mg/m<sup>2</sup> [27, 158 537] and PbAf 73 mg/m<sup>2</sup> [3, 1463]. The PbP and PbT models explain 44% and 55% of accumulated lead variability, respectively; their predictors were: PbB = 1.24 ( $p = 0.020$ ) and = 0.93 ( $p = 0.003$ ); the seniority total years sum at both presses, = 0.76 ( $p < 0.001$ ) and = 0.34 ( $p = 0.007$ ); the exposure categories: medium = -1.60 ( $p = 0.83$ ) and = 2.79 ( $p = 0.52$ ); high, = 12.5 ( $p = 0.16$ ) and = 16.9 ( $p = 0.004$ ); and very high, = 15.4 ( $p = .048$ ) and = 18.0 ( $p < 0.001$ ), respectively, using low exposure as a reference.

**Conclusions** Although air lead exposure was low, bone lead concentrations were high, similar to those found in workers with greater exposure. In both models the PbP and PbT accumulation is determined by the intensity of exposure (PbB) and the seniority sum years with lead exposure, as well as various exposure levels, according to the workplace, and working an additional shift at a similar press.

## 3 FRACTIONAL AND CHEMICAL COMPOSITION OF DUST IN THE WORKING AREA OF MACHINE BUILDING ENTERPRISE

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**Objectives** The purpose of the research is the study of dust fractional and chemical composition and exposure assessment in workplaces of the machine building enterprises.

**Methods** Research carried out on the example of one of the largest machine building enterprise of Perm. Sampling was carried out at the workplaces, directly at the emission sources. Dusts fractional composition was determined using a laser particle analyser Microtrac S3500 (covering the particle size range from 20 nm to 2000 microns). Based on the determined fractional composition was the mass concentration of TSP calculated, and then the mass of PM2.5 and PM10. Dusts microscopy was conducted using a scanning electron microscope with high resolution X-ray fluorescence attachment S3400N «HITACHI».

**Results** The results showed that the composition of the dust emissions in different technological processes is heterogeneous. In workplace air of welders, turners, millers the PM10 fraction reaches 2 - 50%, PM2.5 - 1 - 13%. Median diameters size: 50-300 mkm. By microscopy of dust from welding in carbon dioxide were identified nanoscale dust particles. Dust contains iron oxides, manganese, chrome, vanadium and fluoride compounds, while also established the presence of silicon, carbon, sodium, magnesium, aluminium, calcium.

**Conclusions** - dust pollution workplace air for welders, turners, millers and the other employees characterised by high proportion of fine particles, indicating the threat to health of employees;

- for some technological processes established presence of the nanoparticles in the dusts of the work area air. Hygienic characteristics of the nanoparticles are poorly understood, that requires close attention to the quality of the working area air when performing technological operations;

- the results confirm the relevance of the determination of fractional and chemical composition of dust in the workplaces air pollution. Such data will allow to evaluate the employees