

## Poster Presentation

## Other

**0409 INDUSTRY, OCCUPATION AND SEX DIFFERENCES IN WORKERS' EXPOSURE TO ENDOCRINE DISRUPTING METALS IN AN AMERICAN AND A CANADIAN SURVEY**

<sup>1,2</sup>Sabrina Gravel\*, <sup>1,3</sup>Jérôme Lavoué, <sup>1,2</sup>France Labrèche. <sup>1</sup>School of Public Health, Université de Montréal, Montreal, Qc, Canada; <sup>2</sup>Institut de recherche Robert-Sauvé en santé et en sécurité du travail, Montreal, Qc, Canada; <sup>3</sup>Centre de recherche du Centre hospitalier de l'Université de Montréal, Montreal, Qc, Canada

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These analyses explore whether a gradient of exposure to four potential endocrine disrupting metals can be detected in workers of different occupational groups and industries, in two national population surveys.

Blood levels of lead (PbB), cadmium (CdB) and mercury (HgB), as well as urinary levels of arsenic (AsU) were measured in the National Health And Nutrition Examination Survey (NHANES) 2003–2010 and the Canadian Health Measures Survey (CHMS) 2007–2013. Data from participants aged 16–65 were analysed to identify industries and occupational groups with higher levels. T-tests and one-way ANOVAs were performed to explore differences in the biomarkers' levels according to industry, occupation and sex.

Geometric means (GMs) in NHANES and CHMS were respectively 1.24 and 1.13 µg/dL for PbB, 0.32 and 0.34 µg/L for CdB, 0.96 and 0.78 µg/L for HgB, and 9.96 and 10.61 µg/L for AsU. In NHANES, men had higher levels of PbB (mean difference (MD)=0.75 µg/L, 95% CI:0.70–0.81) and HgB (MD=0.27; 95% CI:0.18–0.36), and there were no differences between men and women for CdB and AsU. In both surveys, the Utilities and Construction industry group had higher GMs of PbB (NHANES: 1.98 µg/dL; CHMS: 1.54 µg/dL) and CdB (NHANES: 0.35 µg/L; CHMS: 0.45 µg/L), and occupations in Health Care and Social Services had the highest HgB GMs (NHANES: 1.16 µg/L; CHMS: 0.97 µg/L).

Results show that certain occupational groups may incur higher exposures to potential endocrine disrupting metals. This should raise attention on workers, considering increasing evidence on the possible effects of such exposures in the general population.

## Oral Presentation

## Pesticides

**0410 OCCUPATIONAL EXPOSURE TO PESTICIDES AND HEALTH EFFECTS IN MALE BANANA PLANTATION WORKERS IN ECUADOR**

<sup>1,2</sup>Hans-Peter Hutter\*, <sup>1</sup>Hanns Moshhammer, <sup>1,3</sup>Peter Wallner, <sup>1</sup>Shifra Shahrakisanavi, <sup>2</sup>Helmut Ludwig, <sup>1</sup>Michael Kundi. <sup>1</sup>Department of Environmental Health, Medical University Vienna, Vienna, Austria; <sup>2</sup>International Society of Doctors for the Environment – Section Austria, Vienna, Austria; <sup>3</sup>Medicine and Environmental Protection, Vienna, Austria

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**Introduction** Intensive agrochemical application in banana production has been documented in Ecuador, world's largest exporter of bananas. This study assessed working conditions, wellbeing and health of farmworkers in conventional farming using biocides and in organic farming.

**Methods** In a cross-sectional epidemiological study exposed and non-exposed male farmworkers were interviewed based on standardised questionnaires about, inter alia, exposure history, pesticide application practices, health and wellbeing. Furthermore, swab samples of buccal cells were taken (Buccal Micronucleus Cytome Assay, BMCA), fixed, stained and later in the laboratory blindly evaluated for nuclear anomalies indicative of cytotoxic and genotoxic effects, according to standard protocols.

**Results** In total, 68 farmworker participated (provinces Los Rios, El Oro). 87% resp. 78% of the pesticide exposed respondents did not use masks/gloves at all; 10% resp. 19% used masks/gloves all the time. Pesticide workers (n=31) showed significantly more often symptoms such as dizziness (OR=4.80), nausea/vomiting (OR=7.50), diarrhoea (OR=6.43), burning eyes (OR=4.10), skin irritation (OR=3.58). Furthermore, eight out of nine biomarkers of the BMCA were significantly more frequent among exposed workers (p<0.001) (micronucleated cells: OR=2.55; total micronuclei: OR=2.45; nuclear buds: OR=1.84; binucleated cells: OR=1.33; condensed chromatin: OR=1.38; karyorrhectic cells: OR=1.30; karyolytic cells: OR=1.19; broken eggs: OR=1.20).

**Discussion** Our findings indicate that the impact of pesticide use is not restricted to acute effects on health and wellbeing, but also point to long-term health risks. BMCA results suggest that pesticide users have a higher risk of developing cancer. There is an urgent need for safety training and minimising application of pesticides.

## Poster Presentation

## Neurological Effects

**0411 EXPOSURE TO DIESEL ENGINE EXHAUST AND THE RISK OF ALS**

<sup>1,2</sup>Susan Peters\*, <sup>2</sup>Calvin Ge, <sup>1</sup>Jan Veldink, <sup>1</sup>Leonard van den Berg, <sup>2</sup>Roel Vermeulen. <sup>1</sup>University Medical Centre Utrecht, Utrecht, The Netherlands; <sup>2</sup>Utrecht University, Utrecht, The Netherlands

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**Background** Only few risk factors have been identified for amyotrophic lateral sclerosis (ALS). Higher risks were reported for various occupations (e.g. farmers, construction workers), but responsible exposures remain largely unknown. We investigated the association between occupational exposure to diesel engine exhaust and sporadic ALS in a population-based study with detailed information on possible confounders.

**Methods** An ongoing ALS case-control study is being conducted in the Netherlands since 2006, and we here present data for 2006–2014. Lifetime occupational histories and lifestyle factors were collected via questionnaires. A general population job-exposure matrix was assigned to estimate exposure to diesel engine exhaust. All exposure variables were estimated up to two years before survey to account for any changes due

to disease onset. Odds ratios were estimated by logistic regression models, adjusted for age, sex, smoking and alcohol.

**Results** Data were available for 1040 sporadic ALS cases (63.6% male) and 2050 controls (60.2% male). Ever occupational exposure to diesel engine exhaust was not associated with risk of ALS (OR=1.06, 95% CI 0.87–1.28). No exposure-response relation was observed for either cumulative exposure or exposure duration on a continuous scale.

**Conclusion** Our analysis suggests that exposure to diesel engine exhaust is not associated with an increased risk of ALS.

## Oral Presentation

## Other

### 0412 CLIMATE CHANGE IMPACTS ON OCCUPATIONAL HEALTH VIA WORKPLACE HEAT

<sup>1</sup>Tord Kjellstrom\*, <sup>2</sup>David Wegman, <sup>3</sup>Lars Nybo, <sup>4</sup>Andreas Fluoris, <sup>5</sup>Lucka Kajfez-Bogataj. <sup>1</sup>Center for Technology Research and Innovation Ltd, Limassol, Cyprus; <sup>2</sup>University of Massachusetts, Lowell, MA, USA; <sup>3</sup>University of Copenhagen, Copenhagen, Denmark; <sup>4</sup>University of Thessaly, Trikala, Greece; <sup>5</sup>University of Ljubljana, Ljubljana, Slovenia

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Climate changes will markedly affect working people as increased heat and extreme weather may directly affect health and indirectly via reduced food access and spread of vector-borne diseases among outdoor workers. The effects will primarily affect low income people in tropical and sub-tropical areas, but occupational health authorities in all countries need to consider the emerging challenges. A recent EU project ([www.HEAT-SHIELD.eu](http://www.HEAT-SHIELD.eu)) is dedicated to improving heat resilience in workers, and NIOSH/USA recently (2016) published new guidelines.

Considering the theme **Eliminating Occupational Disease**, a widespread occupational health threat from climate change will be excessive heat exposure causing "workplace heat related illnesses". This is already a major problem in large parts of the world. A number of aspects of the occupational health challenges will be presented during this Mini-Symposium.

**Translating research into action** involves broadening existing research/analysis to produce improved "heat exposure evaluation" and "occupational health impact assessment" related to climate change. Research needs to identify remediable conditions and solutions/interventions. This requires a major increase in occupational epidemiology studies (including intervention studies), focusing on hot parts of the world. The detrimental health and economic impacts should encourage global and national policies to address climate change mitigation.

The Mini-Symposium will consider how to address these needs, and encourage networking among scientists in different fields for future studies. It also aims to engage young scientists in a field which has been overlooked in climate change impact analysis. The HEAT-SHIELD project welcomes cooperation in specific studies and sharing of methodologies.

## Poster Presentation Specific Occupations

### 0414 RETROSPECTIVE CHANGES IN LUNG FUNCTION OF SERVING SCOTTISH FIREFIGHTERS DURING THEIR CAREERS

<sup>1,2</sup>Christopher Ide\*. <sup>1</sup>Health Management Ltd, Altrincham, UK; <sup>2</sup>Healthy Working Lives Group, University of Glasgow, Glasgow, UK

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**Background** Firefighters are exposed to a wide range of respiratory hazards during their careers, and respiratory disorders can sometimes result in ill-health retirement (IHR) or death. While papers have reported findings from many countries, most originate from North America and/or are in response to specific incidents (eg '9/11'). This is the first report regarding specifically Scottish firefighters

**Aim** To observe the changes in lung function in a group of male Scottish firefighters during the course of their service, and to determine any differences between firefighters who took IHR, or completed maximum service (MS)

**Method** Retrospective data from routine 'over-40' medical examinations of firefighters who retired on the grounds of IHR or MS between 1985 and 1994 which included lung function data such as Peak Expiratory Flow Rate, (PEFR), Forced Expiratory Volume in one second (FEV1), and Forced Vital Capacity (FVC) were gathered and divided into two groups - those who took IHR, and those who completed MS. The results were expressed as a percentage of predicted values for age, height and male sex.

**Results** Peak expiratory flow rate

Total Number	no with usable PEFR data	% range of predicted value	Mean (+/- SD)	Median (IQR)	No of reduced PEFR (%)
IHR 505	235	-46 -+65	+3.7 (16.8)	1(-6-+9)	104(44)
MS 209	181	-31 -+79	+5.2 (14.9)	3(-3.5-+13)	61(34)

**Discussion** Both those taking IHR and MS showed a slight improvement in this aspect of lung function during the course of their careers, generally supporting earlier findings of West Sussex and London firefighters.

Declaration of potential conflict of interest: Author was previously Medical Adviser to the Fire and Rescue Service whose data is the subject of this project.

## Oral Presentation

### Shift Work

#### 0415 WORKING AROUND THE CLOCK: AN EXPOSURE RESPONSE RELATIONSHIP BETWEEN NIGHT WORK AND INCIDENT HYPERTENSION

<sup>1</sup>Jacqueline Ferguson\*, <sup>1</sup>Sadie Costello, <sup>2</sup>Mark Cullen, <sup>1</sup>Ellen Eisen. <sup>1</sup>University of California, Berkeley, Berkeley, California, USA; <sup>2</sup>Stanford University, Stanford, California, USA

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Night work, or work outside of 7am to 6pm, causes chronobiologic rhythm disruption which may cause an increase in hypertension risk. To study this question, we assessed the association between night work and incident hypertension using three exposure metrics.

A cohort of 2941 new hires at 9 aluminium smelter and fabrication facilities were followed from 2003 through 2013 for incident hypertension defined by insurance claim's ICD-9 codes. Night shifts were classified as shifts with  $\geq 3$  hours between 12am-5am using time-registry data. Night work exposure in the previous year was defined three ways; two binary metrics adapted from previous studies: 1) Ever/Never, 2) Working  $\geq$  or  $< 36$  night shifts; and a quantitative metric 3) Percentage of night shifts.

The association between hypertension and each exposure metric was estimated in separate Cox proportional hazards models, adjusting for age, sex, gender, facility, smoking history, annual BMI, annual health claims based risk score, and duration of past night work.

The rate of incident hypertension among workers with night work in the previous year was 1.88 (95% CI [1.16–3.05]) and 1.40 (1.00–1.96) times the rate among workers with no recent night work using metric 1 and 2 respectively. Compared with workers with no recent night work exposure, the hazard ratio among workers with  $>0$ - $<5\%$ ,  $5$ - $<25\%$ ,  $25$ - $<50\%$ , and  $\geq 50\%$  night shifts in the previous year were 1.62 (0.93–2.83), 1.83 (1.05–3.20), 2.20 (1.29–3.78) and 2.29 (1.24–4.20) respectively ( $P_{Trend}=0.004$ ).

Our results suggest recent degree of night shift exposure may be associated with higher rates of hypertension.

## Poster Presentation

### Exposure Assessment

#### 0416 RELATIONSHIP BETWEEN EXTRACELLULAR IRON AND CIRCULATING INFLAMMATION MARKERS IN PLASMA OF MINNESOTA TACONITE WORKERS

Shannon M Sullivan\*, Bin Ma, Bruce H Alexander, Jeffrey H Mandel, Irina Stepanov. University of Minnesota, Minneapolis, Minnesota, USA

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**Background** Higher rates of mesothelioma, pneumoconiosis, lung cancer, and heart disease mortality have been reported in Minnesota taconite (iron ore) workers compared to the rest of the state population. Oxidative stress and inflammation are important underlying mechanisms in cancer and cardiovascular disease, and exposure to silica containing dust with a high iron content may play a key role in the observed elevated health risks.

**Methods** In this study, we compared ICP-MS-measured plasma iron concentrations to levels of circulating inflammatory markers (cytokines and chemokines) in 130 taconite workers using linear regression analysis adjusting for covariates.

**Results** Plasma iron levels varied substantially, ranging from 49 to 636  $\mu\text{g/dL}$ , with a mean of 107 ( $\pm 60$ )  $\mu\text{g/dL}$ . After adjusting for age, body mass index, gender and smoking status, plasma iron levels were positively associated with the levels of chemokines RANTES ( $p=0.06$ ), TARC ( $p=0.04$ ), and MDC ( $p=0.02$ ).

**Discussion** These findings lend some support to the hypothesis that exposure to iron in taconite dust may lead to elevated levels of extracellular iron both in the lung and in the general circulation, producing reactive oxygen species and catalysing oxidative stress. Given that TARC and MDC have been prospectively associated with lung cancer risk in other research, there is a need to better understand the relationship between extracellular iron levels and these biomarkers in taconite workers. Further analyses to assess other metrics of iron exposure from taconite dust components on plasma iron concentrations and measures of oxidative stress are warranted.

## Poster Presentation

### Injuries

#### 0418 VIOLENCE IN HEALTHCARE: HOW DOES IT AFFECT RETURN-TO-WORK AFTER WORK INJURY?

Kelvin Choi\*, Esther Maas, Mieke Koehoorn, Chris McLeod. University of British Columbia, Vancouver, British Columbia, Canada

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