

after diagnosis. Presumably, cancer progression and treatment may cause opportunistic infections. Further evaluation is necessary to support this result.

Poster Presentation

Exposure Assessment

0407 RESPIRATORY IRRITANT EXPOSURES DURING CLEANING AND DISINFECTING IN HOME CARE: PRELIMINARY RESULTS FROM THE SAFE HOME CARE STUDY

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Objectives While there is evidence of asthma and other respiratory illness among workers performing cleaning and disinfecting (C and D) of environmental surfaces in healthcare and in residential and institutional settings, quantitative measurements of C and D exposures are limited. Previously, we found that 80% of home care (HC) aide visits to clients' homes involve C and D; commonly-used C and D products contain bleach, a respiratory irritant. Objectives of this study were to measure quantitatively airborne exposures generated during C and D tasks performed by HC aides using a bleach-containing product. The work reported here is part of a larger evaluation of exposures and respiratory effects of a range of C and D products and practices and their efficacy in reducing pathogens in HC.

Methods A bathroom was constructed in a laboratory according to home building construction specifications. Twenty HC aides were recruited from employer agencies to perform C and D tasks for 20 min sessions in the bathroom following typical HC practices using a C and D spray product containing bleach (1%–5% by weight sodium hypochlorite). Aides wore a vest holding a direct-reading instrument to measure chlorine breathing-zone concentrations as they performed C and D on tub/shower, toilet, and sink.

Results Maximum chlorine concentrations generated during the 20 min sessions ranged from 0.35ppm to 3.40ppm. The tub/shower C and D task produced the highest exposures. The US Occupational Safety and Health Administration ceiling limit for chlorine is 1 ppm; nearly 70% of the aides conducted a C and D session exceeding this value.

Conclusions C and D in HC using a product containing bleach can produce over-exposure to chlorine, a respiratory irritant.

Poster Presentation

Chemicals

0408 WORKERS' EXPOSURE TO BROMINATED FLAME RETARDANTS: A GLANCE AT AMERICAN AND CANADIAN POPULATION DATABASES

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We aim to determine biological concentrations of four congeners of brominated flame retardants, which have no occupational exposure limits, in American and Canadian workers.

Serum concentrations of four polybrominated diphenyl ethers congeners (BDE47, 99, 100 and 153) were obtained from the American National Health And Nutrition Examination Survey (NHANES) 2003–2004 and the Canadian Health Measures Survey (CHMS) 2007–2009 databases. Data from participants aged 16–65 were classified by industry and occupational group. Values below the detection limit (< LOD) were replaced by LOD/ $\sqrt{2}$. Descriptive statistics are presented.

A total of 813 and 1100 serum samples were respectively available in NHANES and CHMS. Proportions of values < LOD varied by survey: BDE47 (NHANES, 1.4%; CHMS, 22.7%), BDE99 (32.3%; 73.9%), BDE100 (4.7%; 72.9%), BDE153 (5.7%; 55.9%). BDE47 was the congener with the highest lipid-adjusted mean concentrations (NHANES, 44.5 ng/g; CHMS, 22.8 ng/g). Higher BDE47 means were found in Agriculture, Forestry and Fishing industries (61.9 ng/g) and in Protective Services and Armed Forces occupations (48.5 ng/g) for NHANES, whereas in CHMS they were higher in Manufacturing of Durable Goods industries (40.3 ng/g) and in Construction and Extraction occupations (44.7 ng/g). BDE153 means were higher for men than for women in both databases (NHANES-men: 16.8 ng/g, NHANES-women: 11.4 ng/g; CHMS-men: 11.0 ng/g, CHMS-women: 7.8 ng/g). In NHANES, non-working men had higher mean concentrations than workers for all congeners.

In the absence of occupational exposure limits, population surveys can be useful to establish reference levels, but careful interpretation is required for chemicals such as flame retardants that are ubiquitous in both the general and work environments.

Poster Presentation

Other

0409

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

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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

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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

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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