653 BENZENE AND WORK ON DECK ON PRODUCT TANKERS: EXPOSURES, BENZENE IN EXHALED AIR AND URINARY BIOMARKERS OF BENZENE EXPOSURE

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10.1136/oemed-2018-ICOHabstracts.1114

Introduction Increased rates of leukaemia have been found among tanker crews. The leukemic carcinogen benzene is a plausible cause, but serving on tankers is not an established risk occupation for leukaemia. Studies on tankers have revealed exposure to benzene, although with inconsistent exposure levels and without toxicological data. We present exposure to benzene together with biomarkers for benzene uptake, metabolism and genotoxic effects on Swedish product chemical tankers.
Methods Between 1995 and 1998, 37 seafarers (20 deck crew members, 17 not on deck) on seven different product chemical tankers, wore personal passive breathing zone dosimeters. Each individual was monitored with timed samples for benzene in end-exhaled (alveolar) air and in urine for unmetabolized benzene, the benzene metabolite tt-muconic acid (t,t-MA) and 8-hydroxydeoxyguanosine (8-OHdG), a marker of DNA oxidative stress. Samples were taken before and following a watch for up to 24 hours.
Result The average concentration of benzene in air during a watch (approximately 4 hour) displayed a wide range depending on work task performed (range 0 to 50 mg/m3; peak 143 mg/m3). All biomarkers were low/undetectable before and elevated after benzene exposure tasks. Peaks for t,t-MA and 8OHdG occurred after 5 and 13 hours, resp. The time needed for returning to pre-'work task' values were in ascending order alveolar benzene, U-benzene, U-t,t-MA and U-8OdG. Controls had low levels of urinary biomarkers and without diurnal variations.
Discussion Several work tasks resulted in high exposure to benzene, often exceeding the Swedish occupational exposure limit (1.5 mg/m3, 8hTWA). Benzene exposure resulted in oxidative damage to DNA in cells, indicating that work on tankers might induce genotoxic effects in the human body. The finding suggest a plausible mechanism between cause and effect in coherence with epidemiological findings for increased risk of leukaemia in tanker crews.

683 VARIANCE IN QUARTZ EXPOSURE DURING REPEATED MEASUREMENTS AT SWEDISH FOUNDRIES

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10.1136/oemed-2018-ICOHabstracts.1115

Introduction Today traditional dust measurements are performed during one or at the most two working days and the results will represent the full year exposure. There is a large variation in exposure at a single company during the year depending on a lot of factors, such as production intensity, used Materials and methods, weather conditions, individual work pattern and behaviour. In this study traditional measurements were made during 2 time periods per company and the variance in measurements were studied.
Methods Personal sampling of respirable quartz was performed between April 2015 and February 2016 at one iron foundry and one bronze foundry. The measurements were made two days in a row, twice with two-three months in-between.

The air exposures of respirable quartz as personal measurements were performed for the full work day. A mixed-model was used to study differences between job titles and companies.
Results In total, 66 personal samples of respirable quartz were collected for 21 individuals. The quartz concentrations ranged between 0.0011–0.079 mg/m^3.

The mixed-model analysis of respirable quartz show that the job titles and companies differs. Shakeout show a statistical significant increasing odds ratio of 2.4 (95% CI: 1.06 to 5.33) and the caster and melter has a significant decreasing odds ratio of 0.46 and 0.32 (95% CI: 0.24 to 0.89 and 0.19 to 0.53) compared to moulder as reference category. The quartz exposures at the iron foundry result in an odds ratio of 2.75 (95% CI: 1.70 to 4.45) compared to the bronze foundry. Between job titles represent 60.4% of the overall variance and the between worker within job title variance 25.5%.
Discussion The study implies that type of foundry and type of work at the foundry is a greater cause of the variance in the exposure then when in time the measurements are made.

749 THE IMPACT OF WORKSITE NUTRITION AND PHYSICAL ACTIVITY INTERVENTIONS ON PRODUCTIVITY, WORK PERFORMANCE AND WORK ABILITY: A SYSTEMATIC REVIEW

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10.1136/oemed-2018-ICOHabstracts.1116

Introduction Healthy lifestyles play an important role in the prevention of premature death, chronic diseases, productivity loss and other social and economic concerns. The aim of this systematic review is to investigate the impact of worksite dietary and physical activity interventions, focused on environmental and organisational structure, on employees' productivity, work performance and work ability.
Methods A comprehensive literature search in Medline, Cochrane Library and PROPSERO was conducted. Studies were identified from reference lists from all the systematic reviews with resembling objective as in this search and were included if they fulfilled our inclusion criteria. An updated search (2015–2016) in Medline, Embase, Cochrane Library and Scopus, was also conducted. Two or more researchers independently screened abstracts and full-texts for study eligibility as well as assessed risk of bias. Disagreements were resolved by a consensus procedure.
Result A total of 29 randomised control trials and non-randomised controlled studies were included. Nearly thirty percent of the included studies were high quality, while sixty four percent were of medium quality. The studies covered a broad range of multi-level, organizational-level and environmental-level interventions. Fourteen effective worksite nutrition and physical activity interventions were identified. Seven of these

showed positive effects on sick leave, two studies showed effects on work performance, one study showed effects on work ability and one study showed effects on productivity.
Discussion The scientific evidence shows that it is possible to influence work-related outcomes, especially sickness absence, positively through health promotion efforts that include components aimed at the workplace's physical work environment and organisational structure. There is a lack of knowledge regarding the impact of interventions on work ability, work performance and productivity and thus more research is needed. In order to draw further conclusions regarding work-related outcomes in controlled high-quality studies, long-term follow-up using objective outcomes and/or quality assured questionnaires are required.

758 ATTITUDES TO THE ROLE OF GOVERNMENT, PERCEIVED WORK-RELATEDNESS AND THE COMPENSABILITY OF MESOTHELIOMA: A SURVEY OF MEDICAL AND LEGAL PROFESSIONALS

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10.1136/oemed-2018-ICOHabstracts.1117

Introduction Despite of the strong link between occupational asbestos exposure and mesothelioma (MM), only a small fraction of MM are recognised and compensated as occupational disease (OD). Lack of awareness of health risks of asbestos and negligence of workers' compensation rights may be underlying factors for low recognition of occupational diseases. While medical and legal professionals are key players in the compensation process, their knowledge and attitudes towards disease causation and compensability of MM as well as attitudes towards welfare state policies are not well understood.
Methods An anonymous survey was conducted among 281 physicians and 929 legal professionals in Taiwan. Provided in the questionnaire was a vignette case. Study participants were asked to comment on the work-relatedness and compensability of the case. Also included was an 8-item scale of the role of government adopted from the International Social Survey Programs to assess participants' attitudes towards welfare state policies.
Results 10.7% of physicians and 2.7% of legal professionals considered the case as an OD with certainty. Uncertainty was much higher in legal professional, as 53.1% of them could not give an answer on this issue. Despite of uncertainty, the majority of physicians (85.1%) and legal professionals (56.6%) agreed that such a case should be compensated under the workers' compensation scheme. After excluding participants who could not answer the question on the work-relatedness of disease, we found that those with lower scores in the role of the government scale were more likely to disapprove MM as an OD and to disagree its compensability.
Conclusion Findings of this study suggest that attitudes of medical and legal professionals towards the compensability of asbestos-related mesothelioma are influenced not just by their knowledge about asbestos hazards and epidemiologic features but also by the ideas they hold about the role of the government in social protection.

774 OCCUPATIONAL EXPOSURE TO COMBUSTION PRODUCTS AND RISK OF DEVELOPING RHEUMATOID ARTHRITIS

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10.1136/oemed-2018-ICOHabstracts.1118

Introduction Studies have suggested a potential association between traffic pollutants and rheumatoid arthritis (RA), but findings have been inconclusive. We therefore assessed the risk of RA from occupational exposure to combustion products in a large population-based case-control study.
Methods We included participants living in Sweden from 2006 to 2013. Incident cases of RA were enrolled from the Swedish Rheumatology Quality Register. Ten controls per case, matched on sex, age and county, were enrolled from the total population register. Work histories were available through population and housing censuses. We estimated exposure to asphalt fumes, diesel engine exhaust (DEE) and polycyclic aromatic hydrocarbons (PAH) from 1955 to 1995 with job-exposure matrices. Conditional logistic regression was used to estimate the risks of two histological subtypes of RA (seropositive or seronegative RA) from exposure to either of the combustion products taken separately or all of them combined. All estimates were adjusted for potential confounding from respirable crystalline silica dust and household disposable income.
Results We analysed 9180 cases and 81 367 controls. Ever exposure to DEE in men was associated with a marginally higher risk of seropositive RA (OR: 1.11, 95% CI: 1.00 to 1.23), which was slightly higher among workers with at least 20 years of exposure (OR: 1.22, 95% CI: 1.00 to 1.49). More than 20 years of asphalt fumes exposure was also associated with a higher risk estimate for seropositive RA among men (OR: 1.87, 95% CI: 1.05 to 3.31). Being exposed to asphalt fumes, DEE or PAH combined for more than 20 years resulted in an OR of 1.22 (95% CI: 1.03 to 1.45) among men and 1.27 (95% CI: 0.50 to 3.26) among women for seropositive RA.
Discussion Long-term exposure to combustion products may increase the risk of seropositive RA among men after adjustments for respirable crystalline silica dust and household disposable income.

793 A POSITION PAPER ON THE FUTURE REQUIREMENTS FOR OCCUPATIONAL HEALTH PHYSICIANS IN THE PUBLIC HEALTH SERVICE, IRELAND

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10.1136/oemed-2018-ICOHabstracts.1119

Introduction At a time when health resourcing costs are contracting, it is vital that services examine the potential to maximise the efficiency of their services and resources. The