

Results We found 8 and 897 CpG sites differentially methylated in former and current smokers, while compared to never smokers, respectively. The 8 candidate markers of former smoking showed a gradual reversion of their methylation levels from those typical of current smokers to those of never smokers. Further analyses using cumulative (over varying time windows) smoking intensities, highlighted three classes of biomarkers: short and long term biomarkers (measuring the effect of smoking in the past 10, and in the past 10 to 30 years respectively), and lifelong biomarkers detected more than 30 years after quitting smoking.

Conclusions Genome-wide DNA methylation profiles show promising abilities to detect short-term to lifelong biomarkers of tobacco smoke exposure and, more generally, to potentially identify time-varying biomarkers of exposure.

0222 NIGHT WORK AND BREAST CANCER RISK AMONG WOMEN IN THE PUBLIC DANISH HEALTH CARE SECTOR - A SHORT-TERM FOLLOW UP OF A LARGE SCALE POPULATION

¹Helene Tilma Vistisen, ²Anne Helene Garde, ^{2,3}Aase Marie Hansen, ⁴Johnni Hansen, ^{5,6}Peer Christiansen, ¹Henrik Kolstad. ¹Department of Occupational Medicine, Danish Ramazzini Centre, Aarhus University Hospital, Aarhus, Denmark; ²National Research Center for the Working Environment, Copenhagen, Denmark; ³Department of Public Health, University of Copenhagen, Copenhagen, Denmark; ⁴Danish Cancer Society Research Center, Copenhagen, Denmark; ⁵Department of Surgery, P, Aarhus University Hospital, Aarhus, Denmark; ⁶Danish Breast Cancer Corporative Group, Copenhagen, Denmark

10.1136/oemed-2014-102362.93

Objectives Experimental evidence suggest a short-term effect of light at night on breast cancer oncogenesis. We studied the short-term effect of night work on breast cancer occurrence.

Method We established a large, national cohort of employees in the public health care sector with a high prevalence of night shift work and with detailed data regarding occupational title and date and hour for beginning and end of every work duty: The Danish Working Hour Database (DWHD). DWHD encompasses payroll data as of 2007 and is updated on an annual basis. For this analysis we defined night work as at least 3 h of work between midnight and 05:00. From national cancer registers we retrieved information about breast cancer diagnosis for all female workers and their relatives. Reproductive history, hormone medications, attendance in mammography screening, and vital status were obtained from other national health registries.

Results The 6-year follow up from 2007 to 2012 included 169,011 women of which 98,297 (58%) had ever worked nights during the follow up. A total of 1,281 breast cancer cases occurred within the study population. 846 cases occurred among women never worked nights and 435 cases among women ever worked nights.

Conclusions Internal risk assessment of this dataset that includes alternative exposure metrics based on day-to-day night work exposure information will be presented.

0223 MARGINAL STRUCTURAL MODELS IN OCCUPATIONAL EPIDEMIOLOGY: AN APPLICATION IN THE US ALUMINIUM INDUSTRY

¹Andreas Neophytou, ¹Daniel Brown, ¹Sadie Costello, ¹Elizabeth Noth, ¹Katharine Hammond, ²Mark Cullen, ¹Ellen Eisen. ¹Environmental Health Sciences, UC Berkeley School of Public Health, Berkeley, CA, USA; ²Department of Internal Medicine, Stanford University, Stanford, CA, USA

10.1136/oemed-2014-102362.94

Objectives To apply Marginal Structural Models (MSM) to address healthy workers survivor effect in a cohort study of active workers when time varying variables on health status and exposure are measured.

Method We used Cox MSMs and inverse probability weighting to assess the effect of PM_{2.5} exposure on incident ischaemic heart disease (IHD) in an active cohort of 11 966 US aluminium workers. The outcome was assessed using medical claims data from 1998 to 2012. Quantitative exposure metrics of current exposure to PM_{2.5} were dichotomized using different cutoffs and effects were assessed separately for smelters and fabrication. Risk score based on insurance claims was available as a time varying health status variable.

Results Defining binary PM_{2.5} exposure by the 10th percentile cut-off, health status was affected by past exposure and predicted subsequent exposure in smelters, but not in fabrication. A Traditional cox model was appropriate for fabricators; the hazard ratio was 1.51(95% CI: 1.12 – 2.06) and was attenuated when considering higher exposure cutoffs. In smelters, Cox MSM Hazard Ratios for IHD comparing the effect of exposure in a population had everyone always been exposed to everyone always unexposed, using the 10th percentile exposure cutoff was 1.83 (95% CI: 1.14 – 2.94). Higher exposure cutoffs also resulted in attenuated effects.

Conclusions Marginal Structural Models can be used in active employment occupational cohorts to address time varying confounding. Results from the current study suggest that occupational exposure to PM_{2.5} in the aluminium industry increases the risk of IHD in both smelters and fabrication.

0224 DIRECT EXPOSURE TO METALWORKING FLUID AEROSOLS AND CHRONIC OBSTRUCTIVE PULMONARY DISEASE IN A COHORT OF U.S. AUTOMOTIVE INDUSTRY WORKERS

¹Stella Beckman, ¹Sadie Costello, ¹Sally Picciotto, ^{1,2}John Balmes, ¹S Katharine Hammond, ¹Ellen Eisen. ¹Environmental Health Science, School of Public Health, University of California, Berkeley, Berkeley, CA, USA; ²Department of Medicine, University of California, San Francisco, San Francisco, CA, USA

10.1136/oemed-2014-102362.95

Objectives Exposure to metalworking fluid (MWF) causes respiratory outcomes such as asthma and chronic bronchitis, as well as symptoms including phlegm and wheezing. Chronic obstructive pulmonary disease (COPD) encompasses these outcomes, and so is a potential result of MWF exposure. Recent evidence based on g-estimation suggests that reducing exposure to MWF would substantially decrease years of life lost due to COPD. The objective of this analysis is to examine the exposure-response relationship between direct exposure to MWF and COPD mortality in a large occupational cohort.

Method Hazard ratios were estimated using Cox proportional hazards models for the association between cumulative exposure to the thoracic fraction (PM_{9.8}) of straight, synthetic, or soluble MWF and COPD mortality. Subjects directly exposed to each fluid type were compared to those who were never directly exposed (assembly workers).

Results Hazard ratios for exposure quartiles increased in a non-monotonic fashion, with a maximum of 1.6 for straight, 1.4 for soluble, and 1.5 for synthetic, reflecting an increased risk of COPD for exposed subjects. However, none of the HRs were significant at the 95% confidence level. Indirect adjustment for

cigarette smoking (based on smoking rates in a cross-sectional survey) did not influence the estimates.

Conclusions While the results of this analysis did not reach statistical significance, they provide evidence supporting previous studies showing a risk of COPD associated with MWF exposure. The hazards presented are likely to be underestimates of the true association between COPD and MWF, due to the healthy worker effect.

0225 CANCER, MORTALITY AND ACUTE MYOCARDIAL INFARCTION IN WORKERS EXPOSED TO RESPIRABLE CRYSTALLINE SILICA DUST AT A SWEDISH PORCELAIN FACTORY

^{1,2}Pernilla Wiebert, ²Magnus Alderling, ³Magnus Svartengren, ^{1,2}Per Gustavsson, ¹Nils Plato. ¹Karolinska Institutet, Stockholm, Sweden; ²Stockholm County Council, Stockholm, Sweden; ³Department of Medical Sciences, Uppsala, Sweden

10.1136/oemed-2014-102362.96

Objectives Exposure to silica dust is a health hazard in the ceramic industry. We studied cancer, mortality and acute myocardial infarction (AMI) among workers at a Swedish porcelain factory.

Method Annual average of exposure levels were estimated from 436 personal measurements of respirable crystalline silica dust (RCS) from 1971–2006. We investigated mortality, incidence of cancer, and first time event of AMI in men and women employed for at least one year at the factory in 1958–2009. We also studied the effect of latency, duration and cumulative exposure.

Results RCS-levels among highly exposed workers were five times higher than the OEL and ten times higher in the early 1970s as in 2000.

We found a non-significant elevated risk for lung cancer, (SIR 1.39; 95 % CI 0.79–2.25) and a significant elevated risk of squamous cell carcinoma in men (SIR 2.37; 1.02–4.66).

Mortality from respiratory diseases was increased (SMR 1.75; 1.22–2.44), especially in men (SMR 1.86; 1.22–2.70). Among women, the risk for mortality from diseases of the circulatory system and incidence of AMI was elevated but not statistically significant. We found no dose-response relationship. There were eight cases of silicosis, and seven appeared with more than 30 years latency.

Conclusions The increased risk for lung cancer and mortality from respiratory diseases was expected in view of the well-documented harmful effects of RCS. The tendency among women for increased mortality from diseases of the circulatory system and an increase in the incidence of AMI should be investigated in further studies.

0228 PERCEIVED WORKPLACE DISCRIMINATION AND SELF RATED HEALTH IN THE CHILEAN WORKFORCE

Junhee Cho, Devan Hawkins, Laura Kernan, Manuel Cifuentes. University of Massachusetts Lowell, Work Environment, Lowell, USA

10.1136/oemed-2014-102362.97

Objectives Increased research shows that perceived discrimination adversely affects physical and psychological health. Even though discrimination or concealed racism is an important

characteristic of the Chilean society, which can be confirmed historically, it is not perceived as an important social problem for mainstream Chile. This paper aims to estimate the prevalence rate of workplace perceived discriminatory experience (WPDE) and its association with self-rated health status in the Chilean workforce

Method Data from the first national survey on employment, work, and health in Chile. Study population of 9720 selected by multistage random sampling drawn to be representative of the entire working population. Study participants were asked about their WPDE (multiple questions) and general self rated health status (one question). Adjusting by demographic and socioeconomic factors, multivariable Poisson-log generalised linear mixed models were used to estimate the association between WPDE and self-rated health.

Results Approximately 17% reported being a victim of WPDE. Age, income, education, and minority (nine ethnicities) were strongly associated with WPDE. Female workers showed higher rate (19.6%) of WPDE than male workers (15.6%). After simultaneously controlling for potential confounders, WPDE was positively associated with poor self-rated health (PR = 2.12, CI = 1.46–3.05).

Conclusions There is positive association between WPDE and poor self-rated health in Chile. These results may be used to emphasise the importance of enacting preventive and protective workplace discrimination policies. Further research is required to study the causal mechanism of the link and best preventive and protective measures.

0231 ACUTE INFLAMMATORY RESPONSE TO SECONDHAND SMOKE EXPOSURE AMONG NON-SMOKING CONSTRUCTION WORKERS: A REPEATED MEASURES STUDY

¹Jennifer Bruno Garza, ²Jinming Zhang, ²Shona Fang, ²Jason Wong, ²David Christiani, ¹Jennifer Cavallari. ¹University of Connecticut Health Center, Farmington, CT, USA; ²Harvard School of Public Health, Boston, MA, USA

10.1136/oemed-2014-102362.98

Objectives This study aimed to characterise the cardiovascular inflammatory response to secondhand smoke (SHS) exposure among non-smoking construction workers.

Method Non-smoking workers (n = 27) were recruited from a local union and monitored inside a union hall while exposed to SHS over approximately 6 h. Using a repeated measures study design, blood samples were taken before SHS exposure (baseline), immediately following SHS exposure (post) and the morning following SHS exposure (next morning). Inflammatory markers including acute phase proteins (SAA, CRP), adhesion molecules (s-ICAM, s-VCAM), and inflammatory cytokines (IL-1, IL-2, IL-6, IL-8, IL-10, TNF-alpha, VEGF) were analysed. Linear mixed effects regression models were used to examine within-person changes in inflammatory markers at post and next morning compared to baseline. Exposure-response relationships with TWA PM2.5 were also examined using mixed effects models. All models were adjusted for age, BMI and circadian variation.

Results There was a decrease in SAA (baseline = 2322 ng/ml, post = 1949 ng/ml, p = 0.04) and TNF-alpha (baseline = 9.6 pg/ml, post = 8.4 pg/ml, p < 0.01) post exposure, as compared to baseline. There was a decrease in IL-10 (baseline = 5.9 pg/ml, next morning = 6.5 pg/ml, p < 0.01) next morning compared to