however, such as for female textile workers and cleaners, where we observed an increased risk of mesothelioma without evidence of exposure to asbestos.

Session: 10. Hazard identification II

| 276 | OCCUPATION, INDUSTRY, AND THE RISK OF PROSTATE CANCER: A CASE-CONTROL STUDY IN MONTRÉAL, CANADA |

[1]J F Sauve, [1]Lavoué, [2]Parent. [1]University of Montreal, Montreal, Canada; [2]INRS-Institut Armand Frappier, Universite du Québec, Laval, Canada

Introduction Prostate cancer (PCa) is the most common cancer among Canadian men. Age, a family history of PCa and ancestry are the only recognised risk factors, but a role for environmental influences is suspected.

Objective To explore the relationship between occupational and industry titles, and PCa risk.

Methods PROtEuS (*Prostate cancer & Environment Study*) is a case-control study of PCa in Montréal, Canada including some 2000 cases and 2000 population controls aged 40–75 years. Detailed occupational histories were elicited through in-person interviews. Unconditional logistic regression was used to estimate odds ratios (OR) and 95% confidence intervals (CI) for the association between PCa and employment in 98 occupations and 74 industries. Models were adjusted for age, ancestry, family history of PCa, PCa screening, income and physical activity.

Results Elevated PCa risks were found for social sciences workers (OR 1.9; 95% CI 1.1–3.4) and metal product fabricators (OR 3.4; 95%CI 1.3–9.3) employed ≥ 10 years, and for non-construction painters (OR 3.4; 95% CI 1.3–9.0) and plumbers and steamfitters (OR 2.4; 95%CI 1.1–5.4) employed < 10 years. Reduced risks were observed for farmers (OR 0.6; 95%CI 0.4–0.9) and food services workers (OR 0.6; 95% CI 0.4–0.9) employed < 10 years, and for physical scientists employed ≥ 10 years (OR 0.6; 95% CI 0.5–0.9). Workers in public service, wood products, and jewellery industries had excess PCa risks. Those in agriculture, miscellaneous food, accommodation and food, air transport, and retail trade industries had reduced risks. Analyses including all subjects, or stratified according to white or blue collar status generated consistent findings.

Conclusions Our findings suggest excess PCa risks in some metal-related occupations, as well as in white-collar occupations such as in public service and social sciences. Farmers and food services workers had reduced risks. Specific occupational exposures possibly underlying these associations will be explored.

| 277 | THRESHOLD VALUE ESTIMATION FOR RESPIRABLE QUARTZ DUST EXPOSURE AND SILICOSIS INCIDENCE IN THE GERMAN PORCELAIN WORKER COHORT |

[1]P Morfeld, [2]Mundt, [3]Taeger, [4]Guldner, [4]Steinig, [5]Miller. [1]Institut für Epidemiologie und Risikobewertung in der Arbeitswelt, Essen, Germany; [2]Environ International Corporation, Amherst, Massachusetts, United States of America; [3]Institute for Prevention and Occupational Medicine of the DGUV (IPA), Bochum, Germany; [4]Verwaltungs-Berufsgenossenschaft, Würzburg, Germany; [5]Institute of Occupational Medicine, Edinburgh, United Kingdom

Objectives To estimate a threshold value tau for the respirable quartz dust concentration and silicosis incidence (1/1, ILO 1980/ 2000) in the German porcelain worker cohort (Birk *et al* 2009, 2010, Mundt *et al* 2011).

Methods 17,144 porcelain workers (128,688 person-yrs) were followed for silicosis incidence (40 cases). Respirable quartz dust exposure was determined by combining detailed individual employment histories with a job exposure matrix based on 8,000 historical industrial hygiene measurements. Cox regression with age as the time variable was used to evaluate silicosis morbidity by log (cumulative quartz dust exposure + 0.01 mg/m^3-yrs) time-dependently, controlling for sex and smoking status. Curvature of the relationship was explored by restricted cubic splines (RCS, ≤ 7 knots) and fractional polynomials (FP, degrees ≤ 5). Estimation of tau was performed by subtracting a series of candidate values from the annual concentration data (setting the result to zero if negative) and recalculation of the time-dependent cumulative exposures. The partial likelihood profile was used to derive point and 95%-confidence interval (CI) estimates. Non-nested models were compared by information criteria (AIC). Lagging exposures by 10 years, using different offsets in the log-function (0, 0.1, 1 mg/m^3-yrs) and varying sets of covariates were explored.

Results We estimated tau = 0.25 mg/m^3 (0.95-CI: 0.15 mg/m^3, 0.30 mg/m^3). Applying this estimated concentration threshold led to lower degree optimal FPs and returned pronounced better fits (AIC > 5) in log-linear Cox models, 5-knots RCS Cox models and 2-degree FP Cox models. The overall exposure-response could be appropriately described by a Cox model on log (unlagged cumulative exposure + 0.01 mg/m^3-yrs) after applying tau = 0.25 mg/m^3.

Conclusions A threshold Cox model fitted the data significantly better than a non-threshold model and summarised the cohort information without a loss in extracted information and much more simply than the curvilinear procedures (RCS, FP).

| 278 | MORTALITY PATTERNS IN A COHORT OF 70,000 WORKERS WITH BLOOD LEAD MEASUREMENTS |

[1]K Steenland, [2]Chowdhury. [1]Atlanta, United States of America; [2]Emory University, Atlanta, United States of America

Objectives To determine whether adult lead exposure is associated with cause-specific mortality in a cohort with measured blood leads

Methods We studied 70,000 US adults from 11 states with blood lead levels measured between 1980–2005. Most were exposed occupationally. One-third had a single blood lead; the remainder had a median of 3 blood leads. Subjects were divided into four groups by highest blood lead (0–5, 6–24, 25–39, 40 + mg/dl; 16%, 33%, 34%, and 17% respectively.

Results Analyses were restricted to males (96% of deaths). There was a strong healthy worker effect in this young cohort (SMR all causes 0.73, 3561 deaths, US referent). Most cause-specific SMRs were unremarkable. The male lung cancer SMR showed a trend of increase across lead categories (SMRs 0.49, 0.61, 0.80, 1.21, 394 deaths, test for trend p = 0.003). With the lowest lead category as referent in Poisson regression, lung RRs were 1.00, 1.27, 1.80, and 2.85 by increasing lead category (test for trend p = <0.0001). Other smoking-related causes of death did not show consistent trends (eg., male COPD male SRRs 1.00, 0.21, 0.44, 0.63 (n = 129), male esophageal cancer SRRs 1.00, 1.29, 0.98, 1.43 (n = 40). There was a marked excess of ALS in

the cohort (SMR 2.25, 43 observed), which however had an inverse relation to blood lead level (SMRS 11.1, 3.2, 0.9. 0.8 by increasing category). Numbers were small for other causes of interest (stomach cancer n = 23, kidney cancer n = 28, brain cancer n = 31). SMRs for stroke were low (0.59, 0.57, 0.81. 0.87) but showed a borderline significant increasing trend in Poisson regression (p = -0.08).

Conclusion We studied a large cohort with documented lead exposure. Results are not conclusive but suggest an association between lung cancer and lead exposure. Data are limited by a lack of work history, a limited blood leads per person, and relatively short latency.

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279 | **CHOLANGIOCARCINOMA AMONG WORKERS IN THE PRINTING INDUSTRY: USING THE NORDIC OCCUPATIONAL CANCER DATABASE TO ELUCIDATE A CLUSTER REPORT FROM JAPAN**

[1]J J Vlaanderen, [1]Straif, [2]Martinsen, [3]Kauppinen, [4]Pukkala, [5]Sparen, [6]Tryggvadottir, [7]Weiderpass, [2]Kjaerheim. [1]IARC, Lyon, France; [2]Cancer registry of Norway, Oslo, Norway; [3]Finnish Institute of Occupational Health, Helsinki, Finland; [4]School of Public Health, University of Tampere, Tampere, Finland; [5]Department of Medical Epidemiology and Biostatistics, Karolinska Institute, Stockholm, Sweden; [6]Faculty of Medicine, University of Iceland, Reykjavik, Iceland; [7]Folkhalsan Researchcenter, Samfundet Folkhasan, Helsinki, Finland

Objectives A cluster of 11 cases of cholangiocarcinoma (CC) was recently observed in a small Japanese printing firm. To explore whether the identified cluster is indicative for an elevated risk of CC among workers in the printing industry at large we explored the risk of liver cancer, gall bladder cancer and CC among individuals employed in the printing industry in four Nordic countries (Finland, Iceland, Norway, and Sweden) over a period of 45 years. We used data from the Nordic Occupational Cancer (NOCCA) cohort.

Methods The cohort was set-up by linking occupational information from censuses to national cancer registry data utilising personal identity codes in use in all Nordic countries. We calculated standardised incidence ratios (SIRs) for men and women working in the printing industry, stratified by occupational category (typographers, printers, lithographers, bookbinders).

Results Among men we observed elevated SIRs for cancer of the liver (1.35, 95% CI: 1.14–1.60; 142 cases), specifically intrahepatic CC (2.34, 95% CI: 1.45–3.57; 21 cases). SIRs for liver cancer were especially elevated among printers and lithographers, and SIRs for intrahepatic CC among typographers and printers. SIRs for cancer of the gall bladder or extrahepatic CC were not elevated. SIRs for women followed a similar pattern, but the number of cases was low.

Conclusions The NOCCA cohort has proven useful for an instant investigation following-up a report of a cancer cluster. Our study supports the notion that the finding of excess CC risk among workers in a small Japanese printing firm possibly extends beyond that specific firm and country. Further studies should focus on the specific exposures that occur in the printing industry.

Session: 11. Neurological outcomes

280 | **A LONGITUDINAL STUDY OF NEUROPSYCHOLOGICAL FUNCTION IN YOUNG MALE DIVERS**

R B P Bast-Pettersen, Skare, Skogstad. National Institute of Occupational Health, Oslo, Norway

Background and Objective Exposure to compressed-air diving may affect the nervous system. The aim of the present study was to prospectively assess possible nervous system effects from diving. A further aim was to study the effect of age on neuropsychological function in healthy young men.

Methods We obtained baseline observations of 50 young men while they were trainees at a professional diving school and retested them after six (N = 43) and twelve (N = 37) years. Average age at the first test examination was 25 years. The subjects underwent an interview focusing on education, life style habits, accidents and illnesses, and they answered a neuropsychiatric questionnaire. Number of dives, years of diving and being a professional diver or not was recorded. They were tested with a comprehensive neuropsychological test battery comprising tests for problem solving, attention/working memory, speed of information processing, motor skills and reaction times.

Results At the end of the follow-up, 16 divers reported to be professional divers (mostly working part-time as diver). Mean number of cumulated dives was 1250 among the professional divers and 400 among the non-professional divers. Diving exposure was not found to be associated with impaired neuropsychological test results during the 12 year follow-up. There was a tendency to an increase in number of self-reported neuropsychiatric symptoms among the oldest divers, but diving activity was not related to an increase in number of symptoms. This group of young men tested three times, had on average similar, and for several tests, almost identical results during this 12 year follow-up.

Conclusion Diving exposure did not seem to be associated with impaired neuropsychological test results in this 12-year longitudinal study.

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281 | **OCCUPATIONS AND PARKINSON'S DISEASE IN A POPULATION-BASED CASE-CONTROL STUDY**

[1]M A Harris, [2]Marion, [2]Tsui, [2]Shen, [2]Teschke. [1]Ryerson University, Toronto, Canada; [2]University of British Columbia, Vancouver, Canada

Objectives Despite mounting evidence on epidemiological risk factors, Parkinson's disease (PD) incidence remains largely unexplained. The purpose of this study was to test associations between occupations and PD to complement analyses of occupational exposures.

Methods We used a population-based case-control design in British Columbia, Canada, including 403 cases (users of antiparkinsonian medication) and 405 controls (from the provincial health insurance register, frequency matched on age and sex). Job histories were collected using structured questionnaires querying all jobs held since age 16. Odds ratios were calculated for associations between PD and occupational categories using unconditional logistic regression, adjusting for age, sex, and smoking.

Results Significantly elevated risks were found for social science, law and library jobs (OR 1.82; 95% CI 1.01 - 3.29); and farming and horticulture jobs (OR 2.03; 95% CI 1.10 - 3.74). Nonsignificantly elevated risks were found for gas station jobs
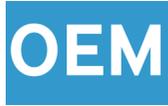
278 Mortality patterns in a cohort of 70,000 workers with blood lead measurements

K Steenland and Chowdhury

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