

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.

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

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10.1136/oemed-2013-101717.279

**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

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10.1136/oemed-2013-101717.280

**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.

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

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10.1136/oemed-2013-101717.281

**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

(OR 2.55; 95% CI 0.84 - 7.72); welders (OR 2.98; 95% CI 0.78 - 11.40); and drivers of heavy equipment (OR 1.95; 95% CI 0.66 - 5.81). Reduced risks were found for management and administration jobs (OR 0.70; 95% CI 0.49 - 0.99); other health care jobs (OR 0.44; 95% CI 0.20 - 0.99); repairers (OR 0.49; 95% CI 0.22 - 1.09); and electricians (OR 0.46; 95% CI 0.17 - 1.26).

**Conclusions** Increased risks for social science jobs could be related to numbers of people contacted in a day and risk of infections. Severe influenza was associated with increased risk of PD but number of people contacted was not. Elevated risks for farmers are typically attributed to pesticide exposure, however our pesticide analyses did not support this attribution. Other exposures of interest for farmers could include animal contact, influenza, head injuries, and vibration from heavy equipment, all associated with PD in our study.

### 282 OCCUPATIONAL EXPOSURE TO PESTICIDES AND PARKINSON DISEASE

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10.1136/oemed-2013-101717.282

**Objectives** The objective of this study was to assess the risk of occupational exposure to pesticides on the development of Parkinson Disease.

**Methods** We conducted a multi-centre hospital-based case-control study in the Netherlands. All patients, diagnosed with Parkinson Disease in one of the five participating hospitals between January 2006 and December 2011 were invited to participate. Two age and sex matched controls per patient were recruited from individuals who were seen at the same department of neurology for non-neurodegenerative disorders. The participants were interviewed in a standardised telephone-interview. The questionnaire contained a complete occupational and residential history, and specific questions about potential risk and protective factors for Parkinson Disease. Among those were detailed questions about use of pesticide at work.

**Results** In total 444 Parkinson Disease patients and 876 controls were included in the analyses. We applied the ALOHA Job-Exposure-Matrix to assess exposure to pesticides in general and specifically to insecticides, to herbicides and to fungicides. Self-reported information allowed for a more detailed categorization of application and re-entry exposure. Preliminary analyses of the data show a slightly increased risk for Parkinson Disease for active application of herbicides and insecticides.

**Conclusions** Our results confirm earlier studies showing an elevated risk for Parkinson Disease after exposure to herbicides and insecticides. The final analyses will show the results of different levels of cumulative exposure resulting from application and re-entry exposure.

### 283 OCCUPATIONAL EXPOSURE TO MAGNETIC FIELDS AND ELECTRIC SHOCKS AND RISK OF ALS - ANALYSIS OF THE SWISS NATIONAL COHORT

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10.1136/oemed-2013-101717.283

**Background** Previous studies have identified increased risks of amyotrophic lateral sclerosis (ALS) in electrical workers, but

studies assessing risk in workers exposed to magnetic fields were ambiguous. Electric shocks have been hypothesised to be the relevant exposure, but potential risks from electric shocks have not been previously disentangled from those of magnetic fields. We aimed at analysing the association of ALS with both magnetic field exposure as well as risk of electric shocks at work.

**Methods** We used the Swiss National Cohort study, which is based on census information from 1990 and 2000 linked with mortality records from 2000–2008. High or medium versus low exposure to magnetic fields and risk of electric shocks was assigned to occupations using two job exposure matrices. Data of 4.7 million persons were analysed using Cox proportional hazard models and adjusted for age, sex, educational level, civil status, nationality, language region, degree of urbanity of the municipality and an area-based proxy for socioeconomic position.

**Results** During 2000–2008, 1313 persons with information on occupation died from ALS. Hazard ratios were around unity for persons exposed to magnetic fields or risk of electric shocks in either 1990 or 2000. In persons classified as medium or high exposed in both 1990 and 2000, a slight increase in mortality from ALS was observed for magnetic field exposures (HR 1.39, 95% CI 1.03–1.87), but less so for electric shocks (HR 1.20, 95% CI 0.88–1.65). When accounting for both exposures in the same model, magnetic fields had a similar HR (1.36, 95% CI 0.99–1.89) as before, but the HR for electric shocks was attenuated to 1.07 (95% CI 0.76–1.5).

**Conclusions** We observed an association of long-term exposure to extremely low frequency magnetic fields and mortality from ALS, but not of risk of electric shocks and ALS.

## Session: 12. Late breaking abstracts

### 284 CANCER RISK AMONG TETRAFLUOROETHYLENE (TFE) SYNTHESIS AND POLYMERISATION WORKERS

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10.1136/oemed-2013-101717.284

**Objectives** Tetrafluoroethylene (TFE), a compound used for the production of fluorinated polymers including polytetrafluoroethylene (PTFE), increases liver and kidney cancer and leukaemia incidence in rats and mice. This is the first time the cancer risk in humans is comprehensively explored in a cohort mortality study.

**Methods** The study included all current PTFE production sites in Europe (Germany, Italy, The Netherlands and UK) and USA (New Jersey and West Virginia). The study cohort included workers ever employed in the period 1950–2002. A job-exposure matrix (1950–2002) was developed for TFE and ammonium perfluoro-octanoate (APFO), a chemical used in the polymerisation process. For each worker we calculated cumulative exposure to TFE and APFO. The mortality ascertainment covered the period 1950–2008. Standardised mortality ratios (SMR) and 95% confidence intervals (CI) were calculated using national mortality rates as reference.