Abstracts

59 AN INTERNATIONAL HISTORICAL COHORT STUDY OF WORKERS IN THE HARD-METAL INDUSTRY - AUSTRIAN COMPONENT

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Objectives To determine the relationship between exposure to hard-metal dusts and lung cancer mortality. This international cohort study is coordinated by the University of Pittsburgh and funded by the International Tungsten Industry Association (Marsh et al 2013, EPICOH abstract). The German component comprises three Kennametal manufacturing sites in North Rhine-Westphalia and Bavaria.

Methods We enrolled all current and former workers at two Bavarian sites (start of production 1960 and 1971 respectively). At the largest plant in North Rhine-Westphalia (start of production 1926) we will enrol all blue-collar workers who were employed for at least 6 months. We will collect and analyse measurement data, work history, and medical information like smoking and urine data. We will apply an electronic database to collect personal data. To investigate total and cause-specific mortality for the period 1980–2011, we aim to determine each subject’s vital status and, if applicable, cause of death. External comparisons (SMRs) to the German population and state populations will be performed. Cox models will be used for internal analyses.

Results Our preliminary estimates of the numbers of participants at the two Bavarian plants are 2,711 and 1,577. At the North Rhine-Westphalian plant we have enrolled 3,700 workers (less than half of the overall workforce). Some current workers refused to be enrolled in the study. 3.7% of 676 and 0.2% of 417 at Bavarian plants and 0.9% of 637 at North Rhine-Westphalian plant. Basic data of these workers will be documented. The data collection process in North Rhine-Westphalia was restricted due to the large number of paper files. Otherwise it would be feasible to meet the budget and time schedule of the international pooling project. Vital status and cause of death tracing are challenging in Germany. We will try to optimise procedures in cooperation with the responsible institutions.

60 CANCER MORBIDITY OF LEAD EXPOSED WORKERS IN KOREA

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Objectives To compare cancer patterns in lead exposed workers with the Korean general population, and to explore the relationship between cancer and lead exposure in an occupational setting.

Methods Using from the Korean annual medical surveillance for exposure to lead, a cohort comprising 75,184 lead exposed workers working between January 1st, 2000 and December 31st, 2004 was compiled. This cohort was merged with the Korea National Central Cancer Registry (KNCCR) in order to evaluate the cancer morbidity for these workers between 2000 and 2008.

Results There were 793 cases cancer and, the incidence of stomach cancer (SIR 1.17, 95% CI = 1.01–1.36) was found to be elevated in lead chromat workers. Excess were observed for kidney (2.15.1.19–3.88) and bladder cancers (2.29.1.149–4.58) in lead exposed workers ≥ 20 years of job duration, kidney cancer (2.25.1.21–4.18)in workers with ≥ 10 µg/dl of blood lead level and lung cancer in female workers with ≥ 10 µg/dl blood lead level.

Conclusions Our study showed excess of lung cancer in female workers, stomach cancer in lead chromat exposed workers and a possible dose-response relationship between lead and kidney cancers and lead exposure.

61 AN INTERNATIONAL HISTORICAL COHORT STUDY OF SWEDISH WORKERS IN THE HARD-METAL INDUSTRY

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In 2006, IARC found limited evidence in humans and sufficient evidence in animals that tungsten carbide (WC) with cobalt binder (WCCo) acted as a lung carcinogen (Group 2A). A Swedish historical cohort study was established as part of the international cohort. Three Swedish sites are included,
contributes to 3000 persons and 200 exposure measurements; 7000 persons and 1000 exposure measurements; 7000 persons and 500 exposure measurements, respectively. From the employment records, individual personal identification numbers, date of birth, sex, first and last date of job specific employment periods are extracted. The cohort will be linked to our national Causes of Death register. Cause of death will be established according to ICD 6–10 and compared to national and if possible regional registers. We will establish a measurement database and a site questionnaire for each company. In our analysis we will investigate the total and cause-specific mortality experience of current and former workers as compared to corresponding national and regional populations and internally-derived control groups, with adjustment for potential confounding factors and focus on lung cancer; characterise the past and current working environment of subjects relative to work area, job title/function and potential for exposure to WCCo, as well as the component exposures: tungsten, tungsten carbide (without cobalt), carbon black, and cobalt; and determine the relationship between level and duration of exposures and lung cancer mortality with adjustment for potential co-exposures, including information obtained on tobacco smoking habits via a nested case-control study.

The epidemiological and exposure assessment components of the study are coordinated by the University of Pittsburgh and the University of Illinois at Chicago, respectively. The study is funded by the International Tungsten Industry Association. Progress in the Swedish studies will be reported separately by us.

### Methods

**Occupational Exposure to Aromatic Amines and Polycyclic Aromatic Hydrocarbons and Bladder Cancer: Results from the EPIC Cohort**


**Objectives** Exposure to aromatic amines (AA) has been strongly linked to bladder cancer. Also polycyclic aromatic hydrocarbons (PAH) have been associated with bladder cancer. Here we investigate the bladder cancer risk of occupational exposure to AA and PAH using a large prospective cohort in European populations.

**Methods** We analysed the bladder cancer risk of exposure to AA and PAH in 754 cases and 833 controls nested in the European Prospective Investigation into Cancer and Nutrition (EPIC) cohort. A semi-quantitative expert rating of the probability and intensity of exposure to AA and PAH was performed for 52 occupations known to entail a cancer risk. For each occupation, we multiplied probability (0 = none, 1 = low, 2 = medium, 3 = high) and intensity (0 = none, 1 = low, 2 = medium, 3 = high) of exposure according to an approach for the association with lung cancer. We categorised the subject’s sum of scores over all at-risk occupations as low, medium, or high using the tertiles of the distribution in exposed controls. Odds ratios (ORs) with 95% confidence intervals (CI) were estimated with unconditional logistic regression adjusted for the matching factors and smoking.

### Results

High occupational exposure to AA and PAH were associated with an estimate of the relative bladder cancer risk of 1.37 (95% CI 1.02 to 1.84) and 1.50 (95% CI 1.09 to 2.05), respectively. We further observed an OR of 1.53 (95% CI 1.03 to 2.28) for ever being exposed to dyestuffs. Ever working in transportation and welding was associated with an increased bladder cancer risk in men that became non-significant after controlling for multiple testing. Smoking and PAH exposure yielded a joint effect of 3.48 (95% CI 2.51 to 4.84).

### Conclusions

We were able to confirm the bladder cancer risk associated with aromatic amines and dyestuffs in this large population-based cohort among Europeans. These results provide further evidence that occupational exposure to PAH could entail a bladder cancer risk.